SOIL VAPOR SAMPLING
WORK PLAN

93 MAIN STREET SITE
SITE NO. 7-04-027
CITY OF BINGHAMTON
BROOME COUNTY, NEW YORK

WORK ASSIGNMENT NO. D003600-40

Prepared For:

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION

Prepared By:

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93 MAIN STREET SITE

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Section 1

1.0 PROJECT BACKGROUND

1.1 Introduction

As part of New York State's program to investigate and remediate hazardous waste sites, the New York State Department of Environmental Conservation (NYSDEC) has issued a remedial design work assignment to Dvirka and Bartilucci Consulting Engineers (D&B) under its Superfund Standby Contract for the 93 Main Street Site located in Binghamton, New York. The site is a Class 2 New York State Superfund site (Registry No. 7-04-027).

The NYSDEC has requested that soil vapor sampling be performed at the site as an additional task of the 93 Main Street Site work assignment. This Work Plan includes a detailed description of the planned soil vapor sampling activities.

1.2 Site Description and History

The 93 Main Street Site is located in a mixed residential and commercial neighborhood in the City of Binghamton, Broome County, New York. The site is located on the southwest corner of Main Street and Arthur Street and is covered with the concrete slab remains of former buildings, a poorly maintained driveway and dirt parking lot, weeds, and a fenced area containing the drummed waste generated as part of previous site investigations. Areas of surface and subsurface soil contamination identified in previous investigations are centered around a dry well located on the 89-91 Main Street parcel and two drains on the 93 Main Street parcel. The site and surrounding area are served by a municipal water supply system.

The McMahon Brothers Pest Control Company operated at the 93 Main Street Site from the 1950's to the 1980's and is believed to be responsible for the release of pesticide and herbicide related contaminants at the site. The site was reportedly used as a pesticide/herbicide storage and handling location for the company. There were also allegations of spills having taken place at the site. Several structures have occupied the site including a building housing the McMahon Brothers Pest Control

Company. A former apartment building and a partially completed motel building were demolished by the City of Binghamton in September 1999.

The results of a remedial investigation indicated that the volatile organic compounds (VOCs) of concern in soil and groundwater were chlorobenzene, 1,2-dichloroethane, ethylbenzene, tetrachloroethene and xylene, and the semivolatile organic compounds (SVOCs) of concern were 2-chlorophenol, 1,4-dichlorobenzene, 2,4-dichlorophenol, 2-methylnaphthalene, 2-methylphenol, 4-nitrophenol, naphthalene, pentachlorophenol, phenol, 1,2,4-trichlorobenzene and 2,4,5-trichlorophenol, as well as the carcinogenic polyaromatic hydrocarbons (PAHs), benzo (a) anthracene, benzo (k) anthracene, benzo (a) pyrene, bis (2-ethylhexyl) phthalate, chrysene, benzo (b) fluoranthene and dibenzo (a,h) anthracene. The pesticides of concern identified were aldrin, beta-BHC, delta-BHC, chlordane, 2,4-D, 4,4'-DDT, 4,4-DDD, 4,4'-DDE, dieldrin, endosulfan I, endosulfan II, endrin, heptachlor, heptachlor epoxide and lindane.

The remedial goals, as described in the March 2000 Record of Decision, are to remediate subsurface soils to concentrations cited in NYSDEC Technical Administrative Guidance Memorandum (TAGM) 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels" and groundwater to concentrations cited in NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1, "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations."

Section 2

2.0 SCOPE OF WORK

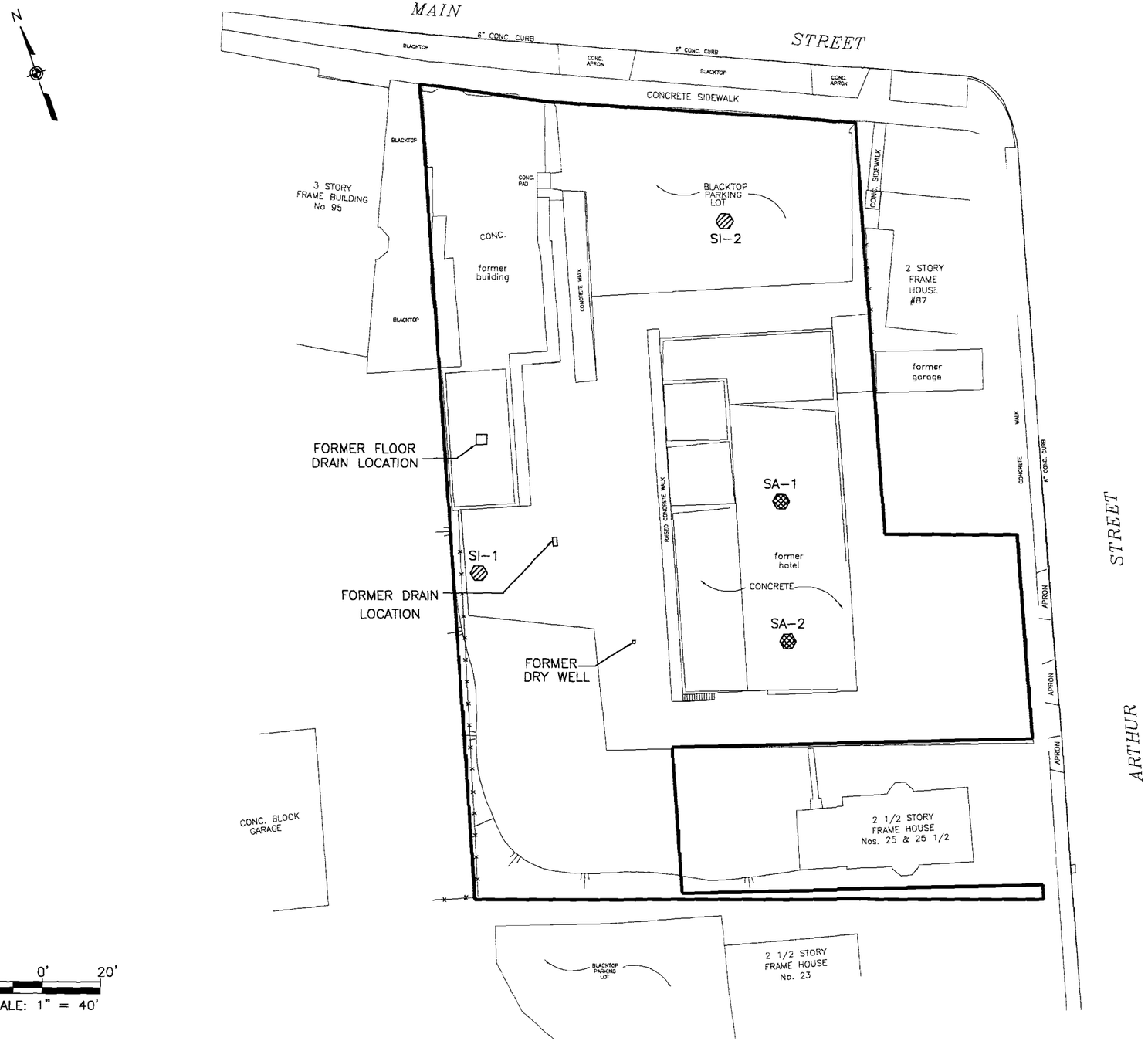
2.1 Sampling Activities

Subsurface soil vapor samples and sub-slab soil vapor samples will be collected at the 93 Main Street Site. Three subsurface soil vapor probes (each at a different discrete depth) will be installed at one location near the eastern perimeter of the site and three subsurface soil vapor probes (each at a different discrete depth) will be installed at one location near the western perimeter of the site (total of six soil vapor probes). In addition, two sub-slab soil vapor samples will be collected from beneath the concrete slab remains at the site. Sample collection will be performed in accordance with the appropriate portions of Sections 2 and 3 of this work plan. Figure 2-1 illustrates the approximate sample locations and Table 2-1 presents a summary of the samples that will be collected. Results of this sampling effort will be presented to the NYSDEC as soon as possible and will also be included in the Engineering Design Report for the project.

2.2 Subsurface Soil Vapor Sampling

Initial attempts will be made to advance subsurface soil vapor probes using direct-push technology. If targeted depths cannot be achieved by direct-push methods subsurface soil vapor probes will be advanced with hollow stem augers. Subsurface soil vapor probes will be installed at two locations at the site, at the eastern perimeter and at the western perimeter. At each location subsurface soil vapor probes will be installed at three discrete depth intervals (approximately 5, 10 and 15 feet below ground surface at SI-1 and approximately 5, 15 and 22 feet below ground surface at SI-2). Utilities will be marked out prior to advancing probes and drilling.

Subsurface soil vapor probes will be constructed of stainless steel screens and Teflon or Teflon-lined polyethylene tubing. Filter glass beads will be placed around the screened portion of the soil vapor probe. The probe screens will be six inches in length and will be constructed of double woven stainless steel wire. The bottom of the probes will have a "PRT" style thread, the same fitting style used with PRT soil sampling tools. The top connection to the tubing will be a vapor-tight stainless steel "swage lock" or clamp fitting to prevent escape of vapors during sample collection.



LEGEND

SA–1 SUB–SLAB SOIL VAPOR LOCATION – PROPOSED

SI–2 SUBSURFACE SOIL VAPOR SAMPLE LOCATION – PROPOSED (3 DEPTHS WILL BE SCREENED AT EACH LOCATION)

CHAIN LINK FENCE

SITE BOUNDARY

93 MAIN STREET SITE
BINGHAMTON, NEW YORK

SAMPLE LOCATION MAP

FIGURE 2–1

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

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Table 2-1
93 MAIN STREET SITE
SOIL VAPOR SAMPLING FIELD ACTIVITIES
SAMPLING SUMMARY MATRIX

Program Element	Environmental Media	Sample Type/Depth	Equipment	Number of Samples	Sample Analyses / Method
Subsurface Soil Vapor Sampling	Soil Vapor	Grab samples from subsurface soil near perimeter of site.	Summa canister.	6	Volatile Organic Compounds / TO-15
Sub-slab Soil Vapor Sampling	Soil Vapor	Grab samples from beneath concrete slab.	Summa canister.	2	Volatile Organic Compounds / TO-15

During probe construction, as the probe rod is withdrawn, the annular space will be filled with glass beads to a depth of six inches above the top of the screen and washed sand will be placed above the glass beads. Tamped and hydrated bentonite pellets will be placed above the sand to form a seal and a high-solids content bentonite grout will be used from the top of the bentonite to a depth of one foot below ground surface.

The soil vapor probes will be temporary and protective casings will not be placed around the probes. The temporary probes will be properly abandoned after receipt of validated lab data.

Soil vapor samples will be collected in six-liter SUMMA ® canisters for lab analysis. A certification check will be performed at the laboratory with the flow controller in place for each SUMMA ® canister. The sampling rate of the canister will be controlled by the use of a calibrated orifice within the flow controller. The calibrated orifice of each flow controller will be preset at the laboratory. The controllers will be attached to the canisters prior to the GC/MS certification check to ensure that the flow controllers are also included in the QA/QC procedures. The cycle time of the canisters will not exceed thirty days. The cycle time is defined as the time from shipment from the laboratory, through the return shipping and analysis at the laboratory.

The connection to the sampling canister will be made through the use of $^1/_8$-inch internal diameter disposable tubing with swage lock or clamped fittings. Immediately prior to connecting the canister to the soil vapor probe tube, the disposable tubing and the riser tube will be purged of at least one volume using a vacuum pump at a flow rate of less than 0.2 liters per minute. A tubing pinch valve will be utilized to seal the end of the tube while the connection to the canister is made and to reseal the tubing after sampling is completed. Any canister with less than 25-inches of mercury (in. Hg) of vacuum showing on the vacuum gauge prior to sampling will not be used. The canister and control valve assembly will be kept out of direct sunlight during sampling by using a cloth or plastic drape or an enclosure. This is to prevent heating of the flow controller. The samples will be collected over a one hour period at a flow rate of less than 0.2 liters per minute.

2.3 Sub-Slab Soil Vapor Sampling

Sub-slab soil vapor samples will be obtained through penetrations in the concrete floor slab remains at the site. Selection and preparation of sample collection points will be performed by observing the condition of the concrete slab for existing penetrations such as cracks, floor drains and sumps. The floor conditions will be noted and potential locations for a sub-slab sample location will be selected. The locations will be central to the concrete slab away from the foundation walls and any existing penetrations noted. Sampling locations will be marked, documented and photographed.

Existing penetrations such as cracks, floor drains and sumps will be screened with a photoionization detector (PID) or flame ionization detector (FID) and the readings will be recorded. If practical, features such as floor drains or sumps will be sealed prior to the collection of the subsurface soil vapor samples. The following sampling preparation procedure will be followed:

1) Drill a 1-inch diameter hole about 1-inch into the concrete using an electric hammer drill. Extend the hole through the remaining thickness of the slab using a $^{3}/_{8}$-inch drill bit. Extend the hole about 3-inches below the sub-slab material using either a drill bit or a steel probe rod.
2) Insert a section of $^{3}/_{8}$-inch O.D., ¼-inch I.D. Teflon or Teflon-line polyethylene tubing to the bottom of the floor slab.
3) Seal the annular space between the 1-inch hole and the $^{3}/_{8}$-inch tubing with a bentonite seal.
4) Connect the tubing to an air sampling pump and purge at least one volume of vapor from the subsurface probe using the air sampling pump at a flow rate of less than 0.2 liters per minute. Collect the sampling pump discharge in a 1 liter Tedlar bag and screen the contents of the Tedlar bag using a PID or FID.
5) Disconnect the air sampling pump and plug the end of the tubing.

For preparation of the SUMMA ® canister and collection of the sample, the following procedure will be followed:

1) Place SUMMA ® canister adjacent to subsurface probe.
2) Record SUMMA ® canister serial number on the chain of custody (COC).
3) Assign sample identification on canister I.D. tag and record on COC.
4) Remove brass plug from canister fitting.
5) Install a pressure gauge/metering valve on canister valve fitting.
6) Open and close canister valve.

7) Record gauge pressure. Gauge pressure must read greater than 25 in. Hg.
8) Remove brass plug from the gauge and install a particulate filter onto metering valve input.
9) Connect subsurface probe to end of in-line particulate filter.
10) Open canister valve to initiate sample collection (flow rate will be less than 0.2 liters per minute).
11) Take a digital photograph of canister setup and surrounding area.
12) Record local time on COC.

The procedure for completing sample collection will be as follows:

1) At the end of the sample collection period, record gauge pressure.
2) Record local time on COC.
3) Close canister valve.
4) Disconnect tubing and remove particulate filter/pressure gauge from canister.
5) Install brass plug on canister.
6) Remove temporary sub-slab probe and properly seal hole in the concrete slab.

During sampling no activities will be permitted in the immediate area that involve using materials containing VOCs. The area will be inspected prior to sampling and any containers of oil, gasoline and any other hydrocarbons will be removed from the area. Sampling personnel will use caution and avoid activities that can influence the sample results, such as pumping gas prior to sampling, using marking pens near the sampling devices, or wearing freshly dry-cleaned clothing while sampling. The sampling point will be monitored during sample collection to confirm that the soil vapor probe, the tubing and valves, and the canister remains intact and undisturbed. A slight vacuum will be left in the canister at the end of sampling and recorded so that it may be documented that the canister did not leak during transit.

Section 3

3.0 SITE-SPECIFIC QUALITY ASSURANCE/QUALITY CONTROL PLAN

Extreme care should be taken during all aspects of sample collection to ensure that high quality data are obtained. The laboratory will use only certified clean sample collection devices. The sampling team members will avoid actions which cause sample interference such as pumping gas prior to testing or using permanent marking pens in the field. Once samples are collected, they will be stored according to the method protocol and delivered to the analytical laboratory as soon as possible. Samples should not exceed recommended holding times prior to being processed by the laboratory.

3.1 Analytical Parameters

Samples will be shipped via standard Chain of Custody (COC) protocols to a laboratory for analyses of the select VOCs (benzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, methyl tert-butyl ether, 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, m-xylene, o-xylene and p-xylene) via United States Environmental Protection Agency (USEPA) Compendium Method TO-15 using selective ion monitoring (SIM). The samples will be analyzed by methods that can achieve minimum detection limits of at least one microgram per cubic meter ($\mu g/m^3$).

All air sample analyses will be performed by a laboratory certified for the analysis under the NYSDOH Environmental Laboratory Approval Program (ELAP), and in accordance with the Analytical Services Protocol (ASP). Category B deliverables will be furnished by the laboratory. Shipping and analyses of the samples will be arranged so that the holding time limits will not be exceeded. The analysis of QA/QC samples will be performed for the same compounds as the environmental samples using the same USEPA methods.

3.2 Duplicates

Field duplicate samples will not be collected during this sampling event.

3.3 Decontamination Procedures

All subsurface tools and equipment used during the advancement and installation of any soil vapor sample probe will be cleaned using the best available method, prior to their introduction or reintroduction into any given point, at the discretion of the NYSDEC representative. One of the proposed cleaning methods incorporates the use of a high-pressure steam cleaner to wash the large diameter samplers and push rods used during the project. An alternative method that may be used to clean large diameter samplers and push rods involves a water wash, followed by an Alconox-solution wash and a final distilled water rinse. If oily residues are present, a pesticide grade methanol rinse will be added to remove any oily residues prior to the final distilled water rinse. One of these specifications will be followed, in order to reduce the potential for cross contamination of any samples and to ensure that the integrity of each soil vapor sampling point is maintained.

3.4 Data Usability Summary Report

A Data Usability Summary Report (DUSR) will be prepared instead of full data validation. The DUSR is prepared by reviewing and evaluating the analytical data. The parameters to be evaluated in reference to compliance with analytical method protocols include all chain-of-custody forms, holding times, raw data (instrument print out data and chromatograms), calibrations, blanks, spikes, controls, surrogate recoveries, duplicates and sample data. Field sampling notes will also be reviewed and any quality control problems will be evaluated as to their effect on the usability of the sample data.

The DUSR will describe the samples and analysis parameters reviewed. Data deficiencies, analytical protocol deviations and quality control problems will be described, and their effect on the data discussed. Re-sampling and reanalysis recommendations will be made, if necessary. Data qualifications will be documented for each sample analyte following the NYSDEC ASP 6/00 guidelines.