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Mr. Jaspal Walia
Project Manager
New York State Department of Environmental Conservation
Region 9 – Division of Environmental Remediation
270 Michigan Avenue
Buffalo, New York 14203-2999

Reference: 0477835

Subject:

Work Plan for Data Gap Investigation
Former Leica, Inc. Facility
Town of Cheektowaga
Erie County, New York
Inactive Hazardous Waste Disposal Site
No. 915156

Dear Mr. Walia,

On behalf of Danaher Corporation and Leica Microsystems, Inc. (Leica), ERM Consulting and Engineering, Inc. (ERM) has prepared this work plan for a data gap investigation at the former Leica, Inc. facility located at 203 Eggert Road in the Town of Cheektowaga, Erie County, New York (the Site). The Site is identified as an Inactive Hazardous Waste Disposal Site (Site Number 915156).

1 Objectives and Approach

Previous investigation activities demonstrate that historical releases of volatile organic compounds (VOC) to the subsurface occurred in multiple locations at the Site. ERM has developed a conceptual site model (CSM) for the Site and identified the following data gaps requiring additional investigation:

- Potential for additional overburden source areas beneath the building; and,
- Vertical extent of contamination in bedrock groundwater is not defined.

The objective of the proposed investigation is to collect the data necessary to fill these data gaps; the data generated will be used to refine the CSM to support development of a Site closure strategy.

This work plan documents the investigation activities that will be completed in order to meet the investigation objectives. This work plan includes some dynamic decision-making components, whereby data generated during implementation of the work plan will be interpreted in real time and used to affect subsequent investigation and characterization activities. Consequently, certain elements of the work plan may be adjusted after discussion with New York State Department of Environmental Conservation (NYSDEC), in particular the number, placement and depth of borings.

2 Investigation Activities

The investigation activities included in this work plan are presented below along with a short description of how the data generated will be used to meet investigation objectives.

2.1 Utility Clearance

Utility clearance will be completed prior to any ground disturbance activities and will be managed in accordance with ERM's sub-surface clearance procedures, which were developed to minimize the potential for striking sub-surface infrastructure. A public utility locate will be completed as required by law and ground penetrating radar (GPR) and other geophysical tools will be applied to the extent possible to screen the subsurface for utilities in the selected investigation areas. Soil borings and bedrock boreholes will be hand cleared to depths of between 5 and 8 feet below ground surface (bgs), using either hand auger or vacuum excavation methods.

2.2 Utility Mapping

In areas of the Site building where solvents were historically used (i.e. degreaser areas), the locations of trenches and drain pipes will be mapped in order to better understand where historical releases may have occurred. Interpretation of the existing soil gas results, coupled with experience from sites with similar release scenarios, suggests there is potential that releases occurred both from spills onto the floor slab and from broken sub-slab drain pipes. Additionally, utility trenches can act as preferential pathways for contaminant migration. Utility locating tools (i.e. GPR, electromagnetic conductivity and active radio frequency line tracing) will be used to map, to the extent possible, the locations of trenches and drain pipes within potential source areas. The utility maps will then be overlaid on top of the existing soil gas data and the two data sets will be used together to inform the selection of soil boring locations for the source area investigation.

2.3 Soil Sampling

Soil borings will be advanced inside of the building in order to characterize and delineate potential source areas. Following completion of the utility mapping task, ERM will prepare a map showing the proposed soil boring locations, which will be provided to the NYSDEC for review prior to initiation of the field program. Soil boring locations will be selected to further investigate areas exhibiting elevated soil gas concentrations, with a focus on historical drain pipes and trenches, where present.

After clearing soil boring locations of potential utilities, direct-push drilling techniques will be used to advance the borings to drilling refusal, which is presumed to represent the bedrock surface (approximately 10 to 15 feet bgs). Continuous soil cores will be collected using both the hand auger (if feasible) and direct-push drilling equipment. The soil will be logged, and soil samples will be collected every foot and screened in the field with a photo ionization detector (PID) fitted with an 11.7 electron Volt (eV) lamp. An average of two soil samples will be collected from each boring for laboratory analysis of VOCs using EPA method 8260C/5035; samples will be selected for laboratory analysis based on the field screening results. The soil samples will be shipped on ice using chain of custody procedures to an accredited laboratory for analysis.

If significant VOC concentrations are detected in soil, additional borings may be required to delineate the lateral extent of contamination. Upon completion, soil borings will be grouted to the surface and floor penetrations will be resurfaced with cement to grade.

2.4 Identification of Preferential Groundwater Flow Pathways in Bedrock

A surface geophysical survey will be completed to identify potential preferential groundwater flow pathways in bedrock. Identification of potential preferential groundwater flow pathways will inform the placement of bedrock wells because a groundwater plume in bedrock is most likely to flow along such pathways. The two-dimensional electrical resistivity survey will be completed in three transects (Figure 1) targeting a depth of 100 feet bgs. The exact location of the transects may be adjusted based on the locations of subsurface utilities identified during the subsurface clearance activities (Section 1.1), as utilities may interfere with the induced electrical field.

2.5 Bedrock Drilling to Evaluate the Vertical Extent of Contamination

Four bedrock boreholes will be drilled and evaluated using high-resolution characterization techniques in order to evaluate the vertical extent of contamination in bedrock. A pilot corehole will be advanced using rock coring techniques and the data generated from the rock core will be used to determine the depth of the three subsequent boreholes. The subsequent boreholes will be advanced using air rotary percussion drilling techniques to the target depth defined based on interpretation of the corehole dataset. Approximate bedrock corehole and borehole locations are shown on Figure 1; the actual locations will be determined following completion of the subsurface utility and 2D resistivity surveys. Following drilling, the corehole and boreholes will be logged and tested using a number of logging tools that are described in more detail below. Collectively, the data set generated will inform the depth of the VOC plume in bedrock as well as the specific fractures, primary flow pathways, and hydraulic units that may be impacted.

2.5.1 Rock Coring and Sampling

The primary objective for completing a corehole and for collecting rock core samples is to define the vertical extent of contamination in bedrock while eliminating concerns associated with the potential for cross contamination during drilling. This will be accomplished by advancing one pilot corehole and sampling porewater within the rock matrix (i.e., primary porosity) in areas adjacent to bedrock fractures (i.e., secondary porosity). If contamination is currently or was historically present within a fracture, the concentration gradient between the contaminated water in the fracture and the clean porewater in the rock would result in diffusion of contamination from the fracture into the rock matrix (i.e. matrix diffusion). Once this occurs, contamination typically remains in the rock matrix for decades, providing a secondary source for a bedrock plume. Additionally, sampling porewater within the rock matrix eliminates the potential for false positives attributable to cross contamination during drilling because the rock core samples are collected as the boring is advanced (i.e., before contaminated water from shallower depths comes into contact with the rock).

The pilot corehole will be advanced using an HQ-diameter wireline drilling system, and continuous rock core will be collected and logged by an experienced geologist to identify changes in lithology and natural fractures (as opposed to mechanical breaks created during drilling and core retrieval). When a natural fracture is identified, rock samples will be collected adjacent to that fracture, processed in the field and analyzed for VOCs using microwave extraction and gas chromatography/mass spectroscopy in a mobile field laboratory. Use of the mobile laboratory will enable receipt of analytical results within 24 hours of sample collection, which will allow ERM to determine the total depth of the corehole in real time. Depth of the corehole will be determined based on field observations and analytical results.

After completion of the rock coring, the corehole will be further characterized and tested using the methods described below. ERM will interpret the collective dataset, refine the CSM and determine the target drilling depth for three additional bedrock boreholes that will be advanced at various locations along the downgradient Site boundary in areas where contaminant plumes are expected to be encountered. The three additional bedrock boreholes will be tested with some, but not all of the methods described below. Collectively, these four deep bedrock boreholes will be used to define the hydrogeologic flow system and the vertical extent of contamination in bedrock at the Site.

2.5.2 DNAPL Screening

After completing the corehole (or any of the subsequent boreholes), the entire open borehole interval will be screened for the presence of DNAPL using a NAPL liner manufactured by Flexible Underground Technologies (FLUTe). The liner is deployed into the borehole and if DNAPL is present in a fracture, it will create a visible stain on the outer liner cover at the depth of that fracture, which can be observed upon removing the liner. If DNAPL is identified, then a blank FLUTe liner will be immediately reinstalled to seal the borehole and minimize the potential for downward DNAPL migration within that borehole.

If DNAPL is identified, no further testing will be conducted within that borehole and the borehole will be completed as a two-inch diameter stainless steel well, constructed with a 5-foot long sump to allow for measurement and possible recovery of DNAPL. The well screen interval will be designed to intersect the depth of DNAPL-containing zone.

2.5.3 Borehole Geophysical Logging

Borehole geophysical logging will be performed shortly after removing the NAPL liner. The objective of the borehole geophysical logging is to identify and evaluate the bedrock fractures intersected by the borehole. Multiple geophysical tools will be used in each borehole in order to identify changes in lithology, the depth and orientation (strike and dip) of fractures and the depth of potential transmissive fractures.

2.5.4 Borehole Transmissivity

Borehole transmissivity will be evaluated in each borehole using one of two possible methods, depending on which method is best suited to the characteristics of the borehole. While the geophysical logging tools listed above can identify specific fracture depths and their orientations, the presence of a fracture does not always equate to significant groundwater flow. Therefore, the objective of evaluating borehole transmissivity is to determine the specific fractures through which the majority of groundwater flows. The two possible methods are:

- Transmissivity Profiling: This method provides a continuous, high-resolution profile of transmissivity within the saturated borehole interval by measuring the descent rate of a blank FLUTe liner as it is deployed within a borehole. The method works well in boreholes with a series of fractures exhibiting similar transmissivities, but does not work well in boreholes where one large transmissive fracture exists because the that fracture masks the transmissivity of smaller fractures located above it.
- Electrical Conductivity Profiling: This method involves displacing the borehole water with low electrical conductivity water. An electrical conductivity probe is lowered through the water column and zones where groundwater flows into the borehole from transmissive fractures show

up as intervals of increased electrical conductivity. This method would be used for boreholes containing a single highly transmissive fracture at depth.

2.5.5 Interconnectivity Monitoring

The objective of interconnectivity monitoring is to understand how transmissive fractures in one borehole are connected to transmissive fractures in another borehole. Understanding and mapping borehole interconnectivity provides information about groundwater transport pathways. Interconnectivity monitoring will be conducted using pressure transducers set at the depths of transmissive fractures in multiple boreholes. Hydraulic pulses will then be created at the depths of transmissive fractures in another borehole. When a change in groundwater elevation is observed at the same time as a pressure pulse, those fractures in which the change occurred are identified as being hydraulically interconnected.

2.6 Groundwater Sampling

Collectively, the hydrogeologic characterization results from the four bedrock boreholes will be used to design multi-level system (MLS) wells for each borehole. ERM will provide the MLS design to the NYSDEC for review prior to purchase and installation. The objective of the MLSs is to collect discrete-interval groundwater elevation and quality data from multiple transmissive fractures in each borehole to confirm the vertical extent of contamination and the groundwater flow direction.

Following installation of an MLS in each borehole, each sampling port will be developed. During sampling events, depth to water will be measured in each sampling port, each port will be purged of approximately 1 gallon of water, and a groundwater sample will be collected. Geochemical parameters will be recorded from each sampling port after purging is completed. Groundwater samples will be shipped on ice using chain of custody procedures to an accredited laboratory and analyzed for VOCs by EPA Method 8260C.

3 Data Quality and Validation

The Data Gap Investigation has been designed to generate data that meet Data Quality Objectives (DQOs) for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC). Field procedures have been developed for this project so that samples produce data of acceptable quality that meet the DQOs. Field quality control (QC) samples (trip blanks, equipment blanks, field duplicates, and matrix spike/matrix spike duplicate samples) will be generated during the project to provide information regarding the adequacy of the sample collection and transportation of samples.

The project laboratory is responsible for generating data that meet PARCC standards, and the project laboratory will demonstrate analytical precision and accuracy by the analysis of laboratory QC samples and by adherence to accepted manufacturer and procedural methodologies. Laboratory QC samples will include method blanks, matrix spike samples, laboratory control samples, laboratory duplicates, and surrogate spikes. The project team will evaluate performance of the project laboratory, and the evaluation will include a review of all deliverables for completeness and accuracy. Following completion of the data evaluation, a Data Usability Summary Report (DUSR) will be prepared.

4 Waste Management

Investigation-derived wastes including soil cuttings, rock chips, and drill water will be containerized and characterized as required by the receiving facility to develop a waste profile. Waste drums will be labeled for temporary on-Site storage and sent to a licensed waste management facility under appropriate transportation documentation.

5 Reporting

Data generated from implementation of this work plan will be reviewed, interpreted, and compiled into a data gap investigation report that will be submitted to the NYSDEC for review.

Yours sincerely,

Joe Fiacco

Joe Fiacco,
Partner

Enclosures:

Figure 1 – Site Plan

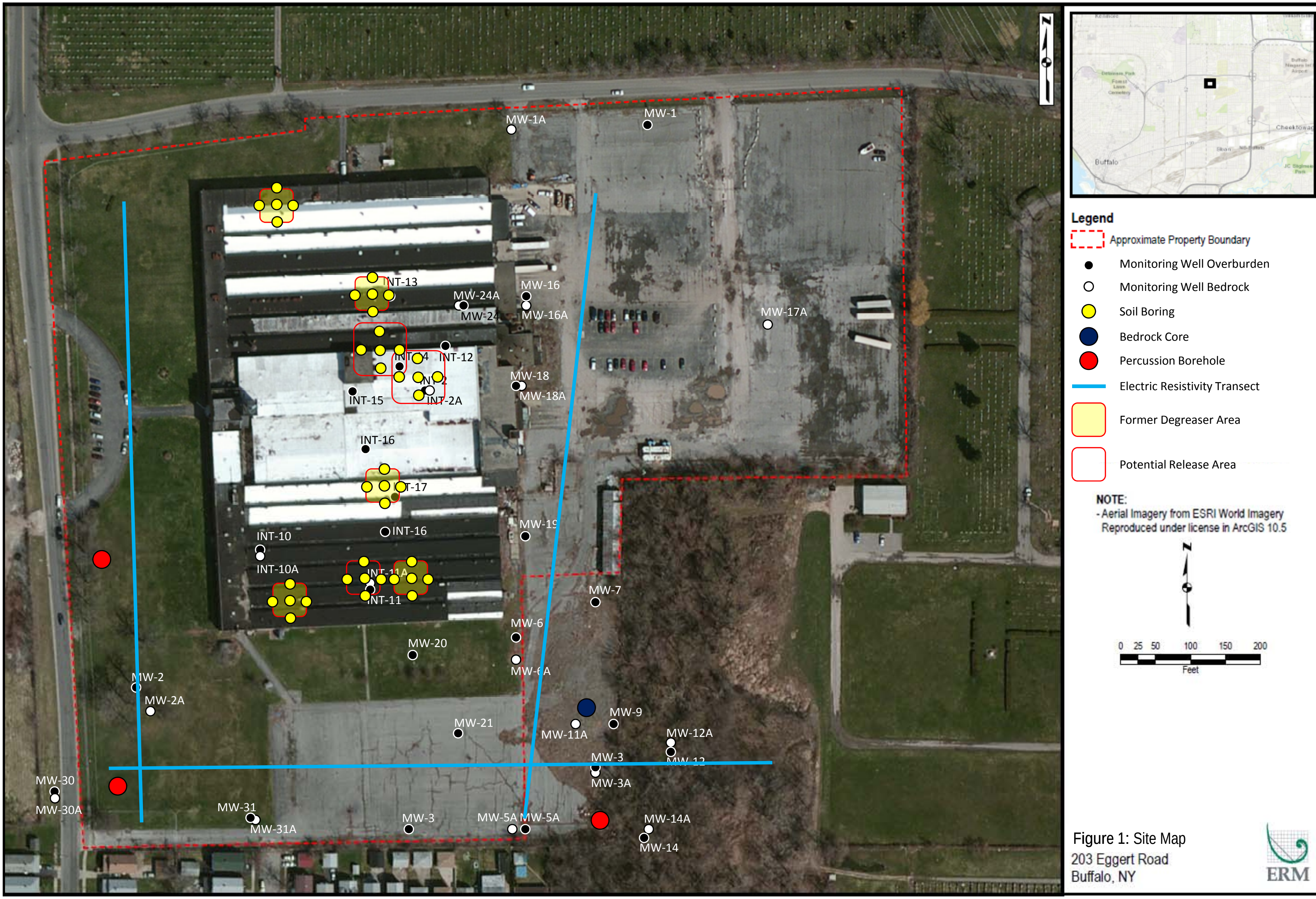

Figure 1: Site Map
203 Eggert Road
Buffalo, NY