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January 7, 2013

Mr. Michael MacCabe
NYS DEC - Division of Environmental Remediation
Remedial Bureau B
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Subject: Draft Site Characterization Letter Report
Work Assignment #D007621-5
West 29th Street Plume Site
West 29th St. and 10th Ave.
New York, New York
Site ID No. 2-31-078

Dear Mr. MacCabe:

Camp Dresser McKee & Smith (CDM Smith) is pleased to present this draft Site Characterization letter report that summarizes the sampling procedures and results for monitoring well installation and groundwater sampling at the above referenced site. This letter report details the site characterization performed to identify a potential source of a chlorinated volatile organic compounds (CVOCs) plume observed in groundwater at the intersection of West 29th Street and 10th Avenue in the West Chelsea section of Manhattan, New York (referred to as the West 29th Street Plume Site). The scope of work was prepared by CDM Smith in the Schedule 1 – Scope of Work dated August 10, 2012. CDM Smith prepared a Health and Safety Plan (HASP) for the site, which was provided to the New York State Department of Conservation (NYSDEC) with the Schedule 1. The field work was conducted in accordance with CDM Smith's Generic QA/QC Plan approved by NYSDEC.

Section 1 – Introduction

1.1 Overview

The on-site characterization included groundwater sampling for volatile organic compounds (VOCs) via direct push methods as well as sampling newly installed and existing monitoring wells. Following ground penetrating radar (GPR) utility location on September 20, 2012, direct push groundwater sampling and monitoring well installation took place on October 1-11, 2012. CDM Smith later returned to the Site on November 14 and 15, 2012 to sample the newly installed monitoring wells as well as some existing monitoring wells found on-site. CDM Smith

subcontracted Geoprobe services to Zebra Environmental (Zebra) of Lynbrook, New York; Test America of Amherst, New York for analytical services; Advanced Geological Services (AGS) of Malvern; Pennsylvania for GPR utility location; Hirani Engineering and Land Surveying, P.C. (Hirani) of Jericho, New York for surveying services; AARCO Environmental Services Corp. (AARCO) of Lindenhurst, New York for investigation derived waste transportation and disposal; and Data Validation Services of North Creek, New York for data validation services.

The purpose of the site characterization was to identify a potential source of a plume of CVOCs observed at three existing spill sites in the area. The site characterization involved collecting grab groundwater samples at 12 locations from the shallow groundwater at depths of between 15 and 25 feet below ground surface (bgs). Permanent monitoring wells were installed at three additional locations for the purposes of groundwater sampling and measuring the elevation of the groundwater table.

A summary of the sampling methodology is presented in Section 2.

1.2 Background

The West 29th Street Plume Site (Site) is located at the intersection of West 29th Street and 10th Avenue in the West Chelsea section of Manhattan, New York (Figure 1). The area in which the Site is located is zoned for a combination of commercial and residential use. Three CVOC spill sites have been identified in the vicinity of the Site, which are identified on Figure 3. The first (referred to as the West 28th Street Site) is associated with NYSDEC spill numbers 0603351 and 0700172 and is located down-gradient of the Site at 319-321 and 323-325 10th Avenue and 511-515 West 28th Street in New York, New York and is on Block 700, Lots 27, 32, and 34. The second spill site (referred to as the 10th Avenue Site) is associated with NYSDEC spill number 1114471 and is located cross-gradient from the West 29th Street Plume Site on the west side of 10th Avenue between 29th and 30th Streets, identified as Block 701 and Lots 30, 33, 36, 37, 42, 43, and 44. The third spill site (referred to as the 11th Avenue Site) is associated with NYSDEC spill number 0700587 and is located down-gradient from the West 29th Street Plume Site at 282-298 11th Avenue on Block 700, Lots 1, 9, and 18. Some of the parcels in the area, including the 10th Avenue Site and the 11th Avenue Site, are being redeveloped for high-rise residential communities with retail space on the lower levels.

The purpose of this work assignment was to conduct a site characterization in the vicinity of the intersection of West 29th Street and 10th Avenue to try to identify the potential source area of a chlorinated solvent plume observed at these three spill sites.

The following information on site features, geology, hydrogeology, historical use, and previous investigations is based on reports generated by others for the three spill sites identified above.

1.2.1 Surrounding Site Features

The Site is about 0.4 miles east of the shore of the Hudson River and is fairly flat, sloping slightly towards the river (Figure 1). The elevation of the 11th Avenue Site is about 10 feet above mean sea level. The West 28th Street Site consists of a one-story night club building, a one-story auto repair shop and a parking lot on 0.4 acres of land. The 10th Avenue and 11th Avenue Sites are currently under construction, the previous buildings have been demolished and construction is underway for new high-rise apartment buildings. The High Line Elevated Park, an old elevated rail line converted to a walking path, passes overhead parallel to and just to the northwest of 10th Avenue (Figure 2).

1.2.2 Geologic and Hydrogeologic Setting

No soil borings were completed as part of this site characterization. However, soil borings have been completed in the area as part of subsurface investigations at related sites. Fleming, Lee, and Shue Environmental Management and Consulting (FLS), in their 2007 Remedial Investigation Report completed for the 10th Avenue Site, characterized the subsurface materials as approximately 10 to 16 feet of fill material, consisting of brick, concrete, ash, cinders, wood, and schist in a matrix of silty sand underlain by bedrock at about 10.25 feet bgs. However, boring logs completed by FLS for the 10th Avenue Site were advanced to 30 feet bgs and showed approximately ten feet of fill material underlain by silt and clay to approximately 25 feet bgs where fine/medium sand was encountered at the bottom of the borings. Based on reports previously completed in the area, bedrock is estimated to lie between 25 and 35 feet bgs.

Figure 2 shows the potentiometric surface plot generated from gauging information collected by CDM Smith from existing and newly installed monitoring wells (Table 1). The groundwater flow direction in the vicinity of the Site is to the west towards the Hudson River. Measurements from monitoring wells MW-8 and MW-9 were excluded from the Figure 2 due to the fact that they are deeper than the other wells gauged. The groundwater elevation of 1.7 feet above mean sea level (MSL) measured in MW-1 was extraneous compared with measurements in other monitoring wells in this area. The groundwater level in this well may be affected by underground utilities in this area; a large utility vault was observed on the corner of 10th Avenue and West 29th Street. The groundwater measurement from this well was also excluded from the plot.

1.2.3 Historical Use

According to a Phase I Environmental Site Assessment (ESA) done in 2005 by Envirotrac Ltd. of Ronkonkoma, NY, the 11th Avenue Site was previously a retail gasoline station with several gasoline underground storage tanks (USTs). The USTs were located on the corners of 11th Avenue and 28th and 29th Streets and were installed in 1956 and removed in 2011. Other portions of the 11th Avenue Site were used historically for parking, but also included hydraulic lifts for auto repair and detailing and storage of construction materials. Historically, according to Sanborn® Fire Insurance Maps covering the period from 1890 to 1996, the 11th Avenue Site was also previously

used as a lumber yard and saw mill, a piano factory, a metal factory, a coal yard, various auto and truck repair facilities and residential dwellings.

A Phase I ESA was performed by Airtek Environmental of New York, NY in 2007 for the West 28th Street Site, which is made up of several lots. The report stated that the current auto repair building has been used for auto repair since circa 1950. The night club building was previously used as a wagon house circa 1930, then for metal fabricating circa 1976 and for a metal shelf manufacturing facility before it became a night club in 2001. What is now a parking lot on 10th Avenue was a gas station with six USTs from 1930 until 1980 when it was converted to an auto glass and tire repair shop; the USTs have been removed. Part of the current auto repair building was once a metal ceiling factory, then a truck repair facility.

According to the 1950 and 1985 Sandborn® Fire Insurance Maps, off-site to the east across 10th Avenue from the auto repair and parking lot, there was a gas station with six gasoline USTs and two auto repair shops. Also, a "metal works" facility was located on the south side of West 28th Street across from the current auto repair shop. Other properties south of the West 28th Street Site were also used as scrap iron yards and an auto repair shop. The former auto repair shops identified in this Phase 1 ESA south of West 28th Street and East of 10th Avenue could potentially be up-gradient sources of chlorinated solvents.

The Phase I ESA report for the 10th Avenue Site has not yet been obtained, but a Spill Summary Report and Request for Closure document prepared by FLS in 2012 stated that a portion of the 10th Avenue Site was previously used as a retail gas station with USTs, which have been removed.

1.2.4 Previous Investigations

Environmental investigations have been performed at each of the three spill sites in the vicinity of the Site. This section summarizes sampling results from each of the studies conducted by others.

A subsurface investigation was performed at the West 28th Street Site by Airtek of New York, New York in March of 2007. During this investigation groundwater and soils were sampled and analyzed for NYSDEC Spill Technology and Remediation Series (STARS) List of VOCs and semi-volatile organic compounds (SVOCs), but not CVOCs. VOC and SVOC exceedances were found in groundwater and SVOC exceedances were found in soils. A Site Investigation Report (SIR) completed by GZA Geoenvironmental of New York, New York in December 2007, reported tetrachloroethylene (PCE) exceedances in soil samples collected from SB-10 and SB-11, collected from below the foundation in the center of the Evan's Auto building, at concentrations of 40,100 µg/kg and 39,100 µg/kg, respectively. GZA's SIR also reported exceedances of PCE, trichloroethylene (TCE), cis-1,2-dichloroethylene (DCE), and vinyl chloride (VC) were also detected in several of the groundwater samples collected in December 2007 throughout the West 28th Street

Site. Groundwater concentrations from this sampling were detected up to 295 µg/L PCE, 77.4 µg/L TCE, 458 µg/L DCE, and 22.6 VC.

A remedial investigation (RI) was performed at the 10th Avenue site in 2007. A copy of the RI report for this investigation was not provided; however the investigation was summarized in a report by FLS. According to the report, during the RI, four groundwater samples were collected from 30 feet bgs, below a clay layer. One of these groundwater samples, SB-8, contained PCE, TCE, DCE, and VC exceedances. Thirty-five shallow (2-4 feet bgs) and deep (9-13 feet bgs) soil samples were collected during the RI, two of which showed elevated concentrations of gasoline-related compounds, but no CVOC exceedances. Further groundwater sampling performed at the 10th Avenue Site in November 2011 revealed PCE, TCE, DCE, and VC exceedances in MW-7 and PCE and VC exceedances in MW-1, which was located near the SB-8 sample. Groundwater concentrations detected in samples collected in 2007 and 2011 ranged up to 24.9 µg/L PCE, 11.4 µg/L TCE, 1,820 DCE, and 39.3 µg/L VC.

Soil vapor samples were also collected from the urban fill material at the 10th Avenue Site in November 2011. The soil vapor samples revealed elevated gasoline-related VOCs in some locations and some slightly elevated CVOCs at other locations. The environmental investigations at the 10th Avenue Site concluded that no CVOC source exists at this location and that CVOC contamination detected in the groundwater came from an off-site source. Currently, soils at the 10th Avenue Site are being excavated to a depth of 14 feet bgs. A vapor barrier will be installed prior to the placement of the concrete foundation for the new apartment building in response to gasoline contamination in the on-site soils.

A RI done in September 2007 and a groundwater investigation performed in 2012 at the 11th Avenue Site revealed exceedances of DCE and VC in several groundwater samples collected from soil borings and temporary monitoring wells. Groundwater exceedances detected in the January 2012 investigation by FLS are included in Figure 4. CVOCs were detected mainly at the eastern, up-gradient end of the property. Groundwater concentrations of up to 1,220 µg/L DCE and 1,510 µg/L VC were detected. Gasoline-related VOCs were also detected in groundwater and soil samples across the property, but no CVOC exceedances were observed in soil samples. The report concluded that the CVOCs detected in groundwater at the 11th Avenue Site were likely derived from an off-site historic, degraded source. Some of the gasoline-related VOCs detected in groundwater were assumed to have originated on-site from USTs and some from possible off-site sources.

A Supplemental Investigation was performed by Langan Engineering and Environmental Services of New York, New York in August 2012; the final report is not yet available. The purpose of the investigation was to delineate previously discovered VOC and metals contamination below the buildings in preparation for building three new apartment buildings on the site. Ten monitoring

wells were installed in the W28th St. Site, including inside Evan's Auto, and well screen were placed from seven to 17 feet bgs. Twenty-three soil borings were also installed to depths of between eight and 22 feet bgs. Soil and groundwater samples were analyzed for VOCs, SVOCs, metals, PCBs, and pesticides. Sample results showed several CVOC exceedances in both groundwater and soils beneath the site. Figure 4 includes the exceedances in groundwater samples from this investigation. In groundwater samples, PCE exceedances were detected up to 50 µg/L, TCE up to 21 µg/L, VC up to 1,200 µg/L, and cis-1,2-DCE up to 2,900 µg/L among other VOC exceedances. CVOC exceedances were also detected in soil samples as compared to the NYCRR Part 375 Standards for Unrestricted Use. Soil CVOC exceedances included PCE up to 40.1 mg/kg, compared to the standard of 1.3 mg/kg, at zero to two feet below the Evan's Auto building, cis-1,2-DCE up to 0.52 mg/kg, compared to the standard of 0.25 mg/kg, in boring EB-15 11-13 foot sample below the night club building, and VC up to 0.026, compared with the standard of 0.02 mg/kg, in sample EB-4 at 13-15 feet bgs under part of the property on West 29th Street.

Section 2 – GPR Survey, Groundwater Sampling, Monitoring Well Installation, and Surveying

2.1 GPR Survey

Due to the density of underground utilities in Manhattan, Advanced Geological Services (AGS) of Malvern, Pennsylvania was contracted to conduct a ground penetrating radar (GPR) utility location survey on September 20, 2012 to clear boring locations. Boring locations were adjusted as necessary to avoid utilities. The GPR survey report is included in Appendix A

2.2 Direct Push Groundwater Sampling

Between October 1 and 8, 2012 CDM Smith collected grab groundwater samples on-site using direct push technology (DPT). Sampling was performed in accordance with the DPT groundwater screening procedures provided in CDM Smith's QAPP on file with NYSDEC. Due to the density of underground utilities in Manhattan each sample location was pre-cleared by Zebra with a hand auger before starting subsurface sampling activities. At each sample location, Zebra utilized a Geoprobe to advance a four foot long stainless steel screen to depths of between 16 and 25 feet bgs, the minimum depth required to get sufficient sample volume at each location. Once the screen was in place, a peristaltic pump was used to purge groundwater using low-flow sampling techniques and passing the groundwater through dedicated tubing into a YSI water quality meter until water quality parameters stabilized. The final water quality parameters were then recorded in the fieldbook (Table 2), the tubing was disconnected from the water quality meter, and the groundwater sample was collected into properly preserved laboratory-provided glassware for VOC analysis by EPA Method 8260B. Groundwater samples were kept on ice until analyzed by Test America, an ELAP certified laboratory. A NYSDEC ASP Category B data deliverable lab report is included in Appendix B.

2.3 Permanent Groundwater Monitoring Well Installation

Three locations, MW-1, MW-2, and MW-3, were selected for installation of permanent monitoring wells for the purpose of determining the local direction of groundwater flow. The New York City Department of Transportation (NYCDOT) required Zebra to install points on 10th Avenue, including MW-1, MW-2 and GWS-9 on Saturday morning due to anticipated conflicts with National Grid work taking place on week days in that area. Zebra installed the three monitoring wells on October 5 and 6, 2012 using a Geoprobe. Each of the three wells was installed to a depth of 20 feet bgs and constructed using ten feet of two-inch diameter, poly vinyl chloride (PVC), pre-packed, 20-slot screen and ten feet of Schedule 40, two-inch diameter PVC riser. A sand backfill was added around the well using No. 2 filter sand from 20 feet bgs to three feet bgs. A two-foot Bentonite seal was then added from three feet bgs to one foot bgs. Finally, a steel, flush-mount protective cover was installed with a concrete apron. Monitoring well construction diagrams are included in Appendix C. The wells were developed by Zebra on October 9, 2012 using a pump and surge technique until either the groundwater quality parameters stabilized or the well went dry.

2.4 Permanent Groundwater Monitoring Well Sampling

After installation of the three permanent monitoring wells, MW-1, MW-2, and MW-3, the wells were left to equilibrate for two weeks before sampling. Sampling was then delayed by transportation difficulties caused by Hurricane Sandy. The newly installed wells were sampled on November 14 and 15, 2012 along with three existing on-site monitoring wells, which CDM Smith labeled MW-9, MW-7, and MW-10 (Figure 3). Monitoring wells were sampled with a peristaltic pump and dedicated tubing using low-flow sampling techniques in accordance with CDM Smith's QAPP on file with NYSDEC. No monitoring well construction information was available for the existing monitoring wells. The depth to bottom was measured at 19 feet, 36.75 feet, and 18 feet in wells MW-7, MW-9, and MW-10, respectively (Table 1). CDM Smith assumes the wells were constructed as standard monitoring wells with ten feet of screen at the bottom of the well. This subset of existing wells was chosen for sampling due to each well's proximity to groundwater CVOC exceedances detected during DPT groundwater sampling. The depth of monitoring wells MW-10 and MW-7 was in the same range as the DPT samples, while MW-9 was a bit deeper.

2.5 Decontamination

All non-dedicated equipment and tools used to collect samples for chemical analysis were decontaminated prior to and between each sample interval using an Alconox and water mix for washing and potable water rinse prior to reuse. Decontamination fluids were discharged to the ground surface since a visible sheen or odor was not detected either on the equipment or the fluids.

2.6 Investigation Derived Waste

Groundwater purged during groundwater sampling was containerized in drums and disposed of off-site. A total of ten drums of non-hazardous liquid waste were generated during the investigation. No storage space was available on-site for drums, so AARCO picked up the drums from the Site daily and stored them temporarily at their facility before transporting them to the disposal facility. On the first day of sampling, October 1, 2012, CDM Smith collected a groundwater waste classification sample for lab analysis by Test America (Appendix B). This sample was considered representative of all the purge water produced on-site as the visual and odor characteristics were consistent throughout the sampling. No soil cuttings were generated during the investigation. A small amount of concrete was generated and was disposed of in Zebra's dumpster. Copies of the waste disposal manifests/bills of lading are included in Appendix D.

2.7 Quality Assurance/Quality Control and Field Documentation

All samples were analyzed by Test America, a NYSDOH approved ELAP certified laboratory under strict chain-of-custody protocol. All groundwater samples were analyzed for VOCs by EPA Method 8260B. Laboratory reports are included in Appendix B.

All samples were validated by Judy Harry of Data Validation Services, an independent, qualified data validator in accordance with the NYSDEC Data Usability Summary Report (DUSR) guidance, and a usability analysis is attached as Appendix E.

A total of two blind duplicate samples were collected, including 231078-MW109-GW-35 as a duplicate of 231078-GWS09-GW-35 and 231078-GWS112-GW-25 as a duplicate of 231078-GWS12-GW-25. In addition, two MS/MSD, three field blanks, and four trip blanks were submitted for laboratory analysis.

A field notebook was utilized during all on-site work and maintained by the field technician overseeing the site activities. In addition to a copy of the field notebook, a copy of sampling forms, and purge forms used during the field activities are provided in Appendix F.

2.8 Site Survey

A field survey was conducted by Hirani at the Site on October 15, 2012. During that survey, the site features and the locations and elevations of newly installed monitoring wells, existing monitoring wells, and soil boring locations were surveyed. The horizontal and vertical positions were tied into the North American Datum 1983 (NAD83) coordinate system. The vertical positions were tied to the North American Vertical Datum 1988 (NAVD88). The measuring points included ground surface and casing elevations and the coordinates of each sampling point. The measuring points were recorded to an accuracy level of 0.01 feet vertically. The coordinates for each of the sampling points

are provided in Table 1. The well elevations were used to determine the groundwater flow direction on-site, as shown on Figure 2. The coordinates were used to map the locations on Figures 2 through 4.

Section 3 – Groundwater Sampling Results

The following provides a summary of the analytical results for DPT and permanent monitoring well groundwater samples collected during the site characterization. A complete laboratory report is provided in Appendix B. Table 3 presents CVOC exceedances in groundwater samples. Figure 3 shows CVOC exceedances in groundwater samples. Figure 4 shows those groundwater exceedances from this site characterization along with those from the FLS investigation completed in January 2012 and the Langan investigation completed in August-September 2012.

3.1 Summary of DPT Groundwater Sampling Results

A total of 11 samples were collected using DPT groundwater sampling techniques. The samples were located in the sidewalks between 10th Avenue and 11th Avenue and West 28th Street and West 30th Street. Samples were collected from depths of between 16 and 25 feet bgs (Table 2) and were analyzed for VOCs by EPA Method 8260B. Sample results were compared to NYSDEC TOGS 1.1.1 Ambient Water Quality Standards (Table 3). CVOC exceedances were detected in five of these samples including samples from locations GWS-12, GWS-1, GWS-3, GWS-2, GWS-8, and GWS-4. No PCE or TCE exceedances were detected in the DPT samples. DCE exceedances were detected in samples from four of the DPT sample locations including GWS-12, GWS-1, GWS-2, and GWS-8 at concentrations ranging from 8.2 µg/L to 67 µg/L compared with the standard of 5 µg/L. A VC exceedance of 3.6 µg/L was detected in the sample from GWS-2, compared to the standard of 2 µg/L. 1,1-Dichloroethane exceedances were detected in samples from GWS-2 and GWS-12 at concentrations of 9.2 µg/L 22 µg/L, respectively compared to the standard of 5 µg/L and a 1,1,1-Trichloroethane exceedance was detected in the sample from GWS-1 at a concentration of 11 µg/L, compared to the standard of 5 µg/L. An exceedance of 1,2-Dichloroethane was detected in the sample from GWS-3 at an estimated concentration of 0.89 µg/L, slightly above the standard of 0.6 µg/L. Benzene exceedances were also detected in the samples from GWS-4 and GWS-3, both at concentrations of 1.1 µg/L and above the standard of 1 µg/L.

3.2 Summary of Permanent Monitoring Well Groundwater Sampling Results

On November 14 and 15, 2012 CDM Smith sampled newly installed monitoring wells MW-1, MW-2, and MW-3 as well as three existing monitoring wells found on-site, MW-10, MW-9, and MW-7. A total of six groundwater samples were collected from permanent monitoring wells, plus one duplicate sample and one MS/MSD sample. Samples were analyzed by Test America for VOCs by EPA Method 8260B. Sample results were compared to NYSDEC TOGS 1.1.1 Ambient Water Quality

Standards (Table 3). CVOC exceedances were detected in two of these samples including samples from locations MW-9 and MW-10. Exceedances of 1,1-Dichloroethane were detected in both wells MW-9 and MW-10 at concentrations of 27 µg/L and 47 µg/L, respectively, compared to the standard of 5 µg/L. Exceedances of cis-1,2-Dichloroethene were detected in both wells MW-9 and MW-10 at concentrations of 300 µg/L and 74 µg/L, respectively, compared to the standard of 5 µg/L. Exceedances of VC were detected in both wells WM-9 and MW-10 at concentrations of 9.1 and 37 µg/L, respectively, compared to the standard of 2 µg/L. Exceedances of 1,1-Dichloroethene, PCE, and TCE were also detected in well MW-9 at concentrations of 7.7 µg/L, 9.6 µg/L, and 8.7 µg/L, respectively, compared with the standard for each of 5 µg/L.

3.3 Data Validation Usability Report

All groundwater samples collected by CDM Smith were validated by Data Validation Services, an independent, qualified data validator in accordance with NYSDEC Data Usability Summary Report (DUSR) guidance. A usability analysis is attached as Appendix E. The results of the validation are summarized as follows:

"Initial and continuing calibration standard (ICV and CCV) responses are within protocol and validation guidelines, with the following exceptions, results for which are qualified as estimated in the indicated samples:

- dichlorodifluoromethane, 1,1,2-1,2,2-trichlorotrifluoroethane, and cyclohexane (22%D to 30%D) in 231078-TB-100612, 231078-GWS09-GW-20, 213078-GW05-GW-18, and 231078-GW04-GW-18
- acetone, 2-butanone, 4-methyl-2-pentanone, 2-hexanone, and bromoform (21%D to 36%D) in all samples reported in SDG 480-28955-1
- methyl acetate (21%D) in all samples reported in SDG 480-28955-1 except 231078-MW02-GW-15
- dibromochloromethane (22%D) in 231078-MW02-GW-15

The Tentatively Identified Compound in 231078-MW09-GW-35 has been edited to "unknown"; the spectrum is not a good match for the compound with which it was identified."

The qualifiers applied to the data by the data validator did not affect the data in Table 3, since not all data are listed, only exceedances.

Section 4 – Conclusions

Based on the results of the groundwater sampling conducted during this investigation and the results of the groundwater and soil sampling conducted during the August 2012 investigation conducted by Langan on the West 28th Street Site and the January 2012 groundwater sampling conducted by FLS on the 11th Avenue Site, CDM Smith concludes that a source of CVOCs exists below the West 28th Street Site and is contributing to the shallow groundwater contamination in the area of the W29th Street Plume. The contamination appears to be degrading and flowing off-site with groundwater to the west. This is based on no PCE or TCE compounds being detected in the groundwater samples collected but degradation compounds were detected.

In addition, the groundwater sample collected by CDM Smith from MW-9 (Figure 4) from a depth of 36.75 feet bgs was the deepest groundwater sample collected in the area and is located at the intersection of West 29th Street and 10th Avenue. The CVOC exceedances in this sample indicate that CVOC contamination may have sunk deeper into the aquifer and dispersed to this area across gradient from the source area. Alternatively, there may be another deeper plume of CVOCs from another source in the area that is contributing to the contamination at this depth. However, further investigation would be warranted to determine the deeper groundwater flow direction and delineate this potential deeper CVOC plume.

CDM Smith is available to meet with you and discuss the results of this site characterization. Please call me at 518-782-4543 if you have any questions or need any additional information while completing your review of this letter report.

Very truly yours,

Heather L. Hallett, P.G.
Project Manager

Attachments:

Figure 1 – Site Location Map
Figure 2 – Potentiometric Surface Plot
Figure 3 – Groundwater Sample VOC Exceedances
Figure 4 – Groundwater CVOC Exceedances – All 2012 Investigations

Table 1 – Permanent Monitoring Well Gauging Information
Table 2 – Groundwater Sampling Field Parameters Summary
Table 3 - Summary of Groundwater Sampling Results - Exceedances Only

Appendix A – GPR Survey Report
Appendix B – Laboratory Report
Appendix C – Monitoring Well Construction Diagrams
Appendix D – Waste Disposal Manifests
Appendix E – Data Usability Report
Appendix F – Field Log Book Notes and Low Flow Sheets

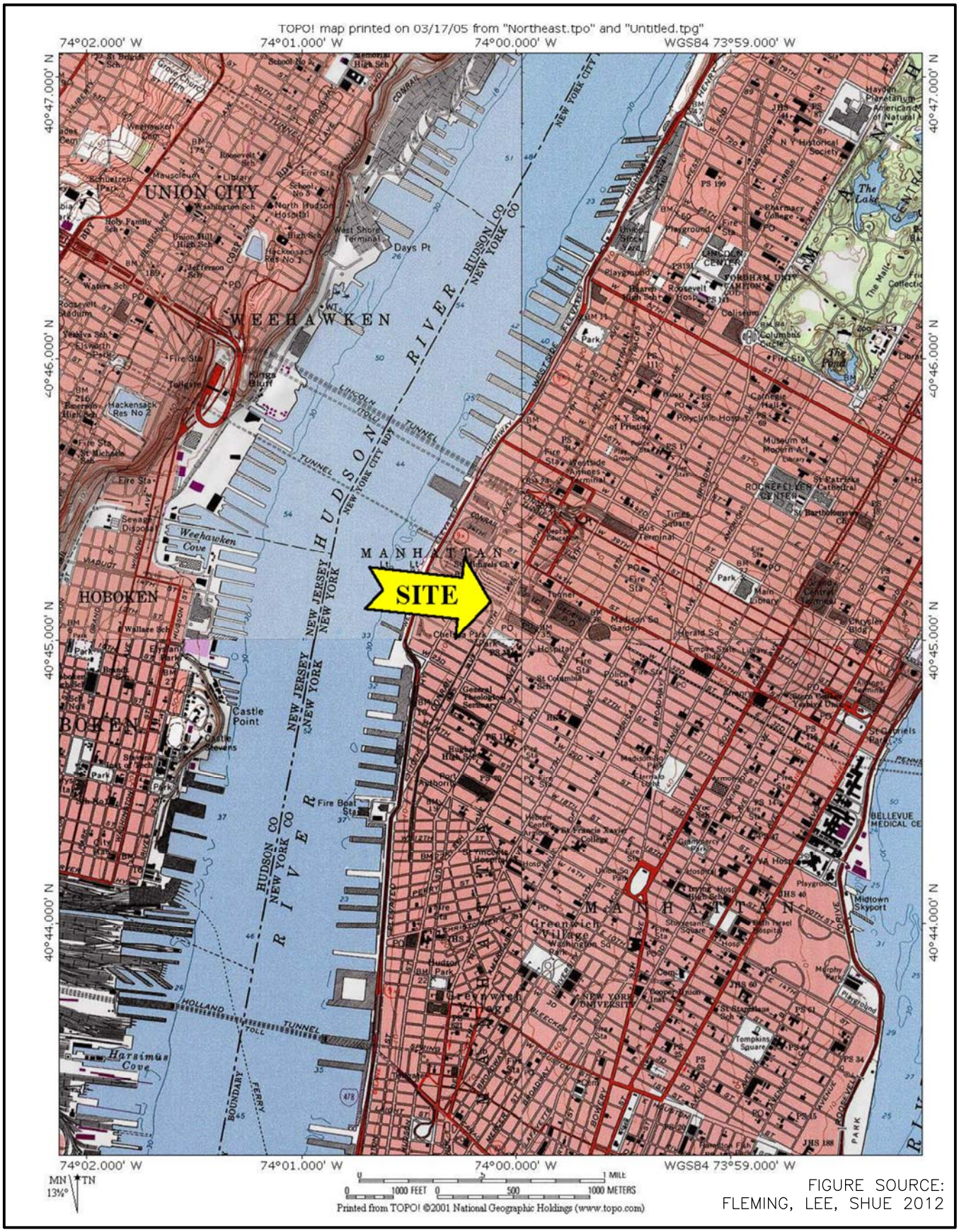

FIGURE SOURCE:
FLEMING, LEE, SHUE 2012

CDM Smith

Figure No. 1
Site Location
JANUARY 2013

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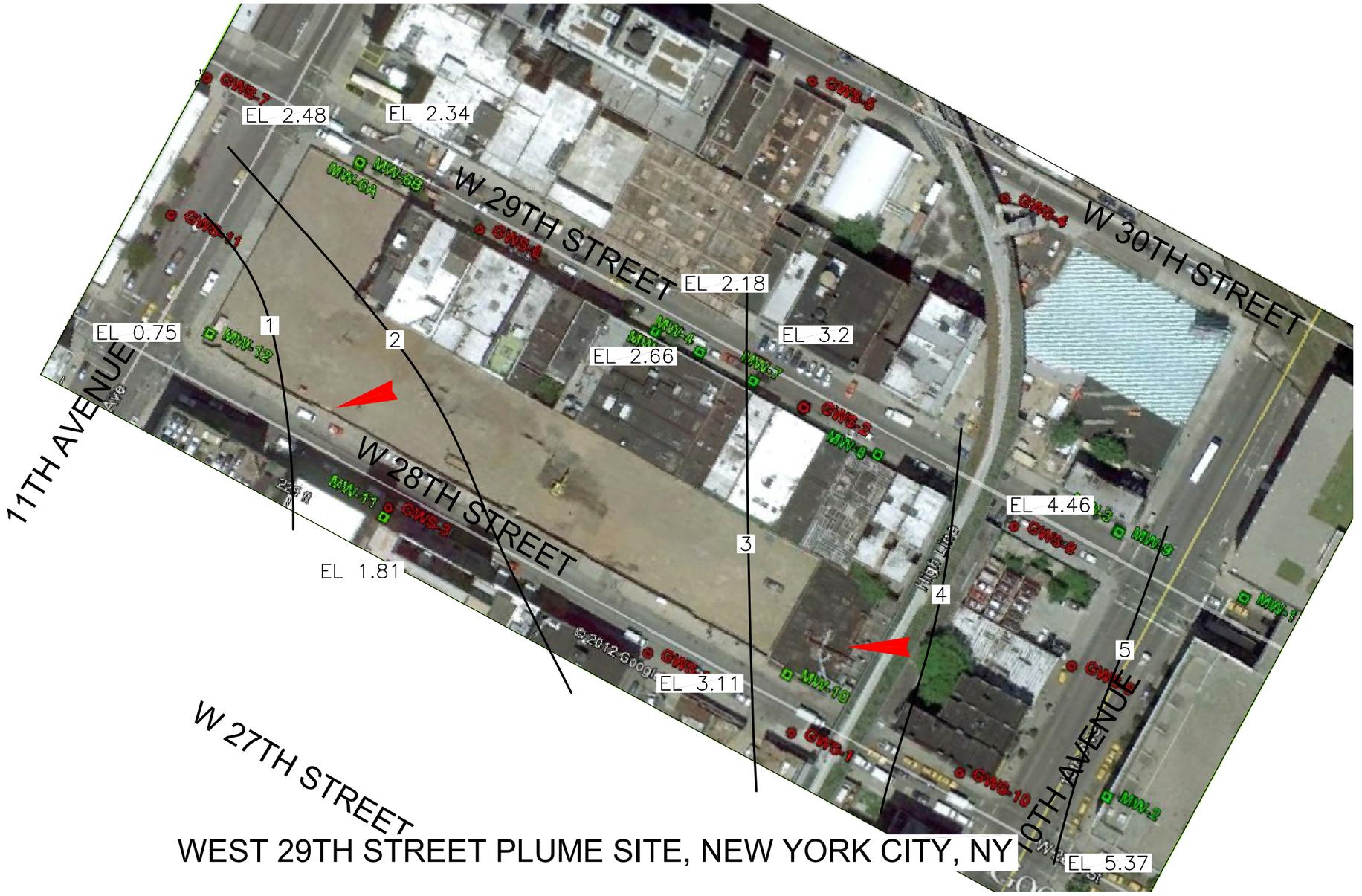


WEST 29TH STREET PLUME SITE, NEW YORK CITY, NY

LEGEND

MW–1 MONITORING WELL LOCATIONS

GWS–1 DIRECT PUSH GROUNDWATER SCREENING SAMPLE LOCATION

1 CONTOUR INTERVAL – 1 FT

GROUNDWATER FLOW DIRECTION

Base plan and survey prepared by Hirani Group, October 2012

0ft 100ft 200ft 300ft

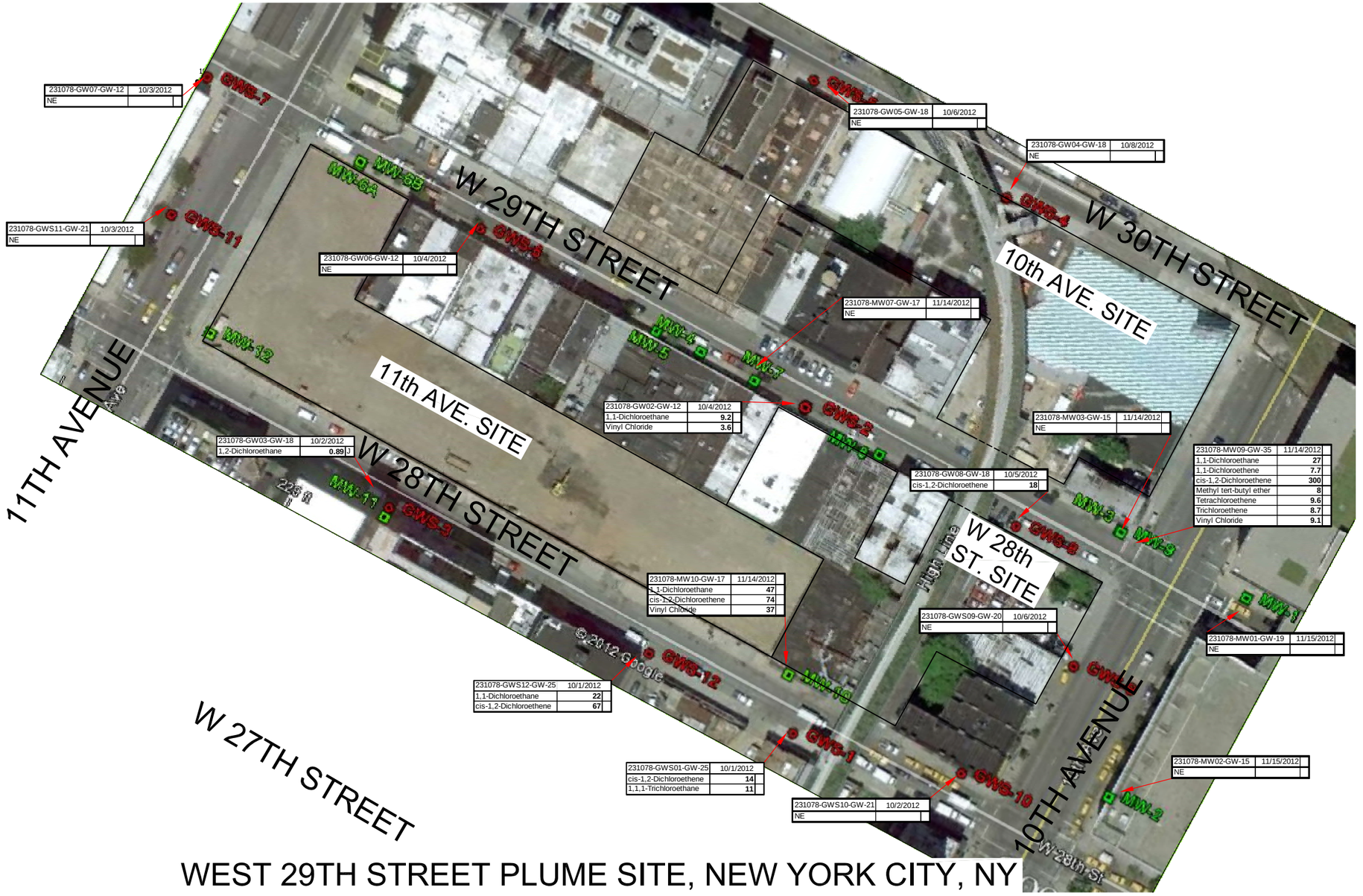
GRAPHIC SCALE
ALL MEASUREMENTS ARE U.S. SURVEY FEET

CDM Smith

Figure No. 2
Potentiometric Surface Plot
JANUARY 2013

C:\cdmxm\romano\d1018370\FIG 2 POT SURF PLOT.dwg, 1/4/2013 11:54:56 AM, RomanO

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\0897\92618\03 REPORTS AND STUDIES\09 CADD FIGURES AND GRAPHICS\FIG 3 MON WELL LOC.DWG



LEGEND

MW–1 MONITORING WELL LOCATIONS CDM SMITH GAUGED AND/OR SAMPLED OCT/NOV 2012

GWS–1 DIRECT PUSH GROUNDWATER SCREENING SAMPLE LOCATION CDM SMITH OCT 2012

Analytical results are presented in micrograms per liter (µg/L)

Only exceedances are shown on figure

Bold text indicates exceedance of NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS)

J = Estimated concentration

NE = No exceedance

Base plan and survey prepared by Hirani Group, October 2012

Analytical data is preliminary and has not been validated

0ft 100ft 200ft 300ft

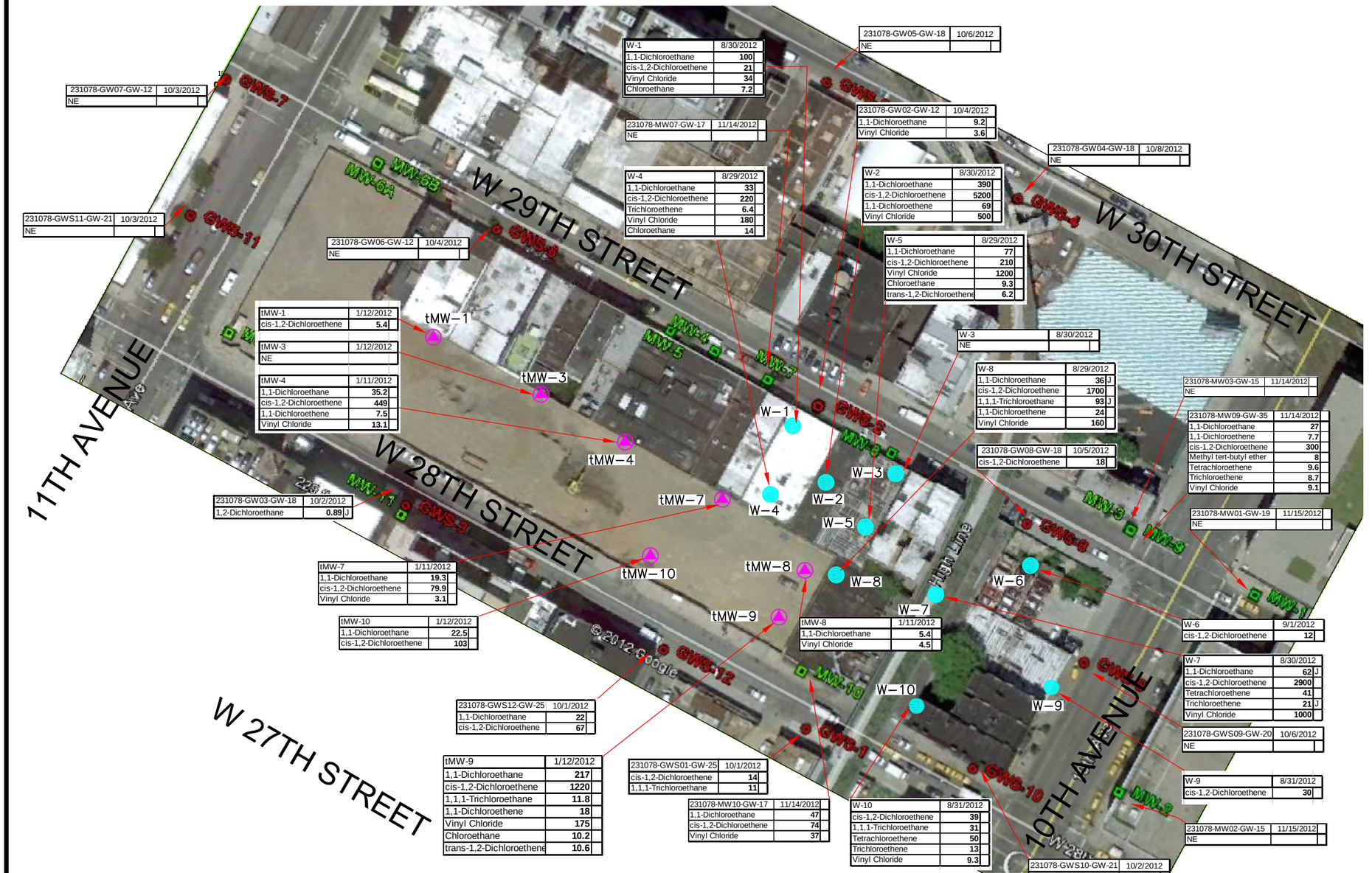
GRAPHIC SCALE
ALL MEASUREMENTS ARE U.S. SURVEY FEET

WEST 29TH STREET PLUME SITE, NEW YORK CITY, NY

CDM Smith

Figure No. 3
Groundwater Sample VOC Detections
JANUARY 2013

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\0897\92618\03 REPORTS AND STUDIES\09 CADD FIGURES AND GRAPHICS\FIG 4 VOC EXCEED.DWG



231078-GW07-GW-12	10/3/2012
NE	

231078-GWS11-GW-21	10/3/2012
NE	

231078-GW06-GW-12	10/4/2012
NE	

tMW-1	1/12/2012
cis-1,2-Dichloroethene	5.4

tMW-3	1/12/2012
NE	

tMW-4	1/11/2012
1,1-Dichloroethane	35.2
cis-1,2-Dichloroethene	449
1,1-Dichloroethene	7.5
Vinyl Chloride	13.1

231078-GW03-GW-18	10/2/2012
1,2-Dichloroethane	0.89 J

tMW-7	1/11/2012
1,1-Dichloroethane	19.3
cis-1,2-Dichloroethene	79.9
Vinyl Chloride	3.1

tMW-10	1/12/2012
1,1-Dichloroethane	22.5
cis-1,2-Dichloroethene	103

231078-GWS12-GW-25	10/1/2012
1,1-Dichloroethane	22
cis-1,2-Dichloroethene	67

tMW-9	1/12/2012
1,1-Dichloroethane	217
cis-1,2-Dichloroethene	1220
1,1,1-Trichloroethane	11.8
1,1-Dichloroethene	18
Vinyl Chloride	175
Chloroethane	10.2
trans-1,2-Dichloroethene	10.6

231078-GWS01-GW-25	10/1/2012
cis-1,2-Dichloroethene	14
1,1,1-Trichloroethane	11

231078-MW10-GW-17	11/14/2012
1,1-Dichloroethane	47
cis-1,2-Dichloroethene	74
Vinyl Chloride	37

W-1	8/30/2012
1,1-Dichloroethane	100
cis-1,2-Dichloroethene	21
Vinyl Chloride	34
Chloroethane	7.2

231078-MW07-GW-17	11/14/2012
NE	

W-4	8/29/2012
1,1-Dichloroethane	33
cis-1,2-Dichloroethene	220
Trichloroethene	6.4
Vinyl Chloride	180
Chloroethane	14

231078-GW05-GW-18	10/6/2012
NE	

231078-GW02-GW-12	10/4/2012
1,1-Dichloroethane	9.2
Vinyl Chloride	3.6

W-2	8/30/2012
1,1-Dichloroethane	390
cis-1,2-Dichloroethene	5200
1,1-Dichloroethene	69
Vinyl Chloride	500

231078-GW04-GW-18	10/8/2012
NE	

W-5	8/29/2012
1,1-Dichloroethane	77
cis-1,2-Dichloroethene	210
Vinyl Chloride	1200
Chloroethane	9.3
trans-1,2-Dichloroethene	6.2

W-3	8/30/2012
NE	

W-8	8/29/2012
1,1-Dichloroethane	36 J
cis-1,2-Dichloroethene	1700
1,1,1-Trichloroethane	93 J
1,1-Dichloroethene	24
Vinyl Chloride	160

231078-GW08-GW-18	10/5/2012
cis-1,2-Dichloroethene	18

tMW-8	1/11/2012
1,1-Dichloroethane	5.4
Vinyl Chloride	4.5

W-10	8/31/2012
cis-1,2-Dichloroethene	39
1,1,1-Trichloroethane	31
Tetrachloroethene	50
Trichloroethene	13
Vinyl Chloride	9.3

231078-GWS10-GW-21	10/2/2012
NE	

231078-MW03-GW-15	11/14/2012
NE	

231078-MW09-GW-35	11/14/2012
1,1-Dichloroethane	27
1,1-Dichloroethene	7.7
cis-1,2-Dichloroethene	300
Methyl tert-butyl ether	8
Tetrachloroethene	9.6
Trichloroethene	8.7
Vinyl Chloride	9.1

231078-MW01-GW-19	11/15/2012
NE	

W-6	9/1/2012
cis-1,2-Dichloroethene	12

W-7	8/30/2012
1,1-Dichloroethane	62 J
cis-1,2-Dichloroethene	2900
Tetrachloroethene	41
Trichloroethene	21 J
Vinyl Chloride	1000

231078-GWS09-GW-20	10/6/2012
NE	

W-9	8/31/2012
cis-1,2-Dichloroethene	30

231078-MW02-GW-15	11/15/2012
NE	

LEGEND

MW–1 MONITORING WELL LOCATION CDM SMITH GAUGED AND/OR SAMPLED OCT/NOV 2012

GWS–1 DIRECT PUSH GROUNDWATER SCREENING SAMPLE LOCATION CDM SMITH OCT 2012

tMW–1 GROUNDWATER SAMPLE LOCATION JAN 2012, FLEMING, LEE AND SHUE

W–1 GROUNDWATER SAMPLE LOCATION LANGAN AUG–SEPT 2012

Analytical results are presented in micrograms per liter (µg/L)

J = Estimated concentration

NE = No exceedance

Groundwater sample analytical results are compared to the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS)

Only Exceedances are shown on figure

Base plan and survey prepared by Hirani Group, October 2012

W- sample locations estimated from and analytical results taken from Langan Engineering and Environmental Services report figures dated September 18, 2012

tMW- sample locations estimated from and analytical results taken from Fleming Lee and Shue Environmental Management & Consulting report figures dated February 3, 2012

GWS and GW sample analytical data is preliminary and has not be validated

0ft 100ft 200ft 300ft

GRAPHIC SCALE
ALL MEASUREMENTS ARE U.S. SURVEY FEET

WEST 29TH STREET PLUME SITE, NEW YORK CITY, NY

CDM Smith

Figure No. 4
Groundwater CVOC Exceedances - All 2012 Investigations
JANUARY 2013

DRAFT Table 1
Permanent Monitoring Well Gauging Information
West 29th Street Plume Site, Site ID No. 2-31-078
NYSDEC Work Assignment No. D007621-5

Location ID	Latitude[1]	Longitude[1]	Well Diameter (in)	Top of Casing Elevation (ft)	Depth to Water (ft)	Depth to Bottom (ft)	Well Bottom Elevation (ft)	Groundwater Elevation (ft)
MW-1	40.450509049	-74.000432744	2	15.15	13.45	20	-4.85	1.7
MW-10	40.450444253	-74.000958718	1	13.04	9.93	18	-4.96	3.11
MW-11	40.450582314	-74.001424369	2	10.31	8.5	24.1	-13.79	1.81
MW-12	40.450743198	-74.001625845	2	8.92	8.17	15.4	-6.48	0.75
MW-2	40.450337230	-74.000591317	2	17.52	12.15	20	-2.48	5.37
MW-3	40.450568488	-74.000577252	2	14.37	9.91	20	-5.63	4.46
MW-4	40.450725548	-74.001059181	4	12.06	9.4	15.15	-3.09	2.66
MW-5	40.450743992	-74.001110542	4	11.87	9.69	16.65	-4.78	2.18
MW-6A	40.450890602	-74.001452686	2	9.79	7.31	16.15	-6.36	2.48
MW-6B	40.450893166	-74.001452597	2	9.95	7.61	19.8	-9.85	2.34
MW-7	40.450700169	-74.000997961	4	12.35	9.15	19	-6.65	3.2
MW-8	40.450634304	-74.000851595	2	12.59	10.91	33.45	-20.86	1.68
MW-9	40.450566813	-74.000575967	2	14.48	13.2	36.75	-22.27	1.28

Notes:

1. Latitude and Longigtude is expressed in World Geodetic System 1984 (WGS 84) datum.

DRAFT Table 2
Groundwater Sampling Field Parameters Summary
West 29th Street Plume Site, Site ID No. 2-31-078
NYSDEC Work Assignment No. D007621-5

Parameter ID	Location ID / Sample Date / Units	GWS-1 10/1/12	GWS-2 10/4/12	GWS-3 10/2/12	GWS-4 10/8/12	GWS-5 10/8/12	GWS-6 10/4/12	GWS-7 10/3/12	GWS-8 10/5/12
Time	HH:MM	13:00	10:55	11:50	11:45	9:50	9:22	11:05	9:50
Volume Purged	L	5.3	4.92	4.92	1.14	5.68	4.92	NR	3.79
Depth to Water (from TIC)	ft	NR	NR	8.95	NR	NR	NR	NR	NR
Flow Rate	mL/min	300	300	300	200	300	300	300	150
Drawdown From Static	ft	NR	NR	0.6	NR	NR	NR	NR	NR
pH	SU	6.93	6.72	6.84	6.93	7.12	6.74	6.63	6.52
Specific Conductivity	mS/cm	2.218	1.96	0.967	1.94	2.169	2.996	3.921	6.239
Dissolved Oxygen	mg/L	1.91	1.54	1.85	2.51	1.87	1.94	2.37	3.55
Temperature	deg C	18.46	21.18	20.64	18.01	19.61	20.47	21.12	20.58
Redox Potential	mV	72.5	-101.8	-92.8	114.9	176.6	103.2	-87.7	-40.7
Turbidity	NTU	NR	NR	NR	NR	NR	NR	NR	NR
Groundwater Sample Depth	ft bgs	25	16	18	18	18	16	16	17

Notes:

NR = Not recorded

GWS samples are grab groundwater samples collected using direct push technology

DRAFT Table 2
Groundwater Sampling Field Parameters Summary
West 29th Street Plume Site, Site ID No. 2-31-078
NYSDEC Work Assignment No. D007621-5

Parameter ID	Location ID / Sample Date / Units	GWS-9 10/6/12	GWS-10 10/2/12	GWS-11 10/3/12	GWS-12 10/1/12	MW-1 11/15/12	MW-2 11/15/12	MW-3 11/14/12	MW-7 11/14/12
Time	HH:MM	9:25	9:50	9:32	11:05	8:06	9:18	8:21	10:50
Volume Purged	L	3.79	4.92	5.68	13.25	5.15	13.2	4.7	5
Depth to Water (from TIC)	ft	NR	NR	NR	NR	15.75	11.27	12.31	10.8
Flow Rate	mL/min	200	300	300	360	150	400	200	200
Drawdown From Static	ft	NR	NR	NR	NR	3.92	0.2	3.15	1.56
pH	SU	6.61	6.92	6.84	6.65	6.93	6.74	6.89	7
Specific Conductivity	mS/cm	2.785	2.685	3.512	1.808	3.259	2.901	5.427	3.375
Dissolved Oxygen	mg/L	4.2	1.86	1.7	1.05	1.45	0.61	5.09	0.99
Temperature	deg C	21.1	21.21	22.01	19.01	17.21	19.69	17.78	17.47
Redox Potential	mV	95.1	42.1	150.1	189.8	-9.6	91.2	40.7	-122.4
Turbidity	NTU	NR	NR	NR	NR	41.8	1.14	67.5	14.2
Groundwater Sample Depth	ft bgs	20	21	16	25	15	15	15	17

Notes:

NR = Not recorded

GWS samples are grab groundwater sampl

DRAFT Table 2
Groundwater Sampling Field Parameters Summary
West 29th Street Plume Site, Site ID No. 2-31-078
NYSDEC Work Assignment No. D007621-5

Parameter ID	Location ID / Sample Date / Units	MW-9 11/14/12	MW-10 11/14/12
Time	HH:MM	9:20	12:00
Volume Purged	L	5	5.5
Depth to Water (from TIC)	ft	12.08	8.9
Flow Rate	mL/min	250	150
Drawdown From Static	ft	0.09	NR
pH	SU	6.92	6.99
Specific Conductivity	mS/cm	2.089	2.024
Dissolved Oxygen	mg/L	0.85	0.73
Temperature	deg C	16.44	19.17
Redox Potential	mV	33.4	-58.7
Turbidity	NTU	6.54	107
Groundwater Sample Depth	ft bgs	35	17

Notes:
NR = Not recorded
GWS samples are grab groundwater sampl

DRAFT Table 3
Summary of Groundwater Sampling Results - Exceedances Only
West 29th Street Plume Site, Site ID No. 2-31-078
NYSDEC Work Assignment No. D007621-5

Parameter ID	NYSDEC TOGS 1.1.1 Ambient Water Quality Standards	Units	Sample ID Sample Date Sample Location ID	231078-GWS12-GW-25 10/1/12 GWS-12		231078-GWS01-GW-25 10/1/12 GWS-1		231078-GW03-GW-18 10/2/12 GWS-3		231078-GW02-GW-12 10/4/12 GWS-2	
1,1-Dichloroethane	5	µg/L		22		3.5		ND		9.2	
cis-1,2-Dichloroethene	5	µg/L		67		14		ND		8.2	
1,1,1-Trichloroethane	5	µg/L		ND		11		ND		ND	
1,1-Dichloroethene	5	µg/L		ND		3.7		ND		ND	
Tetrachloroethene	5	µg/L		ND		4.3		ND		ND	
Trichloroethene	5	µg/L		ND		1.5		ND		ND	
1,2-Dichloroethane	0.6	µg/L		ND		ND		0.89	J	ND	
Benzene	1	µg/L		ND		ND		1.1		ND	
Vinyl Chloride	2	µg/L		ND		ND		1.3		3.6	

Notes:

Exceedance of NYSDEC TOGS 1.1.1 Ambient Water Quality Standards

J = Estimated Value

ND = Compound not detected above reporting limits

DRAFT Table 3
Summary of Groundwater Sampling Results - Exceedances Only
West 29th Street Plume Site, Site ID No. 2-31-078
NYSDEC Work Assignment No. D007621-5

Parameter ID	NYSDEC TOGS 1.1.1 Ambient Water Quality Standards	Units	Sample ID Sample Date Sample Location ID	231078-GW08-GW-18 10/5/12 GWS-8		231078-GW04-GW-18 10/8/12 GWS-4		231078-MW09-GW-35 11/14/12 MW-9		231078-MW10-GW-17 11/14/12 MW-10	
1,1-Dichloroethane	5	µg/L		ND		ND		27		47	
cis-1,2-Dichloroethene	5	µg/L		18		ND		300		74	
1,1,1-Trichloroethane	5	µg/L		ND		ND		1.7		ND	
1,1-Dichloroethene	5	µg/L		ND		ND		7.7		0.86	J
Tetrachloroethene	5	µg/L		ND		ND		9.6		2	
Trichloroethene	5	µg/L		ND		ND		8.7		1.5	
1,2-Dichloroethane	0.6	µg/L		ND		ND		0.41		ND	
Benzene	1	µg/L		ND		1.1		0.44		ND	
Vinyl Chloride	2	µg/L		ND		ND		9.1		37	

Notes:

Exceedance of NYSDEC TOGS 1.1.1 Ambient Water Quality Standards

J = Estimated Value

ND = Compound not detected above reporting limits