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Division of Environmental Remediation
Bureau E, Section B
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Subject: Abbreviated Corrective Measures Study
SWMUs 7, 8, 25B, and AOC E
Former Hampshire Chemical Corp. Facility, Waterloo, New York

Dear Ms. Dieter:

The Dow Chemical Company is pleased to submit this abbreviated corrective measures study (CMS) for the former Hampshire Chemical Corp. facility in Waterloo, New York. This CMS includes Solid Waste Management Units (SWMUs) 7, 8, 25B, and Area of Concern (AOC) E, and is in response to the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) report comment letter dated November 8, 2006, received from the New York State Department of Environmental Conservation (NYSDEC 2006a). The RFI report was submitted pursuant to an amended Administrative Order on Consent (Index No. CO 8-20000218-3281, June 1, 2004) between Hampshire Chemical Corporation (HCC) and NYSDEC (NYSDEC 2004). HCC is a wholly owned subsidiary of The Dow Chemical Company. This CMS will be performed pursuant to a Second Amended Order on Consent (Index No. CO 8-20000218-3281, August 12 , 2011).

This abbreviated CMS evaluates potentially applicable technologies and recommends corrective measures alternatives to (1) reduce human health risk to the industrial workers at the site and the public, and (2) reduce risks to the environment from SWMUs 7, 8, and 25B. In accordance with telephone communication between CH2M HILL and NYSDEC on February 18, 2011, further investigation will be performed at AOC D to determine appropriate corrective measures. This also was discussed with NYSDEC during a March 3, 2011, meeting. AOC E is not included in this CMS evaluation because a No Further Action (NFA) recommendation has been proposed.

Current Conditions

The facility is located at 228 East Main Street in the Village of Waterloo, Seneca County, New York (Figure 1). The facility is bordered to the north by East Main Street, to the east by

Gorham Street, to the west by East Water Street, and to the south by the Seneca-Cayuga Canal.

The following summary presents the historical investigations performed at SWMUs 7, 8, 25B, and AOC E, as well as the current site conditions. Figure 2 shows the location of SWMUs 7, 8, 25B, and AOC E, as well as historical soil and groundwater sampling locations for these areas.

Soil sample results discussed in the following sections were compared to the appropriate soil cleanup standards at the time of the investigation. Analytical data for soil samples collected before 2006 were screened using the NYSDEC recommended soil cleanup objectives as set forth in the NYSDEC Technical and Administrative Guidance Memorandum HW-4046 (TAGM 4046), entitled *Determination of Soil Cleanup Objectives and Cleanup Levels* (NYSDEC, January 1994, and subsequent revisions). The NYSDEC soil cleanup objectives found at 6 New York Codes, Rules and Regulations Part 375-6.8(b), Restricted Use Soil Cleanup Objectives (RUSCO) (NYSDEC 2006b), became effective in December 2006, and were used to rescreen available soil sample results that were presented in the RFI addendum report (CH2M HILL 2008).

SWMU 7

The hazardous waste container storage area identified as SWMU 7 was an RCRA-regulated storage shed that measured approximately 16 feet by 10 feet and was located approximately 200 feet west of Building 16. No documented releases exist for this area.

Three soil samples (EC-7S-01-01, EC-7S-04-01, and EC-7S-05-01) were collected in June 1999 (Radian 1999). Although analytical data from the initial sampling event did not indicate any release of constituents from SWMU 7, seven additional soil samples (SWMU 7-1-A through SWMU 7-7-A) were collected in July 1999 to document the area beneath the proposed location of the new tanks to be constructed for the wastewater treatment plant (Radian 1999).

The soil investigation in 1999 detected chloroform in one soil sample (SWMU 7–6-A) at a concentration (2.9 milligrams per kilogram [mg/kg]) that exceeded the TAGM 4046 (NYSDEC 1994) soil screening level (0.3 mg/kg). The area was excavated, and post-excavation soil samples did not show exceedances for chloroform (Radian 1999).

In response to the SWMU 7 and 8 summary report (Radian 1999), NYSDEC stated in a letter dated March 7, 2000, that additional soil characterization is required for metals, and that complete methodologies should have been run on the SWMU 7 post-excavation samples. However, NYSDEC concluded that, "Concerns about residual soil contamination may be a moot point at this time given that SWMU 7 has been sheltered by the new sequencing batch reactor tanks." NYSDEC requested in its March 7, 2000, letter that SWMU 7 be incorporated into the sitewide groundwater monitoring program.

Monitoring well MW-25 was installed in October 2008 by a New York State-licensed drilling firm to provide a groundwater monitoring point downgradient of SWMU 7. The well was constructed to 16 feet below ground surface (bgs) with a screened interval from 6 to 16 feet bgs.

MW-25 was sampled during the October 2008, April 2009, and October 2009 sampling events, none of which exhibited volatile organic compound (VOC) concentrations exceeding the Technical Operation Guidance Series (TOGS; NYSDEC 1998) Class GA standards. During the April 2009 sampling event, one semivolatile organic compound (SVOC), bis(2-ethyhexyl)phthalate, was detected above its TOGS Class GA standards of 5 micrograms per liter (µg/L) at a concentration of 10.8 µg/L. This compound was not detected in the October 2008 and October 2009 sampling events. Iron, magnesium, manganese, and sodium were detected above their TOGS Class GA standards. These results were submitted to NYSDEC in the sitewide groundwater monitoring report (CH2M HILL 2010).

At present, SWMU 7 is within a concrete-paved and diked area that has an engineered foundation to support the wastewater treatment plant bioreactors.

SWMU 8

The nonhazardous waste container storage area (SWMU 8) is an outdoor area that was built in 1975 in the northwestern portion of the facility. It was used for storing 55-gallon plastic drums of nonhazardous still bottom wastes, which originated from the various plant processes. No releases have been reported from this SWMU.

A soil investigation was performed in 1999, and soil samples were collected from two soil borings (EC-8S-01-01 and EC-8S-02-01). No constituents of concern were identified at either boring location (Radian 1999). On March 7, 2000, NYSDEC requested that further groundwater and soil investigations be performed.

Additional soil borings (SB-03 and SB-04) completed in December 2001 indicated that polynuclear aromatic hydrocarbons (PAHs) and metals exceeded the TAGM 4046 soil screening levels at one or both of the soil borings. The PAHs may be related to historical industrial uses of the property, including the use of coal-fired boilers. Cinders and ash have been found in the fill material at the site (O'Brien & Gere Engineers, Inc. [OB&G] 2003). Beryllium, cadmium, copper, iron, mercury, nickel, and zinc were detected at SB-03 and SB-04, with higher concentrations of these metals at SB-03. Arsenic, chromium, barium, and selenium also were detected at SB-03 and exceeded the TAGM 4046 soil screening levels.

Iron and zinc were the only production-related constituents detected above TAGM 4046 soil screening levels, while the other metals potentially were related to fill in the area or the past industrial uses, but not to the materials handled within this SWMU or to the onsite production (OB&G 2003). Further soil investigations (SB-03A and SB-03B completed west and northwest of SB-03) in April and May 2004 indicated that PAHs, barium, and copper were found at concentrations above the TAGM 4046, but were limited in vertical and

horizontal extent. These constituents are not attributable to the activities at the SWMU, but are likely attributable to the facility fill (CH2M HILL 2004).

Based on the 2006 RFI report comment letter dated November 8, 2006, NYSDEC conditionally approved NFA at SWMU 8, but requested a draft soil management plan as part of an abbreviated CMS and a community air monitoring plan (CAMP) in accordance with New York State Department of Health (NYSDOH) requirements for any investigations that will breach the existing ground cover. The existing ground cover is paved with concrete and is surrounded by soil cover. NYSDEC also stated in the letter, "These areas, and any other areas where contaminants may remain on the site, will require institutional controls."

SWMU 25B

Molten mercaptopropionic acid (MPA) residue is gravity drained to steel hoppers located immediately adjacent to Building 12. After each hopper is filled, it is replaced with an empty hopper, and the full hopper is transferred to a holding area to cool and solidify before disposal offsite. SWMU 25B is one of three cooling areas for the MPA distillation residue. No releases have been reported from this SWMU.

In 2001, soil analytical results from soil boring SB-08 reported xylene, dimethyl phthalate, PAHs, and metals above TAGM 4046 soil screening levels; however, they were determined to not be related to site activities. OB&G prepared a sampling visit report in September 2003 and indicated PAHs may be related to the historical use of coal and coal-fired burners in this area. Metals such as iron, zinc, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, and beryllium were detected above their TAGM 4046 soil screening levels. The metals exceeding the TAGM 4046 soil screening levels were attributed primarily to fill material observed across the site, and most analytes are not related to site activities (OB&G 2003). The collection of additional soil samples near SB-08 was recommended to assess the extent of elevated metals and NFA at this SWMU in its sampling visit report (OB&G 2003). In a letter dated December 2, 2003, NYSDEC issued Conditional Approval of the OB&G sampling visit report (OB&G 2003; NYSDEC 2003) and requested that cadmium be included in the metal investigation in the vicinity of SB-08.

In April 2004, soil samples were collected from soil borings SB-08A and SB-08B, which were advanced near SB-08. Concentrations of cadmium, mercury, lead, zinc, and sodium at SB-08B exceeded the TAGM 4046 soil screening levels, but, with the exception of sodium and zinc, were lower than previously reported at SB-08. Arsenic was detected below the TAGM 4046 soil screening levels. Magnesium exceeded the TAGM 4046 soil screening levels at both soil boring locations, but did not exceed the levels at SB-08. Calcium exceeded the TAGM 4046 soil screening levels at SB-08A, but did not exceed the levels at SB-08. The 2006 RFI report concluded that elevated levels of certain metals are present in soil in a limited area in the southern portion of this SWMU, and because the area is concrete paved, the potential risk to humans and ecological receptors is limited. Therefore, NFA was recommended (CH2M HILL 2006).

NYSDEC conditionally approved NFA at SWMU 25B in its November 8, 2006, comment letter, but requested a draft soil management plan as part of an abbreviated CMS and a CAMP in accordance with NYSDOH requirements for any investigations that will breach the existing ground cover. NYSDEC also stated in the letter, "These areas, and any other areas where contaminants may remain on the site, will require institutional controls."

AOC E

AOC E consists of monitoring well MW-10, which is north of Building 2B near a subsurface sump. Previous investigation activities identified methyl isobutyl ketone (MIBK), toluene, and metals above the Class GA standards for groundwater in samples collected from MW-10.

RFI fieldwork performed in April 2004 and December 2005 included collecting groundwater samples from MW-10 and installing four direct push soil borings and two temporary well points near MW-10. The soil results indicated that concentrations of arsenic exceeded NYSDEC TAGM and applicable RUSCO industrial soil screening levels. Acetone and toluene exceeded the Class GA standards in groundwater samples collected from the temporary well points. Groundwater data from the temporary well points and MW-10 indicated that metals exceeded the Class GA standards; however, VOC groundwater impacts, including toluene, were not detected at concentrations exceeding the Class GA standards. The results were presented in the May 2006 RFI report (CH2M HILL 2006).

Based on older data, in the May 2006 RFI report, a CMS was recommended evaluating in situ remedial options to address this area. In a letter dated November 8, 2006, NYSDEC and NYSDOH concurred that a CMS should be completed for this area and agreed that in situ remedial options were an appropriate option. NYSDEC requested a limited CMS that summarized the reasons why in situ remedial options are appropriate, reviewed the various in situ options, and selected the most appropriate option.

More recent groundwater sampling of the AOC E well MW-10 was performed in October 2008, May 2009, October 2009, and April 2010 as part of the semiannual sitewide groundwater monitoring program. The results of the sample analyses indicated that no VOCs or SVOCs were detected above the laboratory detection limit in the samples collected from MW-10. Metals consisting of iron, magnesium, selenium, and sodium were detected at concentrations exceeding Class GA standards.

The CMS recommendation for AOC E in 2006 was based on data collected before 2005. Current data obtained in 2008, 2009, and 2010 do not indicate groundwater impacts for toluene, acetone, or any other VOCs above the Class GA standards. The concentrations of metals detected in the well are generally consistent with what is detected in upgradient groundwater monitoring wells. As a result, a recommendation for NFA for AOC E is proposed. Further evaluation of AOC E in this document was not considered because of the NFA recommendation.

Corrective Action Objectives

The objectives of the corrective action are as follows:

- Prevent or minimize exposure to impacted soil at SWMUs 7, 8, and 25B
- Minimize discharge of constituents of concern to groundwater

Identification and Evaluation of Corrective Measures Alternatives

Based on a review of the information collected during the RFI and the November 8, 2006, letter from NYSDEC, the following corrective measures alternatives have been identified. These corrective measures alternatives have been evaluated in terms of their effectiveness and implementability. Cost evaluations for the SWMUs were not considered because costs did not contribute to the decision-making process.

SWMUs 7, 8, and 25B

Alternative 1 – Institutional Controls

This alternative would include implementing institutional controls that minimize the potential for exposure to impacted soil. The institutional control involves obtaining a deed notice for land use restrictions. The deed notice would limit site use to non-residential activities and notify the property owner that appropriate provisions are necessary to conduct excavation activities at SWMUs 7, 8, and 25B. Signs also would be placed to notify workers of the existing hazards. These institutional controls would be incorporated in the materials management plan (MMP; CH2M HILL 2007a) and filed with the deed of the land.

This alternative does not treat or contain existing soil impacts, but has short-, medium-, and long–term effectiveness because it limits exposures to workers. This alternative is easily implementable.

Alternative 2 – Containment

Alternative 2 involves extending the existing concrete paved surface at SWMU 8 (Figure 3) to isolate the contaminated material, and monitoring and maintaining the paved surface at SWMUs 7, 8, and 25B as needed. This alternative is designed to protect groundwater from these SWMUs by minimizing the transport of constituents through soil by the cover (i.e., limiting infiltration of precipitation).

An evaluation of the thickness, permeability, and quality of the existing concrete-paved surface would be performed at SWMU 8 to determine its integrity and the design parameters for extending the existing paved surface. The engineered paved surface would be designed to control run-on, run-off, infiltration, and soil erosion.

A long-term monitoring and maintenance plan would be developed and implemented to ensure the integrity of the engineered paved surfaces would be maintained. The monitoring

is assumed to consist of at least annual visual inspections of the paved surfaces with maintenance as needed.

Exposure to construction workers would be controlled by using personal protective equipment during the extension and maintenance of the paved surface. The long-term risks to workers would be acceptable, and would be restricted to monitoring and maintenance of the engineered paved surface, if cracks were present. The short- and long-term risks to the public would be acceptable, because access to the SWMUs would be restricted by facility requirements.

The potential for further releases to the environment would be minimal because the paved surface would reduce the infiltration of precipitation and subsequent leaching of constituents to deeper soil and groundwater.

This alternative is already in place at SWMUs 7 and 25B because of existing structures. SWMU 8 is partially paved, and therefore, Alternative 2 is easy to implement because it involves extending the existing concrete paved surface. This alternative would be effective in eliminating worker contact with contaminated soil. Extending the existing paved surface and the maintenance and monitoring plan and activities would be the only associated costs.

Activities related to implementing this alternative, which involve breaching the existing ground cover, would be conducted in accordance with the facility MMP (CH2M HILL 2007a), health and safety plan (HASP; CH2M HILL 2007b), and CAMP (CH2M HILL 2005).

Recommended Corrective Action Alternatives

SWMUs 7, 8, and 25B

A combination of Alternatives 1 and 2, Containment with institutional controls, is the recommended alternative for SWMUs 7, 8, and 25B because it is feasible, provides more protection to human health and the environment, and can be implemented with ease.

If the existing structures at SWMUs 7 and 25B are properly maintained, and the concrete paved surface at SWMU 8 is extended and properly maintained, the conditions will be sufficient to eliminate exposure to workers, except construction workers. Alternative 2 further reduces the exposure risk of workers to contaminated soil and is easily implemented because of existing structures.

Alternative 1 is recommended to be implemented in conjunction with Alternative 2 because with SWMUs 7, 8 and 25B contained and properly maintained, a deed notice to limit site use to non-residential activities would further minimize the potential for human exposure to contamination by ensuring appropriate land use in the future.

Based on the above, a combination of Alternatives 1 and 2 appears to be the most reasonable remedy given the future intended use of the site. This recommendation is consistent with the comments provided by NYSDEC in a letter dated November 8, 2006.

Materials Management Plan

In May 2007, an MMP was prepared for the site and submitted to NYSDEC in June 2007 (CH2M HILL 2007a). This MMP described the management, transportation, and disposal approach for wastes generated during the supplemental RFI activities and from facility upgrades and site improvements being conducted at the former HCC facility in Waterloo, New York. The MMP was updated in 2008 and will be used during implementation of the selected corrective measures because these measures will be considered as site improvements. This plan also addresses the disposal options and transportation for the waste, if necessary.

Air Monitoring Plan

The CAMP provides a measure of protection for the downwind community (i.e., onsite workers not directly involved with the subject work activities and offsite receptors including residences and businesses) by monitoring potential airborne constituent releases as a direct result of investigative and remedial work activities, and to confirm work activities did not spread contamination offsite through the air.

Air monitoring activities will follow the procedures outlined in the CAMP (CH2M HILL 2005), which were presented as Attachment A in the revised RFI Work Plan Addendum in August 2005 and has been included in subsequent work plans and HASPs associated with the site.

Public Involvement Plan

A public involvement is not required for the work presented in this CMS because the applicable engineering controls are already largely in place. NYSDEC approved that this approach during a meeting with HCC and CH2M HILL on April 19, 2011. CH2M HILL will comply with the citizen participation plan as outlined by NYSDEC in Title 6 of the New York Codes, Rules and Regulations Subpart 375-1.10 during implementation of the sitewide CMS which will be submitted to the NYSDEC after completion of investigation activities.

Schedule

Engineering controls will be installed at SWMU 8 and maintained at SWMUs 7, 8 and 25B in agreement with the current facility owner. The engineering controls work plan and schedule will be provided to the NYSDEC before fieldwork is implemented. Additional engineering controls may be identified in the forthcoming CMS for other AOCs and SWMU.

Institutional controls will be implemented at the site after completion of all other onsite investigation and remediation activities.

If you have any questions or comments, please contact me at 304-747-7788.

Sincerely,

Jerome E. Cibrik, P.G.
Remediation Leader

cc: Pete Hoffmire, NYSDEC Region 8
Scott Foti, NYSDEC Region 8
Katherine Fish, NYSDOH
Steve Brusso, Evans Chemetics
CH2M HILL Project File

References

CH2M HILL. 2004. *RCRA Facility Investigation Report, Evans Chemetics Facility, Waterloo, New York.* October.

CH2M HILL. 2005. *Revised RCRA Facility Investigation Work Plan Addendum, Hampshire Chemical Corp, Waterloo, New York.* August.

CH2M HILL. 2006. *RCRA Facility Investigation Report, Evans Chemetics Facility, Waterloo, New York.* May.

CH2M HILL. 2007a. *Materials Management Plan, RCRA Corrective Action Program, Evans Chemetics Facility, Waterloo, New York.* May, revised February 2009.

CH2M HILL. 2007b, as amended. *Health and Safety Plan, Evans Chemetics Facility, Waterloo, New York.* July; November.

CH2M HILL. 2008. *RCRA Facility Investigation Report Addendum, Former Hampshire Chemical Corp.* November, revised February 2010.

CH2M HILL. 2010. *Groundwater Monitoring Results Report – October 2008, April 2009 and October 2009 Sampling Events, Former Hampshire Chemical Corp Facility, Waterloo, New York.* March.

New York State Department of Environmental Conservation (NYSDEC). 1994. *Division Technical and Administrative Guidance Memorandum (TAGM) 4046: Determination of Soil Cleanup Objectives and Cleanup Levels.* January 1994; modified December 2000; modified April 2001; modified July 2001.

New York State Department of Environmental Conservation (NYSDEC). 1998. *Technical and Operational Guidance Series (TOGS), Ambient Water Quality Standards and Guidance Values and Ground Water Effluent Limitations.* June; modified January 1999; April 2000; June 2004.

New York State Department of Environmental Conservation (NYSDEC). 2003. *Letter from NYSDEC, re: Conditional Approval of Sampling Visit Work Plan Addendum, Hampshire Chemical Corp, Evans Chemetics Facility.* December 2.

New York State Department of Environmental Conservation (NYSDEC). 2004. *Amended Administrative Consent Order between Hampshire Chemical Corp and New York State Department of Environmental Conservation (Index Number CO 8-20000218-3281).* June 1.

New York State Department of Environmental Conservation (NYSDEC). 2006a. *Letter from NYSDEC, re: RCRA Facility Investigation (RFI) Report May 2006, Hampshire Chemical Corp, Evans Chemetics Facility, Waterloo, New York.* November 8.

New York State Department of Environmental Conservation (NYSDEC). 2006b. *Environmental Remediation Programs. NYSDEC Restricted Use Soil Cleanup Objectives (RUSCO): Protection of Public Health, Residential and Industrial (6 NYCRR Part 375-6.8(b)).* December 14.

New York State Department of Environmental Conservation (NYSDEC). 2011. *Second Amended Order on Consent Order between Hampshire Chemical Corp and New York State Department of Environmental Conservation (Index Number CO 8-20000218-3281).* August 12.

O'Brien & Gere Engineers, Inc. (OB&G). 2003. *Sampling Visit Report, RCRA Facility Assessment, Hampshire Chemical Corp Facility, Waterloo, New York.* September.

Radian International (Radian). 1999. *SWMU 7 and 8 Investigation Report, Evans Chemetics Facility, Waterloo, New York.* November.

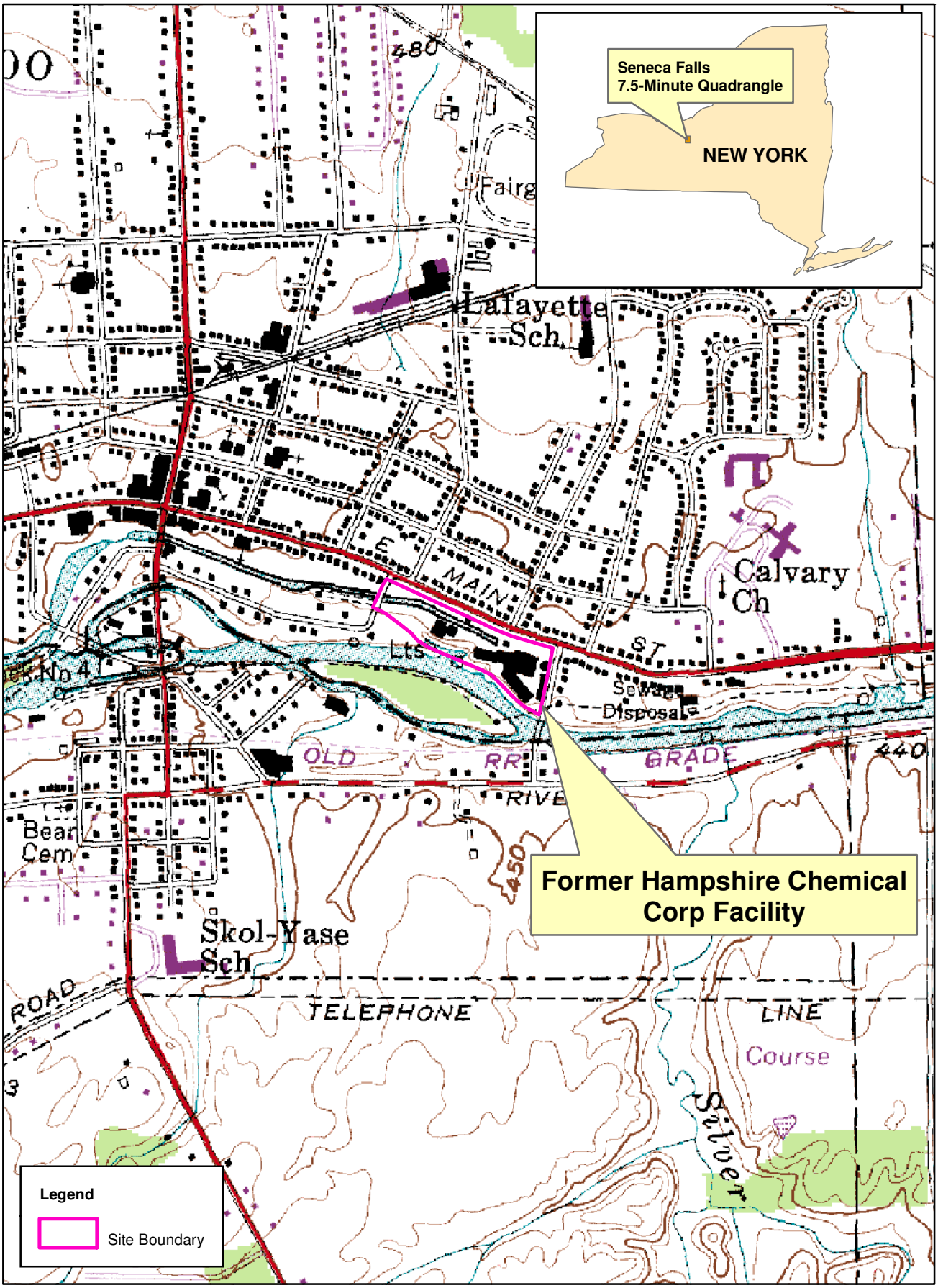

Figure 1
Facility Location Map
Former Hampshire Chemical Corp Facility
Waterloo, New York

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Figure 2
Corrective Measures Study
Historical Sample Locations
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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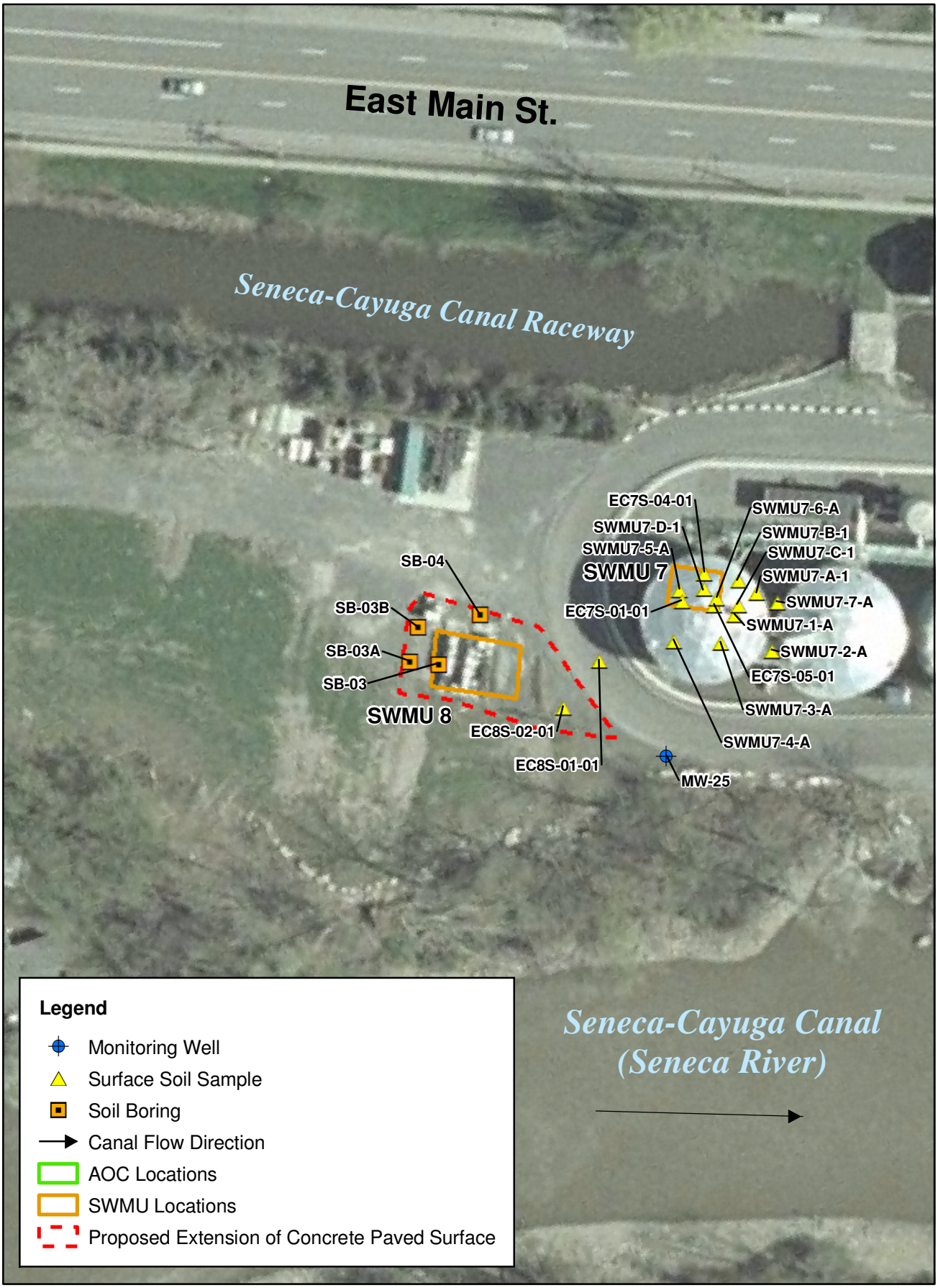

Figure 3
Corrective Measures Study
SWMU 8 Proposed Extension of Paved Surface
Former Hampshire Chemical Corp. Facility
Waterloo, New York

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