DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRAInfo Code CA750
Migration of Contaminated Groundwater Under Control

Facility Name: **Ashland Inc.**
Facility Address: **130 South St., Rensselaer, New York**
Facility EPA ID #: **NYD046877775**

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of contaminated groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater contamination subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

Site Background

The Ashland site is located at 130 South Street in the City of Rensselaer, Rensselaer County, New York, north of the intersection of South Street with State Route 9/US Highway 20 (Columbia Turnpike). The main portion of the site, located on the west side of South Street, has an areal extent of approximately 4.8 acres. The site has most recently been used by Ashland for a chemical distribution facility; however these operations were discontinued in 2001. The site is now vacant and is enclosed by a six-foot high chain-link fence. All related buildings and other structures have been removed from the site. A small parcel of land associated with the site and formerly used as a parking lot is located on the east side of South Street. The main site area is bordered by CSX Transportation, Inc. property and rail lines to the west, undeveloped land to the north, South Street to the east, and Columbia Turnpike to the south. Commercial and light industrial properties are located west of the CSX rail lines and residential properties are located east of the site across South Street.

The site is located on the edge of the Hudson River floodplain. The northeast end of the site is within the 100-year floodplain. A small unnamed creek enters the east central part of the site, crosses the site in a buried culvert, then discharges into an open ditch at a headwall just inside the northern site boundary.

The commercial history of the site began in 1892 when a slaughterhouse occupied the southern portion of the site. Chemical-related industry began in 1909 when Empire Size and Chemical Corporation acquired the site and continued through successive owners (Hercules Powder Co. and Eastern Chemical Corp.) until Ashland purchased the property in 1969. Ashland operated a chemical distribution facility at the site until 2001. In 1984, Ashland entered into a Consent Agreement/Consent Order with USEPA (Docket No. II RCRA-83-0253) to conduct environmental investigations at the site.

EI DETERMINATION

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   ✓ If yes - check here and continue with #2 below.

   _____ If no - reevaluate existing data, or

   _____ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

2. Is **groundwater** known or reasonably suspected to be **contaminated**[1] above appropriately protective levels (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

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[1] "Contamination" and "contaminated" describe media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate levels (appropriate for the protection of the groundwater resource and its beneficial uses).

✓ If yes - continue after identifying key contaminants, citing appropriate levels, and referencing supporting documentation.

_____ If no - skip to #8 and enter "YE" status code, after citing appropriate levels, and referencing supporting documentation to demonstrate that groundwater is not known or reasonably suspected to be contaminated.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Groundwater contaminant concentrations exceed New York State standards for Class GA groundwater. Key contaminants are listed in the table below. References: (1) New York State Department of Environmental Conservation, Technical and Operational Guidance Series, Section 1.1.1, *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (June 1998 and Addenda); (2) Ashland Inc., *Revised Draft RCRA Facility Investigation Report* (March 2009) and references therein; (3) Ashland Inc., quarterly Progress Reports for the Rensselaer facility (various dates).

Key Contaminant	Standard for Class GA groundwater (µg/L)	Max. Detected* (µg/L)	Location
1,1,1-TCA	5	20	MW-1
1,1-DCA	5	160	PZ-5
cis-1,2-DCE	5	5900	PZ-1
trans-1,2-DCE	5	84	PZ-1
PCE	5	48	MW-1
TCE	5	1100	MW-1
Vinyl chloride	2	2900	PZ-1
Benzene	1	34	MW-15
Toluene	5	260	PZ-1
Ethylbenzene	5	51	PZ-1
Xylenes (total)	5	230	PZ-1

* Since 2007

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within existing area of contaminated groundwater[2] as defined by the monitoring locations designated at the time of this determination)?

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of contamination that can and will be sampled/tested in the future to physically verify that all contaminated groundwater remains within this area, and that the further migration of contaminated groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

___✓___ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the existing area of groundwater contamination[2]).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the existing area of groundwater contamination[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Unconsolidated sediments at the facility consist of alluvial deposits (generally clays in the northern and central portions of the site and coarser sands and gravels in the southern portion) overlying glacio-lacustrine silts and clays. Within the alluvium, fill material is locally present in the northern and central portions and prevalent in the southern portion. The unconsolidated materials overlie shale bedrock at variable depth. Within the unconsolidated sediments, the water bearing unit is divided into two zones, the upper shallow groundwater zone (USGZ) and the lower shallow groundwater zone (LSGZ). In the northern and central portions of the site, the USGZ is unconfined and consists of isolated sand lenses within the alluvial deposits. The LSGZ occurs along the sediment-bedrock interface, is confined by the overlying glacio-lacustrine silts and clays, and is not hydraulically connected to the USGZ. In the southern portion of the site the USGZ is more laterally continuous, is generally unconfined (but locally confined), and overlies a low permeability layer of silts and clays at approximately 17.5 feet bgs. The LSGZ in the southern portion is below this low permeability layer, is confined, and is not hydraulically connected to the USGZ. Pumping tests, boring logs, and groundwater sample results indicate that the USGZ is limited in extent and is bounded by vertical hydraulic barriers (silts and clays).

Horizontal migration
Horizontal migration of contaminated groundwater has stabilized. Site contamination is generally limited to the USGZ (see discussion on vertical migration, below). As noted above, naturally occurring vertical hydraulic barriers (silts and clays) have been demonstrated to exist around the USGZ at the site. As a result, off-site migration of site contaminants has been effectively limited to the CSX Transportation railroad right-of-way immediately west (downgradient) of the facility boundary. A line of off-site groundwater monitoring points (IMP-1, -2, -3, IP-1, MW-16, and MW-18) is located less than 100 feet downgradient (west) of the site boundary and within the railroad right-of-way. These six monitoring points consistently show site-related contamination. These wells are near, yet within, the aforementioned vertical hydraulic barriers. A seventh well (MW-10), located north of the other six at the downgradient facility boundary, is generally clean.

Conversely, approximately 100 feet farther downgradient, a second line of off-site groundwater monitoring points, both permanent (MW-11, -12S, -12D, and -17) and temporary (HP-1, -2, and -3) has not yielded site-related contaminants since the wells have been installed (between 1986 and 2001 for the MWs and in 2007 for the HPs). These four wells and three temporary sampling points are located beyond the aforementioned vertical hydraulic barriers. Releases at the site are assumed to have been occurring for more than 50 years so the lack of site chemistry in these sampling

points provides evidence that horizontal migration of contaminants is not occurring beyond a limited off-site area.

Vertical migration
Vertical migration of contaminated groundwater has stabilized. A silt/clay confining layer between the USGZ and the LSGZ inhibits vertical migration of groundwater and site contaminants over most of the site. Areas where vertical migration has occurred are limited in extent and the resulting leakage into the LSGZ has not migrated beyond the facility boundary. The following table provides analytical data from collocated points sampling both the upper and lower aquifers.

Sample Location	GP-19	GP-26	GP-27	GP-28	GP-30
USGZ total VOCs (µg/L)	16,800	19,400	180	19	210
LSGZ total VOCs (µg/L)	486	11	ND	ND	ND

Removal of contamination sources combined with demonstrated natural attenuation of site contaminants (and concomitant reduction in contaminant mass) provide evidence that a driving force for contaminant migration (i.e., a concentrated source zone) has been removed. This supports the conclusion that migration of contaminated groundwater has stabilized.

References: (1) ESC Engineering (2002): *RFI Report for the Ashland Distribution Facility, Rensselaer, New York*; (2) URS Diamond (2004): *Groundwater Natural Attenuation Study, Former Ashland Distribution Facility, Rensselaer, New York*; (3) URS (2005): *Human Health Risk Assessment Former Ashland Distribution Facility, Rensselaer, NY*; (4) Arcadis (2009): *Ashland Inc., Revised Draft Corrective Measures Study Report, Rensselaer, New York*; (5) Arcadis (2009): *Ashland Inc., Revised Draft RCRA Facility Investigation Report, Rensselaer, New York.*

4. Does contaminated groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

__✓__ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater contamination does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

An unnamed tributary to the Hudson River enters the site in the central portion and crosses the site from southwest to northeast. The tributary was routed in a buried culvert as part of remedial activities required in a 1984 Consent Agreement/Consent Order. In 2008, the influence of the culverted stream on groundwater flow was analyzed. The analysis showed that, in the central area of the site (where site contaminants are found in groundwater) there is no hydraulic communication between the groundwater and the tributary as shown by a 2- to 3-foot difference in elevation between the surface water in the culvert and groundwater adjacent to the culvert at the measured locations. Farther north, hydraulic communication is less certain and may be occurring. However no contaminants of interest are found in this area. Therefore, the evidence supports the conclusion that groundwater contamination is not entering surface water bodies.

Reference: Arcadis (2009): *Ashland Inc., Revised Draft RCRA Facility Investigation Report, Rensselaer, New York.*

5. Is the **discharge** of contaminated groundwater into surface water likely to be **insignificant** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater level, and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or ecosystems at these concentrations)?

   _____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: (1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater level, the value of the appropriate level(s), and if there is evidence that the concentrations are increasing; and (2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or ecosystem.

   _____ If no - (the discharge of contaminated groundwater into surface water is potentially significant) - continue after documenting: (1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater level, the value of the appropriate level(s), and if there is evidence that the concentrations are increasing; and (2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater levels, the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

   _____ If unknown - enter "IN" status code in #8.

6. Can the **discharge** of contaminated groundwater into surface water be shown to be **currently acceptable** (i.e., not cause impacts to surface water, sediments or ecosystems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

   _____ If yes - continue after either: (1) identifying the final remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and ecosystems), and referencing

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[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR (2) providing or referencing an interim assessment[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist, including ecologist) adequately protective of receiving surface water, sediments, and ecosystems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment levels, as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological risk assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

____ If no - (the discharge of contaminated groundwater cannot be shown to be currently acceptable) - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or ecosystems.

____ If unknown - skip to #8 and enter "IN" status code.

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected **in the future** to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the existing area of contaminated groundwater?

_✓_ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the existing area of groundwater contamination.

____ If no - enter "NO" status code in #8.

____ If unknown - enter "IN" status code in #8.

Rationale and references:

The draft Corrective Measures Implementation Work Plan for the site includes a groundwater

[5]The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or ecosystems.

monitoring schedule that continues for at least ten years following implementation of the selected remedy. Groundwater monitoring will be performed quarterly for the first two years, then semiannually for the next eight years. The monitoring schedule may be adjusted depending on the effectiveness of the selected remedy. Groundwater samples will be collected from the following wells: IP-1, IMP-3, MW-13, MW-16, MW-17, MW-18, and MW-21.

Reference: Arcadis (2010): *Ashland Inc., Draft Corrective Measure Implementation Work Plan, Rensselaer, New York*

8. Check the appropriate RCRAInfo status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain supervisor (or appropriate manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

✓ **YE - Yes**, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that **the migration of contaminated groundwater is under control at the Ashland Inc. facility, EPA ID # NYD046877775, located at 130 South St., Rensselaer, New York.** Specifically, this determination indicates that the migration of contaminated groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the existing area of contaminated groundwater. This determination will be reevaluated when the agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

_____ IN - More information is needed to make a determination.

Completed by: A. C. Czuhanich Date: 3/5/10
Alex Czuhanich
Engineering Geologist

Supervisor: Denise M. Radtke Date: 3/16/10
Denise Radtke
Engineering Geologist 3

Director: Robert J. Phaneuf Date: 3/16/10
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Locations where references may be found:

New York State Department of Environmental Conservation
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US Environmental Protection Agency, Region 2
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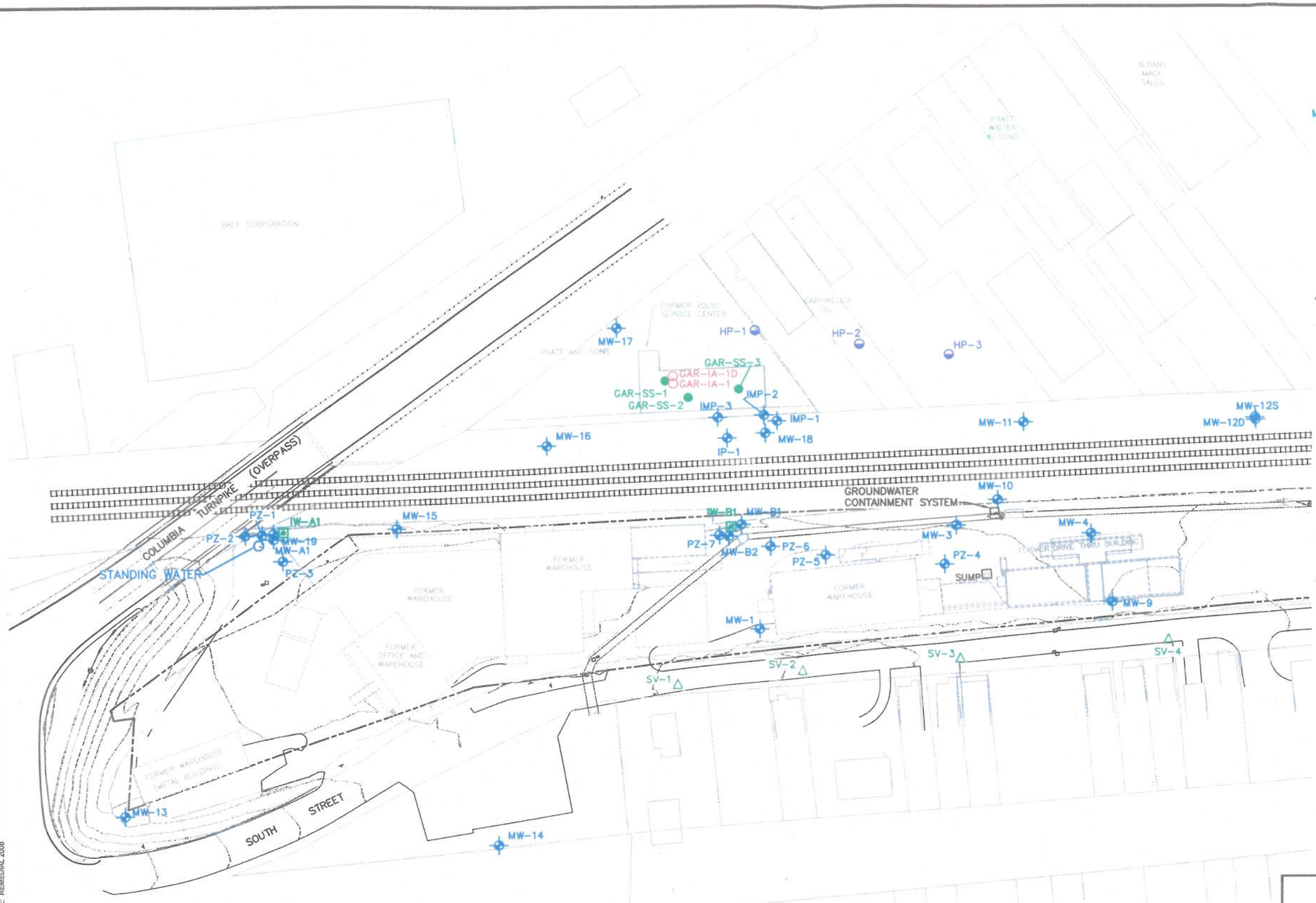

LEGEND:

- MW-1/PZ-1/GP-18/IMP-1/IP-1 — PERMANENT GROUNDWATER SAMPLING LOCATION
- SUB-SLAB AIR SAMPLE LOCATION
- INDOOR AIR SAMPLE LOCATION
- HP-3 — TEMPORARY GROUNDWATER SAMPLING LOCATION
- SV-3 — SOIL VAPOR SAMPLE LOCATION
- IW-B1 — INJECTION WELL LOCATION
- SURFACE CONTOUR
- RAILROAD TRACK
- CULVERTED STREAM PIPE
- PROPERTY LINE
- FORMER BUILDINGS AND STRUCTURES

NOTE:

1. LOCATIONS AND TOPOGRAPHY EAST OF CSX RAILROAD PROPERTY AND WEST OF AND INCLUDING SOUTH STREET, SURVEYED BY THEW ASSOCIATES PE-LS, PLLC (OCTOBER 2008). REFERENCED HORIZONTALLY TO THE NORTH AMERICAN DATUM OF 1983 (NAD83) AND PROJECTED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM (EAST ZONE). VERTICAL REFERENCE TO NGVD 1929. OTHER PROPERTY LINE MAP FEATURES SHOWN ARE FROM RENSSELAER COUNTY TAX MAPPING AND BUILDINGS SHOWN ARE FROM NEW YORK STATE CLEARING-HOUSE AERIAL PHOTOGRAPHY.

0 100' 200'

GRAPHIC SCALE

ASHLAND INC. FACILITY
RENSSELAER, NEW YORK
REVISED DRAFT RFI REPORT

SITE PLAN

ARCADIS

FIGURE 1

CITY: Syracuse DIV:141/GROUP: ENV-141 DB: RCS AMS RCB LD: AM: PD: TM: TR: LYR:ON=*OFF=*REF* G:\ENV\CADSYRACUSE\ACTIVE\OH002000\NY41001010\DWG\Rensselaer\RFI\OH002801.dwg LAYOUT: 1 SAVED: 3/5/2009 3:07 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ######################## PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/5/2009 3:08 PM BY: BASSETT, RICHARD
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