TAMS 50th year

Quality Assurance Project Plan

New York State Superfund Standby Program
Mahopac Business District Wells RD/CM
Task 2 Site Investigation
Work Assignment Number: D002520-16
Site I.D. 3-40-013

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QUALITY ASSURANCE PROJECT PLAN
MAHOPAC BUSINESS DISTRICT WELLS RD/CM
TASK 2 SITE INVESTIGATION

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1.0 INTRODUCTION

1.1 Purpose

This Quality Assurance Project Plan (QAPjP) was developed by TAMS Consultants, Inc. (TAMS) as subcontractor to Dunn Geoscience Engineering Company, P.C. (DUNN). This QAPjP was prepared as part of Task 1 of Work Assignment No. D002520-16 under the New York State Department of Environmental Conservation (NYSDEC) Superfund Standby Contract. The Work Assignment consists of remedial design and construction management for selected portions of the Record of Decision for the Mahopac Business District Wells, Site # 3-40-013 in the Town of Carmel, Putnam County (see Figure 1-1).

The Work Assignment involves six tasks, the first of which includes preparation of a detailed Work Plan, a Health and Safety Plan, and this Quality Assurance Project Plan. Task 2 consists of a design Site Investigation to supplement the findings of the Remedial Investigation performed previously by Wehran-New York, Inc. (February 1990). Hydrogeologic testing was originally a part of Task 2, but will be performed at a future date as a separate seventh task. Remaining tasks involving reporting of findings, preparation of bid documents, pre-award services and construction management are described in the Work Plan and any subsequent amendments that may be prepared.

This plan presents the Quality Assurance/Quality Control (QA/QC) policies and procedures which will be followed during the implementation of the Task 2 Site Investigation. Specifically, the plan describes in detail the QA/QC requirements for the following:

- field investigation activities;
- environmental sample collection and handling;
- custody procedures and shipping requirements;
- laboratory analytical procedures;
- data collection, reduction and validation; and
- data reporting.

1.2 Project Site Description

The Village of Mahopac Business District consists of approximately twenty-five establishments in a six-acre commercial area on the shore of Lake Mahopac, Town of Carmel, Putnam County (see Figure 1-2). In 1978, tetrachloroethylene and trichloroethylene were detected in well water by the Putnam County Department of Health. In 1983, NYSDEC completed a Phase I investigation (site data evaluation), conducted by Ecological Analysts, Inc. The Phase I study resulted in a preliminary Hazardous Ranking System (HRS) score (Sm = 32) which shows a potential for harm to human health and the environment from groundwater or surface water migration. The Mahopac site was nominated for the National Priorities List (NPL) for federal lead action. However, the site was

not included on the NPL and therefore, NYSDEC contracted with Wehran Engineering in January 1987 to perform a Remedial Investigation/Feasibility Study (RI/FS) at the site.

The RI/FS was completed in August 1990 and the NYSDEC issued a Record of Decision (ROD) in that same month which stipulated the following remedies:

- Install individual carbon treatment units at affected wells.
- Provide an alternative water supply for the business district from Lake Mahopac.
- Remove contaminated sanitary sewer sediments.
- Review Sanitary Sewer Evaluation Survey and proposed town work to determine if any additional work is necessary.
- Perform long-term groundwater monitoring.
- Consideration of a pump and treat system on new or existing wells to contain the plume after a new water supply is installed.

In March 1992, the site was referred by the NYSDEC Division of Environmental Enforcement for action under State Superfund to implement the remedies stipulated in the Record of Decision.

NYSDEC has installed activated carbon point of entry (POE) water treatment systems on nine wells which have exhibited contamination. Two additional wells have had POE treatment systems installed by Mobil Oil, in response to a nearby petroleum release. As many as ten (10) additional wells within the area of impacted groundwater, which have not exhibited contamination, are periodically sampled.

Sediment in sanitary sewers has been found to contain tetrachloroethene (PCE) at levels up to 1100 mg/kg and total volatile organic compounds (VOCs) of over 2500 mg/kg. Though the RI/FS did not identify any other significant sources of contamination, the VOCs may have leaked from the sewer line into soil and bedding surrounding the sewers.

Contamination outside the sanitary sewer, if it exists, is not expected to be widespread. Soil gas surveys and soil sampling performed during the RI/FS did not detect significant levels of contamination near the suspect source areas. Also, the sewer line is situated below the natural groundwater table, hence in general, water flow is into the sewer rather than out. However in low areas of the sewer line and at large leaks or breaks in the line, soils outside the line may be contaminated.

The NYSDEC has delegated the responsibility of developing a permanent water supply to the Town of Carmel. Construction is tentatively scheduled to begin in July 1992 and is expected to be completed by October of the same year. It is intended that this soil gas survey data be collected and issued to the water line contractor prior to initiation of construction.

2.0 SITE INVESTIGATION PROCEDURES

2.1 Soil Gas Survey

a. **Description:** The survey will be conducted in the area of the sanitary sewer line and proposed water line installation in the business district. Sampling points will be located at approximately 50-foot intervals along US Route 6 and State Route 6N, and at intervals up to 100 feet along Cherry Lane and Clark Place and certain portions of US Route 6 and State Route 6N. Sampling locations will be staggered between the existing sewer line and the proposed water line as shown on Figure 2-1.

b. **Rationale:** Soil gas samples will be collected to identify subsurface contamination resulting from possible breaks or leaks in the sanitary sewer line and transport through bedding material. The results will be provided by the Department to the Town of Carmel to aid in determining locations where water line installation may pass through contaminated soils. The Department may consider immediate removal actions for contaminated soils if it determines that the results indicate a potential hazard to the construction contractor or the public during water line installation.

c. **Sample Type, Number, and Analysis:** Approximately 50 soil gas samples will be analyzed for the tetrachloroethene (or perchloroethene, PCE), trichloroethene (TCE), trans-1,2-dichloroethene (DCE), and 1,1,1 trichloroethane (TCEA). Analysis will be conducted using a portable gas chromatograph equipped with an electrolytic conductivity (or "Hall") detector (ELCD) and a photoionization detector (PID).

d. **Methodology:** Soil gas samples will be collected through hollow tubes placed approximately two to six feet into the ground. It is intended that the tubes will be placed close to the depth of the sewer line, in the bedding material but above the groundwater table. A gas sampling bulb, tubing and a vacuum pump will be utilized to collect the soil gas sample from each tube. The samples will be retained in the sampling bulb until a subsample is extracted by syringe and injected into the gas chromatograph for analysis.

Prior to conducting the field soil gas survey, a utilities search will be performed. The proper utility companies will be notified as to our soil gas survey sampling locations. Based on the limited intrusive activities proposed, only six feet, it may not be necessary to have each utility representative mark the location of their lines.

The following procedure will be followed at each soil gas sampling location as field conditions permit:

- Determine soil gas sampling locations in the field based on the locations provided on Figure 2-1 and the rationale above.

- Identify the approximate depth to water using nearby wells.

- Establish permanent reference points such building corners or manhole covers for later identification of the sampling location. Record distances from the sampling location to the reference points in the field notebook.

- Establish proper traffic control if a sampling location is in or very near an active roadway. Signs, barrier devices, and flagging operations will be established by a subcontractor, as appropriate.

- Position the field vehicle, van or car, between the barriers established by the subcontractor and the sample location in the line of traffic at sufficient distance to protect the field crew from vehicles which may disregard other traffic control operations. Position the vehicle facing the samplers but angled to the center of the road with the front wheels turned toward the center also. Set the parking brake and put the transmission in "Park" (automatic) or "Reverse" (manual).

- Don orange reflective vests before performing any work on or near roadways.

Once safety considerations have been addressed, field work may proceed. (Note: roadway field activities will not be performed during rainstorms, or past sunset.)

- Set up equipment at the sampling location.

- Clean the solid drive rod and hollow drive rod. Rinse each rod with distilled water, scrub wash with a detergent solution, and then rinse with distilled water. Discharge the cleaning water to a convenient sanitary sewer.

- Cut a hole through the asphalt until the roadbed is encountered using the rotary impact drill, equipped with a 1.5-inch masonry bit.

- Attach the solid drive rod to the drill in place of the bit and continue advancing until a six-foot depth is reached, the elevation six inches above the predetermined water level is reached, or until water is detected. Water may be confirmed by removing the drive tip occasionally and observing for a water mark on the drive rod.

- Establish the sampling interval at either six feet below the surface or six inches above the water level, whichever is higher in elevation.

- Remove the solid drive rod from the hole.

- Attach a dedicated probe tip with teflon shield to a piece of dedicated teflon tubing, three feet longer than the desired sampling depth. Insert the probe tip and tubing fully into a hollow drive rod.

- Push the drive rod/probe tip assembly into the hole to the desired depth. If excessive resistance is encountered, a drive tube assembly may be attached to the rotary drill to advance the probe tip to the desired depth (set drill on "hammer" only to utilize impact with no rotation).

- Retract and remove the hollow drive rod from the hole allowing the probe tip and teflon tubing to remain at the desired depth.

- Backfill the top of the hole and compact with soil to seal off the hole from the atmosphere.

- Connect a personal air sampling pump to the tubing and set at 2 to 3 liters per minute. Purge the teflon tubing for one to two minutes. Assure that the probe tip is not clogged.

- Seal the end of the tubing with parafilm and then allow the hole to remain undisturbed for a minimum of 15 minutes.

- Remove the parafilm and connect the tubing to one port of the 125 ml glass sample bulb with both stop cocks closed.

- Attach the personal air sampling pump to the other sample bulb port.

- Turn on the pump, and run at 2 to 3 liters per minute.

- Open the sample bulb stop cock to the probe tip assembly, quickly.

- Open the stop cock to the sampling pump, quickly.

- Allow two liters of air to flow through the glass sample bulb, and then close the stop cock to the sampling pump.

- Turn off the pump and allow pressure to equalize in the sample bulb for 1 minute.

- Close the stop cock to the probe tip assembly.

- Remove sample bulb from the apparatus and label the sample.

- Store the sample in an iced, dark cooler and immediately transport for analysis. Analysis will be conducted using a portable gas chromatograph to be set up in the laboratory at the local sewage treatment plant (see below).

- Analyze the sample within two hours of collection.
- Remove the teflon tubing from the hole and discard.
- Backfill the hole as necessary with clean sand and repair the road surface using cold asphalt patch.

The analytical system for the soil gas survey will consist of a temperature programmable gas chromatograph (GC) suitable for on-column injections, and will include all required accessories (i.e., detectors, analytical columns, gases, regulators, syringes, integrators, etc.). A brief description of required equipment is presented below:

- SRI 8610 with photoionization detector (PID), electrolytic conductivity detector (ELCD), and dual integrators or one dual channel integrator.
- J.W. DB 624 capillary column, 60 m x 0.32 mm, 1.8 micron film thickness.
- A PID followed by an ELCD in series. This combination of detectors will detect the compounds of interest with confirmation of those analytes which are detectable by both detectors.
- Microsyringes - 10 ul, 50 ul, 100 ul, 500 ul, and 1000 ul gas tight syringes. Two sets are required for preparation of gas standards and sample introduction into the GC.
- Miscellaneous - All associated glassware and accessory items including 40 ml VOA vials, disposable pipets, nuts, bolts, ferrules, molecular sieves, column cleavers, etc.
- Reagents - HPLC grade methanol, reagent grade 1-propanol, and pure standard materials for PCE, TCE, trans-1,2-DCE and TCEA.

2.2 Soil Borings and Soil Sampling

a. **Description:** Borings will be performed in overburden soils along the same area as the soil gas survey, as shown in Figure 2-2. A soil sample will be collected from each boring at the approximate depth of the sanitary sewer line invert.

b. **Rationale:** It is currently planned that one boring will be performed at each of the three locations where the proposed water line route crosses the existing sanitary sewer line sample locations SB-01, SB-02, and SB-03 (as shown on Figure 2-2). One sample from each boring will be sent for expedited chemical analysis. Two boring locations (SB-04 and SB-05) are planned in the vicinity of cracks or breaks in the sewer line. The

other five soil samples will be taken at locations dictated by soil gas survey results.

c. **Sample Type, Number, and Analyses:** A total of 10 borings are planned. One soil sample will be collected from each boring in or adjacent to the sewer line bedding at the approximate elevation of the sewer invert for GC/MS analysis of VOCs by ASP Method 91-1, as shown on Table 2-1.

d. **Methodology:** Borings will be performed using the hollow stem auger (HSA) method. Soil samples will be obtained in advance of the augers within the sewer line bedding material by split spoon samplers in accordance with ASTM Method D1586-84. Soils will be logged using the Unified Soil Classification System (ASTM D2487-85). Selection of sampling depths will be made by a qualified TAMS representative and based upon approximate elevations of the invert of the sanitary sewer line in the vicinity of the boring locations. Some samples may thus be collected below the groundwater table; this has been deemed acceptable by the NYSDEC, in order to obtain samples at the desired depth. Split spoon samplers and augers will be cleaned prior to drilling and between boreholes by steam/pressure washing at a location to be determined. (Washwater will be allowed to seep into the ground in the steam cleaning area.) Drill cuttings will be returned to the boreholes. A cement grout will be used to fill the holes if drill cuttings are insufficient. The asphalt surface will be repaired using cold patching material.

Prior to the soil boring and sampling program, a utilities search will be performed by the drilling subcontractor. Utility companies will be notified of the known boring locations. After determining the exact locations of the remaining five borings (as described above), utility companies will be notified these of locations as well.

The following procedure will be performed at each soil boring location as field conditions permit:

- Clean all augers and sampling tools to be used at the location by steam cleaning in the designated area. (If possible, enough equipment for several borings should be cleaned at a time to avoid excessive travel through the town and down time).

- Determine the boring locations in the field based on the locations provided in Figure 2-2 and on soil gas survey results, as discussed above.

- Establish the sample collection depth based on the elevation of the sewer line invert in the vicinity of the boring location. This may be determined by observation in a nearby manhole. The sample will be collected from the two-foot interval ending approximately one foot below the invert.

- Establish permanent reference points, such as building corners or manhole covers, for later identification of the sampling location. Record distances from the sampling location to the reference points in the field notebook.

- Establish proper traffic control if a sampling location is in or very near an active roadway. Signs, barrier devices, and flagging operations will be established by a subcontractor, as appropriate.

- Position the drill rig at the boring location facing oncoming traffic to protect the field crew from vehicles which may disregard other traffic control operations.

- Don orange vests before performing any work on or near roadways.

Once safety considerations have been addressed, boring activities may proceed. (Note: roadway field activities will not be performed during rainstorms, or past sunset.)

- Auger to the top of the sampling interval.

- Log observations of the drill cuttings in accordance with the Unified Soil Classification System (ASTM D2487-85).

- Drive a 3-inch OD split spoon sampler to the bottom of the sampling interval and record geotechnical information in accordance with ASTM D1586-84.

- Retrieve and immediately open the split spoon sampler.

- Scan the sample with a HNu meter and record the reading.

- Collect a sample aliquot using a pre-cleaned stainless steel spoon and place in pre-cleaned vials for VOC analysis.

- Label the containers and place in an iced, dark cooler.

- Log the split spoon sample in accordance with the Unified Soil Classification System.

- Return any remaining sample material and cuttings to the borehole and tamp in place.

- Grout the hole to the base of the pavement, if necessary.

- Apply and compact cold patch asphalt to repair the roadway.

- Retrieve all equipment, dismantle traffic control and move to the next location or to the decontamination area.

2.3 Sanitary Sewer Sediment Sampling

a. **Description:** Sediment samples will be collected from manholes along the sanitary sewer line in the business district, as shown on Figure 2-2.

b. **Rationale:** Results of this program will supplement the results of the previous remedial investigations in defining the extent of contaminated sediments in the sewer. Manhole locations upgradient and downgradient of known contamination, at sewer line terminus points and junctions, as well as at areas where VOCs were previously detected, will be sampled. These data will be needed for the sewer cleaning contracts.

c. **Sample Type, Number, and Analyses:** One sediment sample will be collected from the bottom of each of 10 manholes. Laboratory GC/MS analyzes will be conducted for VOCs by ASP Method 91-1, as shown on Table 2-1.

d. **Methodology:** Samples will be scooped from the bottoms of the manholes using pre-cleaned wide-mouth glass jars attached to extension handles. Personnel will not enter manholes.

The following procedure will be performed at each sediment sampling location as field conditions permit:

- Proceed to the sampling location. Samples should be collected starting at the farthest downgradient location and proceeding to the farthest upgradient location. The table below provides the recommended sequence:

SAMPLE ORDER	LOCATION
1	SD-06
2	SD-05
3	SD-04
4	SD-03
5	SD-02
6	SD-01
7	SD-08
8	SD-09
9	SD-07
10	SD-10

- Establish proper traffic control. Signs, barrier devices, and flagging operations will be established by a subcontractor, as appropriate.

- Position the field vehicle, van or car, between the barriers established by the subcontractor and the sampling location in the line of traffic at sufficient distance to protect the field crew from vehicles which may disregard other traffic control operations. Position the vehicle facing the samplers but angled to the center of the road with the front wheels turned toward the center also. Set the parking brake and put the transmission in "Park" (automatic) or "Reverse" (manual).

- Don orange reflective vests.

Once safety considerations have been addressed, sampling may proceed. (Note: roadway field activities will not be performed during rainstorms, or past sunset.)

- Attach a pre-cleaned wide-mouth glass jar to the extension handle with clamp. The extension handle should provide sufficient length (approximately 8 to 10 feet) to reach the bottom of the manhole without placing one's head directly over the manhole opening.

- Remove the manhole cover using pointed steel bars. If difficultly is encountered, contact the Town of Carmel Engineering Department for assistance at (914 628-1500).

- Perform health and safety monitoring in the breathing zone while the manhole is open.

- Extend the sampling device into the manhole and scoop sediment from the bottom.

- Retrieve the sample and immediately collect a sample aliquot using a pre-cleaned stainless steel spoon and place in pre-cleaned vials for VOC analysis.

- Label the containers and place in an iced, dark cooler.

- Empty any remaining sample material back into the bottom of the manhole and rinse visible material from the sampling device using potable water.

- Replace the manhole cover.

- Dispose of the glass jar used for sample collection.

- Retrieve all equipment, dismantle traffic control and move to next sampling location.

TABLE 2-1
SAMPLING AND ANALYSIS SUMMARY
MAHOPAC BUSINESS DISTRICT WELLS RD/CM

MATRIX	SAMPLE UANTITY	ANALYSIS	PRESERVATION	HOLDING TIME	CONTAINER
SEWER SEDIMENT	10	Volatiles	None	7 Days	125 ml amber glass
Field duplicates	1	Volatiles	None	7 Days	125 ml amber glass
Field Blanks	1	Volatiles	None	7 Days	2 x 40 ml VOA
Trip Blanks	0	N/A	N/A		
MS/MSD	1/1	Volatiles	None	7 Days	125 ml amber glass
SOIL BORINGS	10	Volatiles	None	7 Days	125 ml amber glass
Field duplicates	1	Volatiles	None	7 Days	125 ml amber glass
Field Blanks	5	Volatiles	None	7 Days	2 x 40 ml VOA
Trip Blanks	0	N/A	N/A		
MS/MSD	0/0	Volatiles	None	7 Days	125 ml amber glass

Sample quantities are estimated.
QC sample quantity estimated; actual quantity will be based on criteria specified in Section 4.4 of the QAPjP.

3.0 SAMPLE HANDLING

3.1 Sample Identification/Labelling

Samples collected for off-site laboratory analysis during the Mahopac Business District RD/CM field investigations will be assigned a sample identification code consisting of three parts. These parts will consist of the project identifier, sample type, and sequential numerical identification. The sample identification codes that will be used for the Mahopac Business District project are shown below.

Project Identifier: MBD
Sample Type: SG (Soil GAS);
SB (Soil Boring);
SD (Sewer Sediment);
FB (Field Blank)
Sequential Numerical Identifier (01, 02, 03, etc).

Field duplicates will have a three digit numerical identifier, with the first digit being "2"; e.g., the field duplicate of MBD-SD-04 will be numbered MB-SD-204. Site-specific samples submitted for matrix spike/matrix spike duplicate analysis will be designated by the suffix "MS/MSD".

The actual sample ID will be marked in the field notebook and on the Chain-of-Custody record copy kept by the samplers (Figure 3-1). Samples will be labelled in the field prior to the collection of the sample. Affixed to each sample container will be an adhesive label on which the following information will be recorded with a permanent water-proof marker:

- project name
- date/time
- preservative
- requested analyses.

The chain-of-custody forms and the sample labels will be provided by the analytical laboratory.

No specific sample identification is mandated for soil gas samples analyzed in the field; however, sufficient information shall be recorded so that soil gas analysis are traceable to the time and location from which the sample was collected.

3.2 Containers, Preservation, and Holding Times

The selection of sample containers used to collect samples for the project will be based on the following criteria:

- sample matrix
- analytical methods
- ASP CLP requirements.

Sample containers for soils and sediment samples will be 125 milliliter amber glass bottles with plastic caps and Teflon liners. Sample containers for aqueous VOA samples (blanks) will be 40 ml clear glass vials and will be supplied by the laboratory. Sample bottles will be Eagle-Picher Level I or equivalent.

Samples will be preserved on ice as soon as possible after collection and during transport to the laboratory. Holding times for soil samples will be seven days from the verified time of sample receipt (VTSR) at the laboratory in accordance with the 12/91 Revision of the 1989 NYSDEC Analytical Service Protocol (ASP) Superfund Contract Laboratory Program (CLP). The holding time for aqueous blanks is 7 days, from VTSR.

Soil gas samples will be initially analyzed within two hours of collection. Any subsequent analyses (i.e., dilution of off-scale peaks) will be analyzed within two to three hours of collection.

3.3 Chain-of-Custody and Shipping Requirements

A chain-of-custody form will trace the path of the sample containers from the laboratory, to the field for sample collection and preservation, and back to the laboratory. The TAMS Project Manager or field sampler will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, as well as the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. Sample bottles within each shipping container will be individually labelled with an adhesive identification label provided by the laboratory. Shipping coolers will be numbered, or otherwise identified, and this identification will be entered into the chain-of-custody form. Each sample shipping cooler will be sealed with two adhesive custody seals during shipment from the laboratory to the field. Separate adhesive custody seals will be provided for return shipment. Field samplers receiving the sample containers will check each cooler for the integrity of the seals. Coolers with both broken seals will be returned to the laboratory with the containers unused.

Field samplers will break the seals, inspect the contents for container damage, and sign the chain-of-custody form as having received the sample containers.

Once the sample containers are filled, they will be immediately placed in the cooler with bags of ice or chemical ice to maintain the samples at 4°C. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample. The "remarks" column of the chain-of-custody form will be used to record specific considerations associated with sample acquisition, such as: sample type, number of containers, sample preservation, date and time of collection, and analyses to be performed. The chain-of-custody forms will be signed and placed in a sealed plastic bag in the cooler. The completed shipping container will be closed, and two seals will be affixed to the latch and lid. The seals must be broken to open the cooler and will