# *Long-Term Groundwater Monitoring Plan for Corrective Measures Study*

*Tecumseh Redevelopment Site*
*Lackawanna, New York*

May 2008
Revised March 2009

0071-008-111

Prepared For:

ArcelorMittal Tecumseh Redevelopment, Inc.
Richfield, Ohio

Prepared By:

TurnKey Environmental Restoration, LLC

Benchmark Environmental Engineering & Science, PLLC

726 Exchange Street, Suite 624, Buffalo, New York | phone: (716) 856-0599 | fax: (716) 856-0583

# CORRECTIVE MEASURES STUDY WORK PLAN
# APPENDIX E

# LONG-TERM GROUNDWATER MONITORING PLAN

## TECUMSEH REDEVELOPMENT SITE
## LACKAWANNA, NEW YORK

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# LONG-TERM GROUNDWATER MONITORING PLAN

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# 1.0 INTRODUCTION

This Long-Term Groundwater Monitoring (LTGWM) Plan has been designed to monitor the effectiveness of existing source area, containment and removal actions, Interim Corrective Measures (ICMs), and groundwater controls at the Tecumseh Site, as well as additional groundwater remedial efforts as may be called for in accordance with the planned Corrective Measures Study (CMS). Groundwater quality and flow will be monitored along the Site perimeter at 104 locations (45 monitoring wells and 59 piezometers) adjacent to surface water body receptors including Lake Erie, Smokes Creek, and the Gateway Metroport Ship Canal (Ship Canal). As groundwater use on the Site is deed restricted, the overriding environmental objective for groundwater on the Site is protection of adjacent surface water quality.

## 1.1 Background

ArcelorMittal Tecumseh Redevelopment Inc. (Tecumseh) owns approximately 1,074 acres of property located along the west side of NYS Route 5, Lackawanna, New York (the "Tecumseh Property" or " Tecumseh Site") comprising a significant portion of the former Bethlehem Steel Corporation – Lackawanna Facility (the "former BSC Property" or "former BSC Site") or that was the subject of an Administrative Order on Consent (the "AOC") entered into between Bethlehem Steel Corporation ("BSC") and the United States Environmental Protection Agency (USEPA), dated August 1990 (Docket No. II RCRA-90-3008(h)-0201; see Figure E-1).

In 2001, BSC filed for bankruptcy protection. Tecumseh acquired the Tecumseh Property pursuant to an Asset Purchase Agreement that was approved by the United States Bankruptcy Court for the Southern District of New York in April 2003 (Case No. 01-15288 Jointly Administered)). Tecumseh thereafter assumed the related environmental cleanup obligations at the Tecumseh Property. Tecumseh, however, is not the owner of several portions of the former BSC Lackawanna Facility that were included in the scope of the 1990 USEPA Order. The manufacturing operations formerly owned by BSC on the east side of NYS Route 5 are now owned in part by ArcelorMittal USA Inc. (Tecumseh's parent corporation) and, in part, by Republic Engineered Products, Inc. Approximately 232 acres of property on the west side of NYS Route 5 were sold by BSC prior to the April 2003 asset

purchase agreement and which, upon information and belief, are currently owned by Gateway Trade Center, Inc. and Genesee & Wyoming, Inc..

The former BSC-Lackawanna Facility was used for integrated iron and steel production since the beginning of the 20th century. Steel-making operations were discontinued by the end of 1983, and, by the mid-1990s, most of the steel-making facilities on the west side of Hamburg Turnpike (NYS Route 5) had been demolished. In September 2001, BSC's coke oven operation was terminated leaving only a galvanized products mill and the Republic Engineering Products bar mill operating at the former BSC Site. Galvanizing operations were acquired by International Steel Group (ISG) Lackawanna LLC pursuant to the asset purchase agreement that was approved by the Bankruptcy Court in April 2003. ISG, Inc. merged with Mittal Steel Inc. in July 2005 to become Mittal Steel USA Inc. In June 2007, Mittal Steel merged with Arcelor Steel, with Mittal Steel USA Inc. and Tecumseh Redevelopment Inc. respectively becoming ArcelorMittal USA Inc. and ArcelorMittal Tecumseh Redevelopment Inc.

The Tecumseh Site can generally be subdivided into the following areas based upon former manufacturing operations, historic, current and planned uses as illustrated in Figure E-2 of this Plan:

CMS Areas

- Slag Fill Area (SFA) – Zones 2, 3, 4, and 5 (approx. 230 acres, excluding Steel Winds I and IA)
- Coal, Coke, and Ore Handling and Storage Area (approx. 137 acres)
- Former Petroleum Bulk Storage (Tank Farm) Area (approx. 68 acres)
- Former Coke Plant and By-Products Facilities (approx. 45 acres)
- Watercourses (approx. 11 acres)

Non-CMS Areas

- Business Park Phases I, IA, II, and III (approx. 349 acres combined)
- Steel Winds I, IA, and II (approx. 167 acres)
- SFA Zone 1 (approx. 67 acres, excluding Steel Winds II)

The RFI and related USEPA correspondence identified 43 Solid Waste Management Units (SWMUs) and 5 watercourses within or adjacent to the CMS Areas listed above as requiring further action as summarized in Table E-1 and identified on Figure E-2. Because the RFI did not identify any SWMUs requiring further assessment within Brownfield Cleanup Program (BCP) Business Parks (I, IA, II, and III), Steel Winds II, or SFA – Zone 1, these parcels are not specifically addressed in this LTGWM Plan. In addition, due to the ubiquitous nature and type of low level impacts to Blasdell Creek attributable to many upstream sources (not just the Tecumseh Site), the NYSDEC removed this watercourse from the CMS Order in January 2009. As Steel Winds I and IA parcels are surrounded by the CMS Area, they are by vicinity incorporated in this LTGWM Plan.

## 1.2 Groundwater Discharge Areas

Based on isopotential maps created during the RFI, Site groundwater flow patterns within the saturated fill unit (i.e., shallow groundwater), including several groundwater divides and flow boundaries, separate the Tecumseh Site into 6 distinct Groundwater Discharge Areas (GDAs), four of which are within the CMS Area of the Site, and all of which are identified in the table below and shown on Figure E-3.

| GDA | Receiving Surface Water Body | Approx. Area (acres) | Within CMS Area |
|---|---|---|---|
| 1 | Lake Erie | 256.4 | No |
| 1A | Blasdell Creek | 30.1 | No |
| 2A | Lake Erie | 49.4 | Yes |
| 2B | Smokes Creek | 30.8 | Yes |
| 3 | Smokes Creek | 261.9 | No |
| 3A | Smokes Creek | 45.7 | Yes |
| 4A | Lake Erie | 384.5 | Yes |
| 4B | Lake Erie (via Outer Harbor) | 51.2 | Yes |
| 5 | Ship Canal | 24.1 | Yes |
| 6 | Ship Canal | 126.0 | No |
| 6A | Union Canal | 59.2 | No |

The CMS Area of the Site includes only GDAs 2A, 2B, 3A, 4A, 4B, and 5, therefore only these areas are discussed in the context of the CMS and this LTGWM Plan. As such, groundwater within GDAs 2A, 4A, and 4B flows west discharging to Lake Erie either

directly (2A and 4A) or indirectly via the Outer Harbor (4B); groundwater within GDAs 2B and 3A flows north and south, respectively, discharging to Smokes Creek; and groundwater within GDA 5 flows east discharging to the Ship Canal.

## 1.3 Purpose and Scope

The objective of this LTGWM Plan is to monitor downgradient groundwater quality discharged from the entire CMS Area to adjacent surface water bodies Lake Erie, Smokes Creek, and the Ship Canal within the geological units identified during the RFI and associated with the Site (i.e., fill, sand, clayey silt/till, and bedrock). Groundwater quality and flow monitoring on or adjacent to portions of the CMS Site is already in progress at the Hazardous Waste Management Units (HWMUs) 1A, 1B, and 2 (also referred to as SWMUs S-13, S-16, and S-03, respectively), the Steel Winds I BCP Area, and the Benzol Plant ICM (SWMU P-11) in accordance with their respective post-closure requirements (see Figure E-2). Groundwater monitoring of these areas are effectively monitoring portions of the downgradient groundwater quality and flow across Lake Erie Discharge Areas 2A and 4A and a small portion of the Ship Canal Discharge Area 5 (see Figure E-3). Data and monitoring requirements from the HWMUs, ICM, and BCP Sites will be incorporated into the CMS Area LTGWM program and will continue to be monitored for groundwater quality and flow direction, satisfying both the post-closure requirements of those SWMUs and BCP Sites as well as the LTGWM requirements of this Plan.

Specifically, this LTGWM Plan will provide for the comprehensive monitoring, documentation and evaluation of downgradient groundwater quality trends along the perimeter of the CMS Area as they pertain to specific groundwater discharge areas of the Site and will be addressed on an area-by-area basis as described in Section 1.1 above. More specifically, both the downgradient fill and sand (where present) shallow groundwater-bearing units, identified to be impacted by historic activities during the RFI, will be monitored for groundwater quality and flow direction in accordance with this Plan. In addition, downgradient bedrock groundwater will be monitored.

This LTGWM Plan will also be implemented to monitor the efficacy of each planned Interim Corrective Measure (ICM) and final corrective action as subsequently required by the CMS when completed, as well as to document and track long-term groundwater quality trends on the CMS Site.

# 2.0 GROUNDWATER MONITORING PROGRAM

## 2.1 General

Due mainly to the localized disposal of similar waste materials resulting in geographic grouping of the SWMUs in conjunction with localized groundwater discharge patterns previously identified, groundwater quality on the CMS Site will be addressed by this LTGWM Program specific to each GDA.

## 2.2 Monitoring Network

The existing network of 110 groundwater monitoring wells within the CMS Area installed as part of the RFI, Steel Winds I BCP, and Benzol Yard Area ICM are sufficient to assess downgradient groundwater quality and flow direction within the CMS Area. Therefore, no additional monitoring wells are planned to be installed during the CMS; unless additional monitoring wells are deemed necessary as part of any SWMU final remedy. Monitoring well integrity, once established, will determine whether replacement is necessary or not, on a well-by-well basis. The CMS Area groundwater monitoring network is presented in Table E-2 and shown on Figure E-4. The network is comprised of 52 perimeter monitoring wells (29 screened within the fill unit, 9 within the sand unit, 5 across the fill and sand units, 3 within the clayey silt and till units, and 6 within the bedrock), which equates to approximately 1 well for every 420 horizontal feet along the CMS Area downgradient perimeter. The network also includes an additional 58 monitoring wells (39 screened within the fill unit, 12 within the sand unit, 4 across the fill and sand units, 3 within the clayey silt and peat units, and 0 within the bedrock), which, in addition to the groundwater monitoring wells, will be measured for water level only and will be used to prepare shallow groundwater isopotential maps for the CMS Area. Due to their intended use, these monitoring wells will be referred to as piezometers. Table E-3 summarizes the well construction details of each network monitoring well.

### *2.2.1 Existing Monitoring Wells*

Each existing monitoring well within the groundwater monitoring network will be examined prior to re-development activities. The field team will inspect the interior and exterior of each well for signs of vandalism or damage and record the condition on the

appropriate field form. Specifically, the field team will inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well riser and J-plug/cap. Items requiring maintenance and/or repair will be reported to the Project Manager and will subsequently be addressed. Any network monitoring well that becomes damaged or unusable, will be replaced within 30 days of that determination or at the completion of CMS remedial construction.

### *2.2.2 Replacement and/or New Monitoring Wells*

New monitoring wells, if required, will be installed within 60 days of substantial completion of remedial construction of final corrective measures to avoid damage to the wells from heavy equipment. Construction of replacement wells will be undertaken within 60 days of determination that an existing well requires replacement. Construction of new and replacement monitoring wells and piezometers will either match abandoned well details or be determined by subsurface geology (i.e., screened intervals). After installation, new monitoring wells will be properly developed in accordance with NYSDEC and TurnKey field operating procedures discussed in the next section. Protective casings and surface seals will be installed on all new and replacement wells in addition to existing wells that do not already have them.

The potential need to install additional wells or adjust the location of replacement wells will be addressed in the CMS.

### *2.2.3 Well Development*

All newly installed and existing monitoring wells and piezometers will be developed in accordance with NYSDEC and TurnKey protocols. Each new well or piezometer will be left undisturbed for a minimum of 24 hours following installation before development activities begin to ensure that the cement/bentonite grout has set. Prior to development, well integrity will be evaluated and the static water level and well depth will be measured. Development will be accomplished using a suction-lift pump, air-displacement pump, bottom-discharging bailer, or a Waterra™ hand pump via purge and surge methodologies. Development will be recorded on field forms and considered completed when the pH, specific conductivity and temperature have stabilized; and when the turbidity is below 50 NTU, or has stabilized above 50 NTU and a minimum of 10 well volumes have been

removed. Stability is defined as variation between measurements of 10 percent or less and no overall upward or downward trend in the measurements. Water removed during development will be discharged to the ground surface no closer than 50 feet in any radial direction from the monitoring well unless visual non-aqueous phase liquid (NAPL) is present, in which case it will be drummed for characterization and disposal. If potable water is utilized during the drilling process and if the formation yield is adequate, development volumes should be a minimum of two times the estimated volume used or "lost".

Field personnel will perform visual NAPL surveillance during development of each well. All data collected during well development will be recorded on TurnKey's Groundwater Well Development and Purge Logs. A detailed description of well development procedures, including the field forms, and calibration and maintenance of field instruments used to measure stability parameters are presented in the Quality Assurance Project Plan (QAPP) provided as an appendix to the CMS Work Plan.

#### *2.2.4 Well Abandonment*

The abandonment and decommissioning of wells in the CMS Area that are deemed by TurnKey to be unusable will be performed in order to remove a potential pathway for the vertical migration of potentially-impacted groundwater and/or surface water runoff. Well abandonment will be performed in accordance with TurnKey's Abandonment of Monitoring Wells field operating procedure presented in the QAPP.

## 2.3 Groundwater Flow and Hydrodynamics

New well installations will be surveyed to determine their location relative to New York State Plane (1983 NAD) coordinates and elevation. Groundwater elevation data will be collected during each sampling event and an isopotential map prepared annually. This site-specific isopotential map will be used to determine the groundwater flow direction and hydraulic gradients within each GDA of the CMS Area.

## 2.4 Groundwater Sampling

### *2.4.1 Analysis by Groundwater Discharge Area*

The November 1999 groundwater data collected during the RFI was used to develop the constituents of primary concern (COPCs) for the LTGWM program. Specifically, the 1999 analytical data was tabulated and summarized by GDA for all monitoring wells sampled within or adjacent to the CMS Area of the Site. COPCs detected in excess of the NYSDEC Class GA Groundwater Quality Standard/Guidance Value (GWQS/GV) for each GDA at more than one monitoring well location were included in the COPC list for that discharge area. COPC parameter lists for each GDA in the CMS Area are presented in Table E-2 and discussed by GDA below.

**GDA 2A:** Groundwater samples collected from GDA 2A will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) (Method 8260B), TCL semi-VOCs (SVOCs) (base-neutrals only) (Method 8270C), total recoverable phenolics (Method 9066), total arsenic (Method 6010B), total barium (Method 6010B), total chromium (Method 6010B), total lead (Method 6010B), and total selenium (Method 6010B).

**GDA 2B:** Groundwater samples collected from GDA 2B will be analyzed for TCL VOCs (Method 8260B), TCL SVOCs (base-neutrals only) (Method 8270C), total recoverable phenolics (Method 9066), total arsenic (Method 6010B), total barium (Method 6010B), total chromium (Method 6010B), and total lead (Method 6010B). In addition, wells MWS-02, MWS-18A, MWS-18C, MWS-19A, and MWS-19B will be analyzed for cyanide (Method 9012B).

**GDA 3A:** Groundwater samples collected from GDA 3A will be analyzed for Spill Technology and Remediation Series (STARS) VOCs (Method 8021B), TCL SVOCs (base-neutrals only) (Method 8270C), total recoverable phenolics (Method 9066), total arsenic (Method 6010B), total chromium (Method 6010B), total lead (Method 6010B), and total selenium (Method 6010B). In addition, wells MWN-01B and MWN-44A will be analyzed for cyanide (Method 9012B).

**GDA 4A:** Groundwater samples collected from GDA 4A will be analyzed for TCL VOCs (Method 8260B), TCL SVOCs (base-neutrals only) (Method 8270C), total recoverable phenolics (Method 9066), total arsenic (Method 6010B), total barium (Method 6010B), total chromium (Method 6010B), and total selenium (Method 6010B). In addition, well MWN-05B will be analyzed for cyanide (Method 9012B).

**GDA 4B:** Groundwater samples collected from GDA 4B will be analyzed for STARS VOCs (Method 8021B), TCL SVOCs (base-neutrals only) (Method 8270C), total recoverable phenolics (Method 9066), and total chromium (Method 6010B).

**GDA 5:** Groundwater samples collected from GDA 5 will be analyzed for STARS VOCs (Method 8021B), TCL SVOCs (base-neutrals only) (Method 8270C), total recoverable phenolics (Method 9066), total arsenic (Method 6010B), total barium (Method 6010B), and total chromium (Method 6010B). In addition, wells MWN-07, MWN-26A, and MWN-45A will be analyzed for cyanide (Method 9012B).

After the first two years of monitoring, the COPC lists will be reviewed for each monitoring well to determine whether it can be modified based on the analytical results as well as the proposed activities for the Site. The NYSDEC must agree to any proposed change to the COPC lists, monitoring location, or frequency discussed within this Plan.

### *2.4.2 Sampling Frequency*

Each network overburden monitoring well (new and/or existing) will be sampled on a semi-annual basis for the first 2 years. Following four consecutive semi-annual sampling events, all network overburden wells will continue to be sampled annually thereafter, pending development and NYSDEC approval of an alternate monitoring program.

Each network bedrock monitoring well (new and/or existing) will be sampled on a biennial basis (every two years). Following two consecutive monitoring events, bedrock groundwater results will be reviewed and, pending NYSDEC approval, modified appropriately.

### *2.4.3 Sampling Method*

The monitoring wells in the program will be sampled using USEPA Region II Low Stress (i.e., low-flow) Purging and Sampling technique. The low-flow method produces samples with lower turbidity and smaller volumes of purge water than using conventional bailer techniques. Low-flow sampling also produces less agitation of the groundwater. As a result, the low-flow method provides a more representative sample, in relation to actual groundwater conditions, by not drastically altering the chemistry of the groundwater while

withdrawing the sample. TurnKey's Field Operating Procedure (FOP) for the low-flow technique is provided as Attachment E-1.

## 3.0 REPORTING

During the first two years of semi-annual monitoring described in Section 2, two reports per year will be provided to the NYSDEC: one first semi-annual report and one second semi-annual/annual report. The first semi-annual report will summarize the first semi-annual event and include sampling data, discussion of results, isopotential map, and analytical data presented as tables and maps. The second semi-annual/annual report will follow the same format as the first semi-annual report in addition to historical LTGWM analytical data collected during the calendar year and an engineering and geologic evaluation of all of the data. After the first two years of semi-annual monitoring described above, one annual report will be provided to the NYSDEC, Region 9 Office that includes the information listed above. Each submittal will include one electronically formatted report (i.e., Adobe PDF or similar) transmitted to NYSDEC representatives Mr. Stan Radon (NYSDEC-9) and Mr. Larry Thomas (NYSDEC-4, Albany).

Any and all changes to the Monitoring Program will be approved by the NYSDEC prior to implementation.

# TABLES

**TABLE E-1**

**SUMMARY OF CMS AREA SWMUs AND WATERCOURSES**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Group | Area | SWMU / Watercourse Designation | Description |
|---|---|---|---|
| SLAG FILL AREAS | Zone 2 | S-1 | Impoundments: Surface Impoundment A |
| | | S-2 | Impoundments: Surface Impoundment B |
| | | S-3 | Impoundments: Surface Impoundment C (**HWMU 2**) |
| | | S-4 | Impoundments: Surface Impoundment D |
| | | S-5 | Impoundments: Surface Impoundment E |
| | | S-6 | Impoundments: Surface Impoundment F |
| | | S-7 | Impoundments: Surface Impoundment G |
| | | S-8 | Impoundments: Surface Impoundment H [not used] |
| | | S-20 | Impoundments:Drying Area for Sludge from Impoundment F |
| | | S-27 | Impoundments: Sludge Disposal Area [Adjacent to SWMU S-1] |
| | | S-11 | ATP: Landfill K [Acid Tar Pit South] |
| | | S-22 | ATP: Vacuum Carbonate Blowdown Impoundment South of Smokes Creek [Acid Tar Pit North] |
| | | S-24 | ATP: Tar Pit North of Lime Plant |
| | | S-21 | Sludge Storage Area |
| | Zone 3 | S-10 | Slag Quench Area J |
| | Zone 4 | S-12 | Asbestos Landfill L |
| | | S-13 | Coal Tar Sludge (**HWMU 1A**) |
| | | S-14 | General Rubble Landfill N |
| | | S-15 | General Rubble Landfill O |
| | | S-16 | Lime Stabilized Spent Pickle Liquor (SPL) Sludge/Slag Landfill Basin (**HWMU 1B**) |
| | | S-17 | Vacuum Carbonate Blowdown -Landfill Q |
| | | S-18 | Lime Dust and Kish Landfill R |
| | | S-23 | Tar Pit Adjacent to Lime Stabilized SPL Sludge Landfill |
| | | S-28 | Drum Landfill |
| COAL, COKE, & ORE HANDLING & STORAGE AREA | North Coal Field | S-19 | Murphy's Mountain Landfill AA |
| | | S-25 | Landfill/Impoundment under Noth End of Coal Pile |
| FORMER PETROLEUM BULK STORAGE AREA | Tank Farm | P-8 | Waste Oil Storage Tanks [in Tank Farm] |
| | | P-74 (A, B, C, & D) | Solid Fuel Mix Storage Piles in Tank Farm |
| | | P-75 | Tank Storage Area for No. 6 Fuel Oil and Petroleum Tar [Tank Farm] |
| FORMER COKE PLANT & BY-PRODUCTS FACILITY | Coke Plant | P-1 | PA-1: Quench Water Pit, North Station |
| | | P-2 | PA-1: Quench Water Pit, Arctic Station |
| | | P-3 | PA-1: Quench Water Pit, Central Station |
| | | P-4 | PA-1: Quench Water Pit, A Station |
| | | P-5 | PA-1: Quench Water Pit, B Station |
| | | P-6 | PA-2: Lime Sludge Settling Basin |
| | | P-7 | PA-2: Abandoned Lime Sludge Settling Basin |
| | | P-9 | PA-3: Abandoned Tar Decanter Sludge Pits |
| | | P-10 | PA-3: Contaminated Soil in Area Near Ball Mill |
| | | P-11 | Benzol Plant Tank Storage Area |
| | | P-12 | Spill Cleanup Soil Storage Area |
| | | P-18 (A&B) | [Blast Furnace] Cooling Tower and Hot & Cold Wells |
| | | S-26 | Fill Area Near Coke Battery No. 8 |

**TABLE E-1**

**SUMMARY OF CMS AREA SWMUs AND WATERCOURSES**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Group | Area | SWMU / Watercourse Designation | Description |
|---|---|---|---|
| GALVANIZING PLANT AREA | ArcelorMittal Steel | P-73 (A&B) | Former Drum Storage Area and Flander's Field, East of Cord Strip Mill |
| WATERCOURSES | Watercourses | Smokes Creek | Smokes Creek |
| | | Blasdell Creek | Blasdell Creek (removed from the CMS Order in January 2009 by NYSDEC) |
| | | Ship Canal | Gateway Metroport Ship Canal |
| | | NRWT | North Return Water Trench |
| | | SRWT | South Return Water Trench |

| | |
|---|---|
| **SWMUs** | **43** |
| **WCs** | **5** |
| **TOTAL** | **48** |

= SWMU or Watercourse added by USEPA per May 17, 2006 letter.

Definitions:
SWMU = Solid Waste Management Unit
HWMU = Hazardous Waste Management Unit
NRWT = North Return Water Trench
SRWT = South Return Water Trench
ATP = Acid Tar Pits

**TABLE E-2**

**GROUNDWATER MONITORING NETWORK & ANALYTICAL SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well Designation | Hydro Unit | CMS Network | DTW Only | Other Program | Analytical Parameters and Method [1, 2, 3, 4] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCL VOCs (8260B) | STARS VOCs (8021B) | SVOCs (BN) (8270C) | TRP (9066) | Cyanide (9012B) | Arsenic (6010B) | Barium (6010B) | Cadmium (6010B) | Chromium (6010B) | Lead (6010B) | Selenium (6010B) |
| ***Discharge Area 2A (23 wells)*** | | | | | | | | | | | | | | | |
| MW-2D2 | F | x | | x | x | | x | x | | x | x | | x | x | x |
| MW-2D2B | S | x | | | x | | x | x | | x | x | | x | x | x |
| MW-2D2D | R | x | | | x | | x | x | | x | x | | x | x | x |
| MW-2D3 | F | x | | x | x | | x | x | | x | x | | x | x | x |
| MW-2D4 | F | x | | x | x | | x | x | | x | x | | x | x | x |
| MW-2U1 | F | | x | x | ~ water level only ~ | | | | | | | | | | |
| MW-2U1B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-09 | F | x | | | x | | x | x | | x | x | | x | x | x |
| MWS-10 | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-10B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-11A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-12A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-12B | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-13 | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-14 | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-14B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-15 | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-21A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-21B | F, C | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-25A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-25B | F, S, C | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-26A | F, S | x | | | x | | x | x | | x | x | | x | x | x |
| MWS-29A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| ***Discharge Area 2B (17 wells)*** | | | | | | | | | | | | | | | |
| MW-11 | F, S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-01 | F | x | | | x | | x | x | | x | x | | x | x | |
| MWS-01B | F, S | x | | | x | | x | x | | x | x | | x | x | |
| MWS-02 | F | x | | | x | | x | x | x | x | x | | x | x | |
| MWS-03 | F | x | | | x | | x | x | | x | x | | x | x | |
| MWS-17A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-17B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-18A | F | x | | | x | | x | x | x | x | x | | x | x | |
| MWS-18B | F, S, CS | | | | ~ ABANDONED POST-RFI ~ | | | | | | | | | | |
| MWS-18C | S | x | | | x | | x | x | x | x | x | | x | x | |
| MWS-19A | F | x | | | x | | x | x | x | x | x | | x | x | |
| MWS-19B | F, S | x | | | x | | x | x | x | x | x | | x | x | |
| MWS-20A | F | x | | | x | | x | x | | x | x | | x | x | |
| MWS-20B | F, S, C | x | | | x | | x | x | | x | x | | x | x | |
| MWS-22A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-22B | F, S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-23A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWS-23B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| ***Discharge Area 3A (9 wells)*** | | | | | | | | | | | | | | | |
| MWN-01 | F | x | | x | | x | x | x | | x | | | x | x | x |
| MWN-01B | F, S | x | | x | | x | x | x | x | x | | | x | x | x |
| MWN-11 | F | x | | | | x | x | x | | x | | | x | x | x |
| MWN-17A | F | x | | | | x | x | x | | x | | | x | x | x |
| MWN-17B | S | x | | | | x | x | x | | x | | | x | x | x |
| MWN-23B | S | x | | | | x | x | x | | x | | | x | x | x |
| MWN-24A | F, CS | x | | | | x | x | x | | x | | | x | x | x |
| MWN-24B | T | x | | | | x | x | x | | x | | | x | x | x |
| MWN-44A | F | x | | | | x | x | x | x | x | | | x | x | x |
| ***Discharge Area 4A (56 wells)*** | | | | | | | | | | | | | | | |
| MW-1D1 | F | | | | | | | | | | | | | | |
| MW-1D2 | F | | | | | | | | | | | | | | |
| MW-1D3 | F | | | | | | | | | | | | | | |
| MW-1D4 | F | | | | | | | | | | | | | | |
| MW-1D5 | F | | | | | | | | | | | | | | |
| MW-1D6 | F | | | | | | | | | | | | | | |
| MW-1D7 | F | | | | | | | | | | | | | | |
| MW-1D8 | F | | | | | | | | | | | | | | |
| MW-1U1 | F | | | | | | | | | | | | | | |
| MWN-02 | F | x | | x | x | | x | x | | x | x | | x | | x |
| MWN-02B | S | x | | x | x | | x | x | | x | x | | x | | x |

**TABLE E-2**

**GROUNDWATER MONITORING NETWORK & ANALYTICAL SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well Designation | Hydro Unit | CMS Network | DTW Only | Other Program | Analytical Parameters and Method [1, 2, 3, 4] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCL VOCs (8260B) | STARS VOCs (8021B) | SVOCs (BN) (8270C) | TRP (9066) | Cyanide (9012B) | Arsenic (6010B) | Barium (6010B) | Cadmium (6010B) | Chromium (6010B) | Lead (6010B) | Selenium (6010B) |
| MWN-02D | R | x | | | x | | x | x | | x | x | | x | | x |
| MWN-03 | F | x | | x | x | | x | x | | x | x | | x | | x |
| MWN-03B | S, C, P | x | | x | x | | x | x | | x | x | | x | | x |
| MWN-03D | R | x | | x | x | | x | x | | x | x | | x | | x |
| MWN-04 | F | x | | x | x | | x | x | | x | x | | x | | x |
| MWN-05A | F | x | | | x | | x | x | | x | x | | x | | x |
| MWN-05B | S | x | | | x | | x | x | | x | x | x | x | | x |
| MWN-05D | R | x | | | x | | x | x | | x | x | | x | | x |
| MWN-12 | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-13A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-13C | S, CS | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-14A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-14B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-15A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-15B | F, P, S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-15D | R | x | | | x | | x | x | | x | x | | x | | x |
| MWN-16A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-16B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| **MWN-19A** | F, P, S | | | | | | | | | | | | | | |
| **MWN-19B** | P | | | | | | | | | | | | | | |
| MWN-20A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-20B | F, S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-21A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-21B | CS | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-21C | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-22B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-25A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-25B | F, S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-25D | R | x | | | x | | x | x | | x | x | | x | | x |
| MWN-28A | F | | | | | | | | | | | | | | |
| MWN-29A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| **MWN-30A** | F | | | | | | | | | | | | | | |
| MWN-31A | F | | | | | | | | | | | | | | |
| MWN-32A | F, P, S | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-35A | F | | | | | | | | | | | | | | |
| MWN-36A | F | | | | | | | | | | | | | | |
| MWN-37A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-38A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-39A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-40A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-41A | F | | | | | | | | | | | | | | |
| MWN-42A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-51A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-51B | P | | x | | ~ water level only ~ | | | | | | | | | | |
| **WT1-07** | F, S | x | | x | x | | x | x | | x | x | | x | | x |
| ***Discharge Area 4B (5 wells)*** | | | | | | | | | | | | | | | |
| MWN-06A | F | x | | | | x | x | x | | | | | x | | |
| MWN-18A | F | x | | | | x | x | x | | | | | x | | |
| MWN-43A | F | x | | | | x | x | x | | | | | x | | |
| MWN-50A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-50B | S | | x | | ~ water level only ~ | | | | | | | | | | |
| ***Discharge Area 5 (21 wells)*** | | | | | | | | | | | | | | | |
| **MWN-07** | F | x | | | | x | x | x | x | x | x | | x | | |
| **MWN-08** | F | | | | | | | | | | | | | | |
| **MWN-09** | F | | | | | | | | | | | | | | |
| MWN-26A | F | x | | | | x | x | x | x | x | x | | x | | |
| MWN-26B | CS | x | | | | x | x | x | | x | x | | x | | |
| MWN-27A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-27B | CS | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-27C | F | | x | | ~ water level only ~ | | | | | | | | | | |
| MWN-33A | F | | x | | ~ water level only ~ | | | | | | | | | | |
| **MWN-34A** | F | | | | | | | | | | | | | | |
| MWN-45A | F | x | | | | x | x | x | x | x | x | | x | | |
| MWN-46A | F | | x | | ~ water level only ~ | | | | | | | | | | |

**TABLE E-2**

**GROUNDWATER MONITORING NETWORK & ANALYTICAL SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well Designation | Hydro Unit | CMS Network | DTW Only | Other Program | Analytical Parameters and Method [1, 2, 3, 4] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCL VOCs (8260B) | STARS VOCs (8021B) | SVOCs (BN) (8270C) | TRP (9066) | Cyanide (9012B) | Arsenic (6010B) | Barium (6010B) | Cadmium (6010B) | Chromium (6010B) | Lead (6010B) | Selenium (6010B) |
| MWN-47A | F | x | | | | x | x | x | | x | x | | x | | |
| MWN-48A | F | | | | | | | | | | | | | | |
| **MWN-49A** | F | x | | | | x | x | x | | x | x | | x | | |
| **MWN-49B** | CS, T | x | | | | x | x | x | | x | x | | x | | |
| **MWN-52A** | F | x | | | | x | x | x | | x | x | | x | | |
| **MWN-52B** | S | x | | | | x | x | x | | x | x | | x | | |
| **MWN-53A** | F | x | | x | | x | x | x | | x | x | | x | | |
| **MWN-54A** | F | | x | x | ~ water level only ~ | | | | | | | | | | |
| **MWN-55A** | F | | x | x | ~ water level only ~ | | | | | | | | | | |
| | | | | **Totals:** | **30** | **21** | **51** | **51** | **9** | **48** | **40** | **1** | **51** | **25** | **28** |

= network monitoring location

| | |
|---|---|
| 132 | Total Wells |
| 52 | CMS Network wells |
| 58 | CMS Water-Level wells |
| *117* | *RFI CMS Area Wells* |
| *11* | *RFI Non-CMS Area Wells (off-site)* |
| *4* | *Non-RFI CMS Area Wells (1 Steel Winds I and 3 Benzol Area wells)* |

**Notes:**
1. All analyses will be performed via SW-846 methodologies with standard deliverables package.
2. Target Compound List (TCL) volatile organic compounds (VOCs) via Method 8260B.
3. TCL semi-VOCs (SVOCs) via Method 8270C, base-neutrals (BN) only.
4. Method 9066 for total recoverable phenolics (TRP).
5. Method 6010B for arsenic, barium, cadmium, chromium, lead, and selenium.
6. Well designations **colored blue** indicate a well location outside the CMS Area and off the Teucmseh property.
7. Well designations **colored green** indicate a post-RFI well location installed by TurnKey (1 Steel Winds I and 3 Benzol Area wells).

**Definitions:**

C = Clay
CS = Clayey Silt
F = Fill
P = Peat
R = Bedrock
S = Sand
T = Till

Hydro Unit = hydrostratigraphic unit as identified in the RFI
CMS Network = network monitoring well to be sampled as part of the LTGWM Plan
DTW Only = depth to water measurement only; no samples will be collected from this location
Other Program = monitoring well already being sampled as part of an existing Post-Closure Program

**TABLE E-3**

**MONITORING WELL CONSTRUCTION SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well I.D. | Northing | Easting | Ground Elev. (fmsl) | Casing Elev. (fmsl) | TOR Elev. (fmsl) | Install Date | Contractor | Total Depth (fbgs) | Screened Interval (fmsl) | | Screen Length (feet) | Screened Interval (fbgs) | | Riser / Screen Diam. (in.) | Riser / Screen Material | Screen Slot Size (in.) | Stratigraphic Unit Monitoring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | top | bottom | | top | bottom | | | | |
| ***Discharge Area 2A (23 wells)*** | | | | | | | | | | | | | | | | | |
| MW-2D2 | 1023523.849 | 1073155.919 | 630.69 | 623.69 | 632.11 | 03/08/85 | Baker | 63.00 | 577.69 | 567.69 | 10 | 53.00 | 63.00 | 5 | PVC/PVC | 0.010 | F |
| MW-2D2B | 1023504.539 | 1073159.699 | 629.97 | 633.17 | 632.85 | 11/10/92 | Empire | 83.00 | 556.97 | 546.97 | 10 | 73.00 | 83.00 | 2 | PVC,SS/SS | 0.010 | S |
| MW-2D2D | 1023515.049 | 1073154.669 | 630.59 | 632.79 | 632.60 | 07/21/94 | Empire | 110.00 | 530.59 | 520.59 | 10 | 100.00 | 110.00 | 2 | PVC,SS/SS | 0.020 | R |
| MW-2D3 | 1023710.709 | 1073125.069 | 634.87 | 634.87 | 636.52 | 04/26/85 | Baker | 66.50 | 578.37 | 568.37 | 10 | 56.50 | 66.50 | 5 | PVC,SS/SS | 0.010 | F |
| MW-2D4 | 1023930.919 | 1073102.019 | 628.96 | 630.96 | 630.44 | 03/20/85 | Baker | 60.50 | 578.46 | 568.46 | 10 | 50.50 | 60.50 | 5 | PVC,SS/SS | 0.010 | F |
| MW-2U1 | 1023717.129 | 1073525.099 | 627.15 | 629.05 | 628.32 | 03/06/85 | Baker | 60.00 | 577.15 | 567.15 | 10 | 50.00 | 60.00 | 5 | PVC/PVC | 0.010 | F |
| MW-2U1B | 1023692.869 | 1073522.859 | 626.93 | 629.73 | 629.42 | 11/25/92 | Empire | 75.00 | 561.93 | 551.93 | 10 | 65.00 | 75.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWS-09 | 1023036.999 | 1073341.959 | 628.41 | 631.21 | 630.82 | 10/23/90 | Empire | 62.00 | 576.41 | 566.41 | 10 | 52.00 | 62.00 | 4 | PVC/SS | 0.010 | F |
| MWS-10 | 1024296.139 | 10744398.169 | 599.65 | 602.75 | 602.41 | 10/25/90 | Empire | 31.00 | 578.65 | 568.65 | 10 | 21.00 | 31.00 | 4 | PVC/SS | 0.010 | F |
| MWS-10B | 1024272.009 | 1074411.149 | 599.95 | 602.85 | 602.67 | 11/06/92 | Empire | 39.50 | 570.45 | 560.45 | 10 | 29.50 | 39.50 | 2 | PVC,SS/SS | 0.010 | S |
| MWS-11A | 1024002.349 | 1073558.829 | 637.20 | 639.95 | 639.56 | 01/09/91 | Empire | 70.00 | 582.20 | 567.20 | 15 | 55.00 | 70.00 | 4 | PVC/SS | 0.010 | F |
| MWS-12A | 1023573.689 | 1074214.749 | 598.37 | 601.65 | 601.29 | 10/30/90 | Empire | 31.00 | 577.37 | 567.37 | 10 | 21.00 | 31.00 | 4 | PVC/SS | 0.010 | F |
| MWS-12B | 1023588.579 | 1074215.479 | 598.47 | 601.47 | 601.13 | 10/10/90 | Empire | 41.00 | 562.47 | 557.47 | 5 | 36.00 | 41.00 | 4 | PVC/SS | 0.010 | F |
| MWS-13 | 1023564.829 | 1073983.219 | 639.63 | 642.73 | 642.37 | 01/17/92 | ED | 74.10 | 575.63 | 565.53 | 10.1 | 64.00 | 74.10 | 4 | PVC/SS | 0.010 | F |
| MWS-14 | 1024210.609 | 1073970.789 | 605.70 | 608.70 | 608.36 | 01/09/92 | ED | 37.00 | 578.70 | 568.70 | 10 | 27.00 | 37.00 | 4 | PVC/SS | 0.010 | F |
| MWS-14B | 1024191.189 | 1073995.049 | 605.62 | 608.32 | 608.11 | 11/05/92 | Empire | 50.00 | 565.62 | 555.62 | 10 | 40.00 | 50.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWS-15 | 1023465.139 | 1073589.589 | 625.07 | 627.47 | 627.09 | 01/21/92 | ED | 58.30 | 576.77 | 566.77 | 10 | 48.30 | 58.30 | 4 | PVC/SS | 0.010 | F |
| MWS-21A | 1024248.139 | 1074221.719 | 598.31 | 601.21 | 601.14 | 07/28/95 | SJB | 29.00 | 579.31 | 569.31 | 10 | 19.00 | 29.00 | 2 | PVC/SS | 0.020 | F |
| MWS-21B | 1024258.999 | 1074219.199 | 597.17 | 600.27 | 600.21 | 07/27/95 | SJB | 42.00 | 565.17 | 555.17 | 10 | 32.00 | 42.00 | 2 | PVC,SS/SS | 0.010 | F,C |
| MWS-25A | 1023919.649 | 1074447.769 | 598.85 | 601.95 | 601.87 | 07/21/95 | SJB | 31.00 | 577.85 | 567.85 | 10 | 21.00 | 31.00 | 2 | PVC,SS/SS | 0.020 | F |
| MWS-25B | 1023923.609 | 1074437.069 | 598.55 | 601.55 | 601.37 | 07/20/95 | SJB | 40.00 | 568.55 | 558.55 | 10 | 30.00 | 40.00 | 2 | PVC,SS/SS | 0.010 | S,F,C |
| MWS-26A | 1023245.099 | 1073237.419 | 622.18 | 625.28 | 624.80 | 08/15/95 | SJB | 55.00 | 577.18 | 567.18 | 10 | 45.00 | 55.00 | 2 | PVC,SS/SS | 0.020 | F,S |
| MWS-29A | 1024024.982 | 1074141.648 | 597.17 | 599.27 | 599.02 | 11/02/00 | SJB | 28.00 | 579.17 | 569.17 | 10 | 18.00 | 28.00 | 2 | PVC/SS | 0.010 | F |
| ***Discharge Area 2B (17 wells)*** | | | | | | | | | | | | | | | | | |
| MW-11 | 1024451.716 | 1074446.300 | 603.67 | 606.23 | 205.79 | 03/13/84 | Ehmke | 40.00 | 583.67 | 563.67 | 20 | 20.00 | 40.00 | 5 | PVC/PVC | 0.010 | F,S |
| MWS-01 | 1024249.149 | 1073028.679 | 629.94 | 633.04 | 632.60 | 09/26/90 | Empire | 63.00 | 576.94 | 566.94 | 10 | 53.00 | 63.00 | 4 | PVC/SS | 0.010 | F |
| MWS-01B | 1024218.009 | 1073035.879 | 629.89 | 632.89 | 632.68 | 11/11/92 | Empire | 84.00 | 555.89 | 545.89 | 10 | 74.00 | 84.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWS-02 | 1024778.669 | 1073718.369 | 599.58 | 602.78 | 602.39 | 10/01/90 | Empire | 33.00 | 576.58 | 566.58 | 10 | 23.00 | 33.00 | 4 | PVC/SS | 0.010 | F |
| MWS-03 | 1024939.229 | 1075241.079 | 585.44 | 587.74 | 587.32 | 09/21/90 | Empire | 18.00 | 577.44 | 567.44 | 10 | 8.00 | 18.00 | 4 | PVC/SS | 0.010 | F |
| MWS-17A | 1024634.579 | 1074237.509 | 604.29 | 607.59 | 607.34 | 05/26/94 | Empire | 35.00 | 579.29 | 569.29 | 10 | 25.00 | 35.00 | 2 | PVC/SS | 0.020 | F |
| MWS-17B | 1024642.229 | 1074238.699 | 604.15 | 607.35 | 607.15 | 05/25/94 | Empire | 48.00 | 566.15 | 556.15 | 10 | 38.00 | 48.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWS-18A | 1024859.279 | 1074480.709 | 595.16 | 597.96 | 597.81 | 05/18/94 | Empire | 27.00 | 578.16 | 568.16 | 10 | 17.00 | 27.00 | 2 | PVC/SS | 0.020 | F |
| MWS-18C | 1024848.236 | 1074474.097 | 594.00 | 596.69 | 596.44 | 11/10/00 | SJB | 35.50 | 563.50 | 558.50 | 5 | 30.50 | 35.50 | 8 | PVC,SS/SS | 0.010 | S |
| MWS-19A | 1024841.199 | 1074166.860 | 597.61 | 600.71 | 600.69 | 08/11/95 | SJB | 29.00 | 578.61 | 568.61 | 10 | 19.00 | 29.00 | 2 | PVC,SS/SS | 0.020 | F |
| MWS-19B | 1024842.819 | 1074178.739 | 596.93 | 600.13 | 600.04 | 08/09/95 | SJB | 40.00 | 566.93 | 556.93 | 10 | 30.00 | 40.00 | 2 | PVC,SS/SS | 0.010 | S,F |
| MWS-20A | 1024785.849 | 1074724.279 | 591.68 | 594.68 | 593.69 | 08/07/95 | SJB | 23.00 | 578.68 | 568.68 | 10 | 13.00 | 23.00 | 2 | PVC,SS/SS | 0.020 | F |
| MWS-20B | 1024791.859 | 1074735.239 | 591.40 | 594.50 | 594.28 | 08/07/95 | SJB | 30.00 | 571.40 | 561.40 | 10 | 20.00 | 30.00 | 2 | PVC,SS/SS | 0.010 | S,F,C |
| MWS-22A | 1024511.369 | 1074388.369 | 606.66 | 609.96 | 609.90 | 07/12/95 | SJB | 28.00 | 588.66 | 578.66 | 10 | 18.00 | 28.00 | 2 | PVC,SS/SS | 0.020 | F |
| MWS-22B | 1024512.109 | 1074407.889 | 606.58 | 609.73 | 609.72 | 07/07/95 | SJB | 48.00 | 568.58 | 558.58 | 10 | 38.00 | 48.00 | 2 | PVC,SS/SS | 0.010 | S,F |
| MWS-23A | 1024363.299 | 1074708.909 | 595.37 | 598.47 | 598.35 | 08/04/95 | SJB | 19.00 | 586.37 | 576.37 | 10 | 9.00 | 19.00 | 2 | PVC/SS | 0.020 | F |
| MWS-23B | 1024373.289 | 1074709.909 | 595.46 | 598.36 | 598.20 | 08/03/95 | SJB | 36.00 | 569.46 | 559.46 | 10 | 26.00 | 36.00 | 2 | PVC,SS/SS | 0.010 | S |

**TABLE E-3**

**MONITORING WELL CONSTRUCTION SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well I.D. | Northing | Easting | Ground Elev. (fmsl) | Casing Elev. (fmsl) | TOR Elev. (fmsl) | Install Date | Contractor | Total Depth (fbgs) | Screened Interval (fmsl) | | Screen Length (feet) | Screened Interval (fbgs) | | Riser / Screen Diam. (in.) | Riser / Screen Material | Screen Slot Size (in.) | Stratigraphic Unit Monitoring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | top | bottom | | top | bottom | | | | |
| ***Discharge Area 3A (9 wells)*** | | | | | | | | | | | | | | | | | |
| MWN-01 | 1024541.599 | 1072907.429 | 582.99 | 585.59 | 585.14 | 08/30/90 | Empire | 17.00 | 575.99 | 565.99 | 10 | 7.00 | 17.00 | 4 | PVC/SS | 0.010 | F |
| MWN-01B | 1024563.629 | 1072939.259 | 583.79 | 587.29 | 587.03 | 11/02/92 | Empire | 29.00 | 564.79 | 554.79 | 10 | 19.00 | 29.00 | 2 | PVC,SS/SS | 0.010 | S,F |
| MWN-11 | 1025138.159 | 1074031.239 | 597.80 | 600.08 | 600.06 | 08/30/88 | Empire | 30.00 | 577.80 | 567.80 | 10 | 20.00 | 30.00 | 4 | PVC/SS | 0.010 | F |
| MWN-17A | 1025472.339 | 1074490.589 | 594.96 | 598.06 | 597.82 | 11/11/92 | Empire | 26.00 | 578.96 | 568.96 | 10 | 16.00 | 26.00 | 2 | PVC,SS/SS | 0.010 | F |
| MWN-17B | 1025475.939 | 1074471.769 | 594.88 | 597.88 | 59762.00 | 11/11/92 | Empire | 36.00 | 568.88 | 558.88 | 10 | 26.00 | 36.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-23B | 1024917.019 | 1073466.659 | 596.25 | 599.25 | 599.01 | 05/19/94 | Empire | 51.50 | 554.75 | 544.75 | 10 | 41.50 | 51.50 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-24A | 1025114.169 | 1075097.400 | 585.48 | 588.28 | 588.05 | 05/10/94 | Empire | 20.00 | 575.48 | 565.48 | 10 | 10.00 | 20.00 | 2 | PVC/SS | 0.010 | F,CS |
| MWN-24B | 1025112.769 | 1075109.349 | 585.05 | 588.15 | 587.88 | 05/09/94 | Empire | 38.00 | 557.05 | 547.05 | 10 | 28.00 | 38.00 | 2 | SS/SS | 0.010 | T |
| MWN-44A | 1025118.022 | 1074964.464 | 589.16 | 592.49 | 592.39 | 12/06/00 | SJB | 20.00 | 579.16 | 569.16 | 10 | 10.00 | 20.00 | 2 | PVC/SS | 0.010 | F |
| ***Discharge Area 4A (56 wells)*** | | | | | | | | | | | | | | | | | |
| MW-1D1 | 1028413.499 | 1071454.069 | 609.21 | 610.91 | 610.59 | 02/21/85 | Baker | 43.00 | 576.21 | 566.21 | 10 | 33.00 | 43.00 | 5 | PVC/PVC | 0.010 | F |
| MW-1D2 | 1027772.519 | 1071948.079 | 613.04 | 614.94 | 614.46 | 02/06/85 | Baker | 45.00 | 578.04 | 568.04 | 10 | 35.00 | 45.00 | 5 | PVC/PVC | 0.010 | F |
| MW-1D3 | 1027666.099 | 1071961.879 | 610.72 | 613.12 | 612.69 | 02/13/85 | Baker | 44.00 | 577.22 | 566.72 | 10.5 | 33.50 | 44.00 | 5 | PVC/PVC | 0.010 | F |
| MW-1D4 | 1027566.049 | 1071977.659 | 609.51 | 613.01 | 612.52 | 01/31/85 | Baker | 42.00 | 577.51 | 567.51 | 10 | 32.00 | 42.00 | 5 | PVC/PVC | 0.010 | F |
| MW-1D5 | 1027710.839 | 1071809.760 | 610.70 | 613.70 | 613.49 | 11/16/92 | Empire | 45.50 | 575.20 | 565.20 | 10 | 35.50 | 45.50 | 2 | PVC,SS/SS | 0.010 | F |
| MW-1D6 | 1028316.649 | 1071506.709 | 608.20 | 611.10 | 610.94 | 11/18/92 | Empire | 43.00 | 575.20 | 565.20 | 10 | 33.00 | 43.00 | 2 | PVC,SS/SS | 0.010 | F |
| MW-1D7 | 1028454.389 | 1071403.779 | 608.49 | 611.69 | 611.26 | 11/17/92 | Empire | 43.00 | 575.49 | 565.49 | 10 | 33.00 | 43.00 | 2 | PVC,SS/SS | 0.010 | F |
| MW-1D8 | 1028646.359 | 1073028.679 | 607.97 | 610.97 | 610.74 | 11/17/92 | Empire | 42.50 | 575.47 | 565.47 | 10 | 32.50 | 42.50 | 2 | PVC,SS/SS | 0.010 | F |
| MW-1U1 | 1027965.239 | 1072334.069 | 611.38 | 613.68 | 613.18 | 03/27/84 | Ehmke | 65.00 | 576.38 | 546.38 | 30 | 35.00 | 65.00 | 5 | PVC/PVC | 0.010 | F |
| MWN-02 | 1025751.019 | 1072409.299 | 598.89 | 601.49 | 601.01 | 09/10/90 | Empire | 31.50 | 577.39 | 567.39 | 10 | 21.50 | 31.50 | 4 | PVC/SS | 0.010 | F |
| MWN-02B | 1025727.539 | 1072409.299 | 599.00 | 601.50 | 601.28 | 11/02/92 | Empire | 54.00 | 555.00 | 545.00 | 10 | 44.00 | 54.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-02D | 1025707.429 | 1072401.610 | 599.51 | 602.11 | 601.74 | 08/14/95 | SJB | 77.00 | 527.51 | 522.51 | 5 | 72.00 | 77.00 | 2 | PVC,SS/SS | 0.020 | R |
| MWN-03 | 1027272.219 | 1071756.439 | 609.79 | 612.39 | 611.96 | 09/06/90 | Empire | 47.00 | 572.79 | 562.79 | 10 | 37.00 | 47.00 | 4 | PVC/SS | 0.010 | F |
| MWN-03B | 1027305.739 | 1071753.259 | 609.57 | 612.47 | 612.29 | 11/05/92 | Empire | 88.00 | 531.57 | 521.57 | 10 | 78.00 | 88.00 | 2 | PVC,SS/SS | 0.010 | S,C,P |
| MWN-03D | 1027290.489 | 1071755.689 | 609.83 | 612.73 | 612.65 | 07/26/94 | Empire | 118.50 | 501.33 | 491.33 | 10 | 108.50 | 118.50 | 2 | PVC,SS/SS | 0.020 | R |
| MWN-04 | 1028222.449 | 1071280.649 | 621.02 | 623.82 | 623.45 | 09/12/90 | Empire | 56.10 | 574.92 | 564.92 | 10 | 46.10 | 56.10 | 4 | PVC/SS | 0.010 | F |
| MWN-05A | 1029286.609 | 1071006.469 | 620.22 | 623.42 | 622.84 | 01/02/91 | Empire | 55.50 | 574.72 | 564.72 | 10 | 45.50 | 55.50 | 4 | PVC/SS | 0.010 | F |
| MWN-05B | 1029258.299 | 1071005.459 | 617.85 | 620.65 | 620.54 | 11/03/92 | Empire | 74.00 | 553.85 | 543.85 | 10 | 64.00 | 74.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-05D | 1029211.939 | 1071024.379 | 614.07 | 617.37 | 617.17 | 08/18/95 | SJB | 102.00 | 517.07 | 512.07 | 5 | 97.00 | 102.00 | 2 | PVC,SS/SS | 0.020 | R |
| MWN-12 | 1028521.969 | 1071684.699 | 606.71 | 609.01 | 608.59 | 09/06/90 | Empire | 38.00 | 578.71 | 568.71 | 10 | 28.00 | 38.00 | 4 | PVC/SS | 0.010 | F |
| MWN-13A | 1027754.579 | 1072541.399 | 605.37 | 607.67 | 607.32 | 09/18/90 | Empire | 38.00 | 577.37 | 567.37 | 10 | 28.00 | 38.00 | 4 | PVC/SS | 0.010 | F |
| MWN-13C | 1027763.989 | 1072539.640 | 605.29 | 607.59 | 607.30 | 11/15/91 | ED | 72.00 | 543.29 | 533.29 | 10 | 62.00 | 72.00 | 4 | PVC,SS/SS | 0.010 | S,CS |
| MWN-14A | 1029612.249 | 1072161.079 | 609.78 | 612.48 | 612.38 | 11/23/92 | Empire | 46.50 | 573.28 | 563.28 | 10 | 36.50 | 46.50 | 2 | PVC,SS/SS | 0.100 | F |
| MWN-14B | 1029590.849 | 1072165.679 | 609.84 | 613.04 | 612.90 | 11/18/92 | Empire | 59.00 | 560.84 | 550.84 | 10 | 49.00 | 59.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-15A | 1028158.939 | 1073750.519 | 589.67 | 592.17 | 592.08 | 11/20/92 | Empire | 22.00 | 577.67 | 567.67 | 10 | 12.00 | 22.00 | 2 | PVC,SS/SS | 0.010 | F |
| MWN-15B | 1028165.529 | 1073750.279 | 590.67 | 593.77 | 593.24 | 11/24/92 | Empire | 32.50 | 568.17 | 558.17 | 10 | 22.50 | 32.50 | 2 | PVC,SS/SS | 0.010 | S,F,P |
| MWN-15D | 1028175.739 | 1073750.289 | 591.04 | 593.74 | 592.80 | 08/22/95 | SJB | 103.00 | 493.04 | 488.04 | 5 | 98.00 | 103.00 | 2 | PVC,SS/SS | 0.020 | R |
| MWN-16A | 1025685.709 | 1073502.819 | 600.23 | 602.93 | 602.53 | 11/13/92 | Empire | 31.00 | 579.23 | 569.23 | 10 | 21.00 | 31.00 | 2 | PVC,SS/SS | 0.010 | F |
| MWN-16B | 1025697.529 | 1073499.519 | 600.40 | 603.26 | 602.94 | 11/16/92 | Empire | 54.00 | 556.40 | 546.40 | 10 | 44.00 | 54.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-19A | 1027560.269 | 1074434.899 | 582.64 | 585.24 | 585.11 | 04/28/94 | Empire | 16.00 | 576.64 | 566.64 | 10 | 6.00 | 16.00 | 2 | PVC/SS | 0.010 | F,S,P |
| MWN-19B | 1027550.069 | 1074438.809 | 582.38 | 585.08 | 584.93 | 04/27/94 | Empire | 26.00 | 566.38 | 556.38 | 10 | 16.00 | 26.00 | 2 | PVC,SS/SS | 0.010 | P |
| MWN-20A | 1026915.759 | 1073083.699 | 599.86 | 602.76 | 602.71 | 05/09/94 | Empire | 32.00 | 577.86 | 567.86 | 10 | 22.00 | 32.00 | 2 | PVC/SS | 0.020 | F |

**TABLE E-3**

**MONITORING WELL CONSTRUCTION SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well I.D. | Northing | Easting | Ground Elev. (fmsl) | Casing Elev. (fmsl) | TOR Elev. (fmsl) | Install Date | Contractor | Total Depth (fbgs) | Screened Interval (fmsl) | | Screen Length (feet) | Screened Interval (fbgs) | | Riser / Screen Diam. (in.) | Riser / Screen Material | Screen Slot Size (in.) | Stratigraphic Unit Monitoring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | top | bottom | | top | bottom | | | | |
| MWN-20B | 1026907.719 | 1073088.589 | 599.67 | 602.17 | 601.66 | 06/04/94 | Empire | 54.00 | 555.67 | 545.67 | 10 | 44.00 | 54.00 | 2 | PVC,SS/SS | 0.010 | S,F |
| MWN-21A | 1028093.389 | 1074253.869 | 581.83 | 583.83 | 583.85 | 04/08/94 | Empire | 8.50 | 578.33 | 573.33 | 5 | 3.50 | 8.50 | 2 | PVC/SS | 0.010 | F |
| MWN-21B | 1028099.099 | 1074266.609 | 581.86 | 584.36 | 583.91 | 05/04/94 | Empire | 40.00 | 551.86 | 541.86 | 10 | 30.00 | 40.00 | 2 | SS/SS | 0.010 | CS |
| MWN-21C | 1028095.459 | 1074258.669 | 582.03 | 584.13 | 584.09 | 04/02/94 | Empire | 18.80 | 565.23 | 563.23 | 2.00 | 16.80 | 18.80 | 2 | PVC/SS | 0.020 | F |
| MWN-22B | 1025262.739 | 1073198.889 | 609.96 | 612.56 | 612.44 | 05/12/94 | Empire | 62.00 | 557.96 | 547.96 | 10 | 52.00 | 62.00 | 2 | PVC,SS/SS | 0.020 | S |
| MWN-25A | 1029928.419 | 1073426.919 | 589.83 | 591.98 | 591.74 | 05/03/94 | Empire | 20.00 | 579.83 | 569.83 | 10 | 10.00 | 20.00 | 2 | PVC/SS | 0.020 | F |
| MWN-25B | 1029935.599 | 1073424.819 | 589.86 | 591.46 | 591.25 | 05/02/94 | Empire | 23.00 | 576.86 | 566.86 | 10 | 13.00 | 23.00 | 2 | PVC,SS/SS | 0.010 | S,F |
| MWN-25D | 1029918.539 | 1073428.949 | 589.91 | 592.26 | 592.18 | 08/24/95 | SJB | 54.00 | 540.91 | 535.91 | 5 | 49.00 | 54.00 | 2 | PVC,SS/SS | 0.020 | R |
| MWN-28A | 1027166.699 | 1072064.069 | 593.54 | 594.74 | 595.76 | 02/17/95 | Hunt | 29.00 | 574.54 | 564.54 | 10 | 19.00 | 29.00 | 2 | PVC/SS | 0.010 | F |
| MWN-29A | 1027223.249 | 1072258.399 | 594.01 | 596.21 | 596.19 | 02/20/95 | Hunt | 29.00 | 575.01 | 565.01 | 10 | 19.00 | 29.00 | 2 | PVC/SS | 0.010 | F |
| MWN-30A | 1027634.199 | 1074641.459 | 582.09 | 585.39 | 585.34 | 08/18/95 | SJB | 18.00 | 579.09 | 564.09 | 15 | 3.00 | 18.00 | 2 | SS/SS | 0.010 | F |
| MWN-31A | 1027786.689 | 1074531.809 | 580.63 | 583.53 | 583.63 | 08/22/95 | SJB | 18.50 | 577.13 | 562.13 | 15 | 3.50 | 18.50 | 2 | PVC/SS | 0.010 | F |
| MWN-32A | 1027726.419 | 1074269.989 | 584.06 | 587.06 | 587.00 | 08/21/95 | SJB | 19.00 | 580.06 | 565.06 | 15 | 4.00 | 19.00 | 2 | SS/SS | 0.010 | F,P,S |
| MWN-35A | 1027362.152 | 1072052.685 | 606.60 | 608.86 | 608.71 | 10/18/00 | SJB | 42.00 | 574.60 | 564.60 | 10 | 32.00 | 42.00 | 2 | PVC/SS | 0.010 | F |
| MWN-36A | 1027385.137 | 1072381.047 | 596.48 | 598.60 | 598.42 | 10/20/00 | SJB | 30.00 | 576.48 | 566.48 | 10 | 20.00 | 30.00 | 2 | PVC/SS | 0.010 | F |
| MWN-37A | 1025670.121 | 1074070.494 | 595.38 | 598.09 | 597.82 | 10/20/00 | SJB | 30.00 | 575.38 | 565.38 | 10 | 20.00 | 30.00 | 2 | PVC/SS | 0.010 | F |
| MWN-38A | 1026237.836 | 1073698.859 | 598.23 | 600.29 | 600.16 | 10/21/00 | SJB | 28.00 | 580.23 | 570.23 | 10 | 18.00 | 28.00 | 2 | PVC/SS | 0.010 | F |
| MWN-39A | 1026750.478 | 1073935.803 | 589.16 | 591.43 | 591.24 | 10/31/00 | SJB | 21.00 | 578.16 | 568.16 | 10 | 11.00 | 21.00 | 2 | PVC/SS | 0.010 | F |
| MWN-40A | 1026195.305 | 1074615.333 | 588.06 | 590.34 | 590.16 | 11/01/00 | SJB | 19.00 | 579.06 | 569.06 | 10 | 9.00 | 19.00 | 2 | PVC/SS | 0.010 | F |
| MWN-41A | 1025624.803 | 1073139.081 | 613.64 | 616.03 | 615.86 | 10/30/00 | SJB | 47.00 | 576.64 | 566.64 | 10 | 37.00 | 47.00 | 2 | PVC/SS | 0.010 | F |
| MWN-42A | 1029186.615 | 1071856.735 | 576.93 | 579.52 | 579.37 | 10/25/00 | SJB | 15.00 | 571.93 | 561.93 | 10 | 5.00 | 15.00 | 2 | PVC/SS | 0.010 | F |
| MWN-51A | 1029386.945 | 1073618.099 | 589.18 | 589.10 | 588.23 | 11/01/00 | SJB | 20.00 | 579.18 | 569.18 | 10 | 10.00 | 20.00 | 2 | PVC/SS | 0.010 | F |
| MWN-51B | 1029388.920 | 1073622.514 | 589.20 | 589.20 | 588.90 | 11/01/00 | SJB | 33.00 | 561.20 | 556.20 | 5 | 28.00 | 33.00 | 2 | PVC,SS/SS | 0.010 | P |
| WT1-07 | 1024981.905 | 1072624.985 | 597.45 | 600.55 | 600.31 | 05/30/07 | ED | 35.58 | 571.87 | 561.87 | 10 | 25.58 | 35.58 | 2 | PVC/PVC | 0.010 | F, S |
| ***Discharge Area 4B (5 wells)*** | | | | | | | | | | | | | | | | | |
| MWN-06A | 1030360.339 | 1071017.239 | 652.21 | 655.51 | 655.15 | 01/28/91 | Empire | 90.00 | 572.21 | 562.21 | 10 | 80.00 | 90.00 | 4 | PVC/SS | 0.010 | F |
| MWN-18A | 1031074.099 | 1072841.799 | 592.71 | 594.51 | 594.20 | 12/02/92 | Empire | 26.00 | 576.71 | 566.71 | 10 | 16.00 | 26.00 | 2 | PVC,SS/SS | 0.010 | F |
| MWN-43A | 1030849.391 | 1072294.243 | 595.77 | 598.51 | 598.02 | 11/02/00 | SJB | 30.00 | 575.77 | 565.77 | 10 | 20.00 | 30.00 | 2 | PVC/SS | 0.010 | F |
| MWN-50A | 1030445.558 | 1073169.709 | 592.82 | 592.82 | 592.41 | 10/31/00 | SJB | 20.00 | 582.82 | 572.82 | 10 | 10.00 | 20.00 | 2 | PVC/SS | 0.010 | F |
| MWN-50B | 1030452.544 | 1073168.028 | 592.70 | 592.70 | 592.32 | 10/31/00 | SJB | 33.00 | 564.70 | 559.70 | 5 | 28.00 | 33.00 | 2 | PVC,SS/SS | 0.010 | S |
| ***Discharge Area 5 (21 wells)*** | | | | | | | | | | | | | | | | | |
| MWN-07 | 1031175.359 | 1073593.439 | 581.67 | 584.47 | 584.12 | 10/18/90 | Empire | 17.00 | 574.67 | 564.67 | 10 | 7.00 | 17.00 | 4 | PVC/SS | 0.010 | F |
| MWN-08 | 1029761.779 | 1074088.469 | 582.00 | 584.80 | 584.43 | 10/22/90 | Empire | 17.00 | 575.00 | 565.00 | 10 | 7.00 | 17.00 | 4 | PVC/SS | 0.010 | F |
| MWN-09 | 1028321.939 | 1074556.409 | 582.29 | 585.29 | 584.75 | 10/24/90 | Empire | 16.00 | 576.29 | 566.29 | 10 | 6.00 | 16.00 | 4 | PVC/SS | 0.010 | F |
| MWN-26A | 1028967.579 | 1074285.279 | 583.15 | 583.85 | 583.92 | 04/08/94 | Empire | 6.00 | 582.15 | 577.15 | 5 | 1.00 | 6.00 | 2 | PVC/SS | 0.010 | F |
| MWN-26B | 1028964.359 | 1074274.099 | 580.78 | 583.28 | 583.14 | 05/03/94 | Empire | 38.00 | 552.78 | 542.78 | 10 | 28.00 | 38.00 | 2 | SS/SS | 0.010 | CS |
| MWN-27A | 1027868.459 | 1074620.109 | 580.67 | 583.17 | 583.04 | 04/08/94 | Empire | 6.50 | 579.17 | 574.17 | 5 | 1.50 | 6.50 | 2 | PVC/SS | 0.010 | F |
| MWN-27B | 1027856.349 | 1074622.809 | 580.51 | 583.31 | 582.81 | 05/05/94 | Empire | 34.00 | 556.51 | 546.51 | 10 | 24.00 | 34.00 | 2 | SS/SS | 0.010 | CS |
| MWN-27C | 1027862.999 | 1074621.179 | 580.73 | 583.13 | 583.07 | 04/02/94 | Empire | 14.50 | 576.23 | 566.23 | 10 | 4.50 | 14.50 | 2 | PVC/SS | 0.010 | F |
| MWN-33A | 1028775.849 | 1074222.579 | 583.23 | 586.53 | 586.64 | 08/17/95 | SJB | 18.50 | 579.73 | 564.73 | 15 | 3.50 | 18.50 | 2 | PVC/SS | 0.010 | F |
| MWN-34A | 1029242.329 | 1074277.709 | 581.80 | 584.50 | 584.55 | 08/16/95 | SJB | 20.00 | 576.80 | 561.80 | 15 | 5.00 | 20.00 | 2 | PVC/SS | 0.010 | F |
| MWN-45A | 1027980.081 | 1074850.117 | 582.42 | 584.88 | 584.77 | 10/24/00 | SJB | 18.00 | 574.42 | 564.42 | 10 | 8.00 | 18.00 | 2 | PVC/SS | 0.010 | F |
| MWN-46A | 1027915.782 | 1074863.998 | 580.39 | 583.44 | 582.90 | 10/25/00 | SJB | 12.00 | 578.39 | 568.39 | 10 | 2.00 | 12.00 | 2 | PVC/SS | 0.010 | F |

**TABLE E-3**

**MONITORING WELL CONSTRUCTION SUMMARY**

**Long-Term Groundwater Monitoring Plan**
**ArcelorMittal Tecumseh Redevelopment, Inc.**
**Lackawanna, New York**

| Well I.D. | Northing | Easting | Ground Elev. (fmsl) | Casing Elev. (fmsl) | TOR Elev. (fmsl) | Install Date | Contractor | Total Depth (fbgs) | Screened Interval (fmsl) | | Screen Length (feet) | Screened Interval (fbgs) | | Riser / Screen Diam. (in.) | Riser / Screen Material | Screen Slot Size (in.) | Stratigraphic Unit Monitoring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | top | bottom | | top | bottom | | | | |
| MWN-47A | 1028104.727 | 1074712.550 | 580.76 | 583.41 | 583.28 | 10/24/00 | SJB | 17.00 | 573.76 | 563.76 | 10 | 7.00 | 17.00 | 2 | PVC/SS | 0.010 | F |
| MWN-48A | 1028073.953 | 1074642.705 | 582.58 | 585.42 | 585.18 | 10/25/00 | SJB | 17.00 | 575.58 | 565.58 | 10 | 7.00 | 17.00 | 2 | PVC/SS | 0.010 | F |
| MWN-49A | 1029872.138 | 1074034.022 | 582.82 | 585.47 | 585.34 | 10/26/00 | SJB | 18.00 | 574.82 | 564.82 | 10 | 8.00 | 18.00 | 2 | PVC/SS | 0.010 | F |
| MWN-49B | 1029865.929 | 1074035.291 | 582.73 | 585.56 | 585.21 | 10/30/00 | SJB | 34.00 | 558.73 | 548.73 | 10 | 24.00 | 34.00 | 2 | PVC/SS | 0.010 | CS,T |
| MWN-52A | 1030643.559 | 1073764.165 | 580.96 | 580.96 | 580.09 | 11/03/00 | SJB | 14.00 | 576.96 | 566.96 | 10 | 4.00 | 14.00 | 2 | PVC/SS | 0.010 | F |
| MWN-52B | 1030639.864 | 1073765.126 | 580.98 | 580.96 | 580.70 | 11/03/00 | SJB | 26.00 | 559.98 | 554.98 | 5 | 21.00 | 26.00 | 2 | PVC,SS/SS | 0.010 | S |
| MWN-53A | 1074590.239 | 1028166.838 | 581.56 | NA | 584.19 | 11/29/04 | ED | 18.14 | 573.42 | 563.42 | 10 | 8.14 | 18.14 | 2 | PVC, PVC | 0.010 | F |
| MWN-54A | 1074657.631 | 1028025.891 | 581.73 | NA | 584.68 | 11/30/04 | ED | 20.31 | 571.42 | 561.42 | 10 | 10.31 | 20.31 | 2 | PVC/PVC | 0.010 | F |
| MWN-55A | 1074726.162 | 1027881.685 | 581.48 | NA | 584.20 | 11/30/04 | ED | 16.82 | 574.66 | 564.66 | 10 | 6.82 | 16.82 | 2 | PVC/PVC | 0.010 | F |

**TOTAL WELLS:** **131**

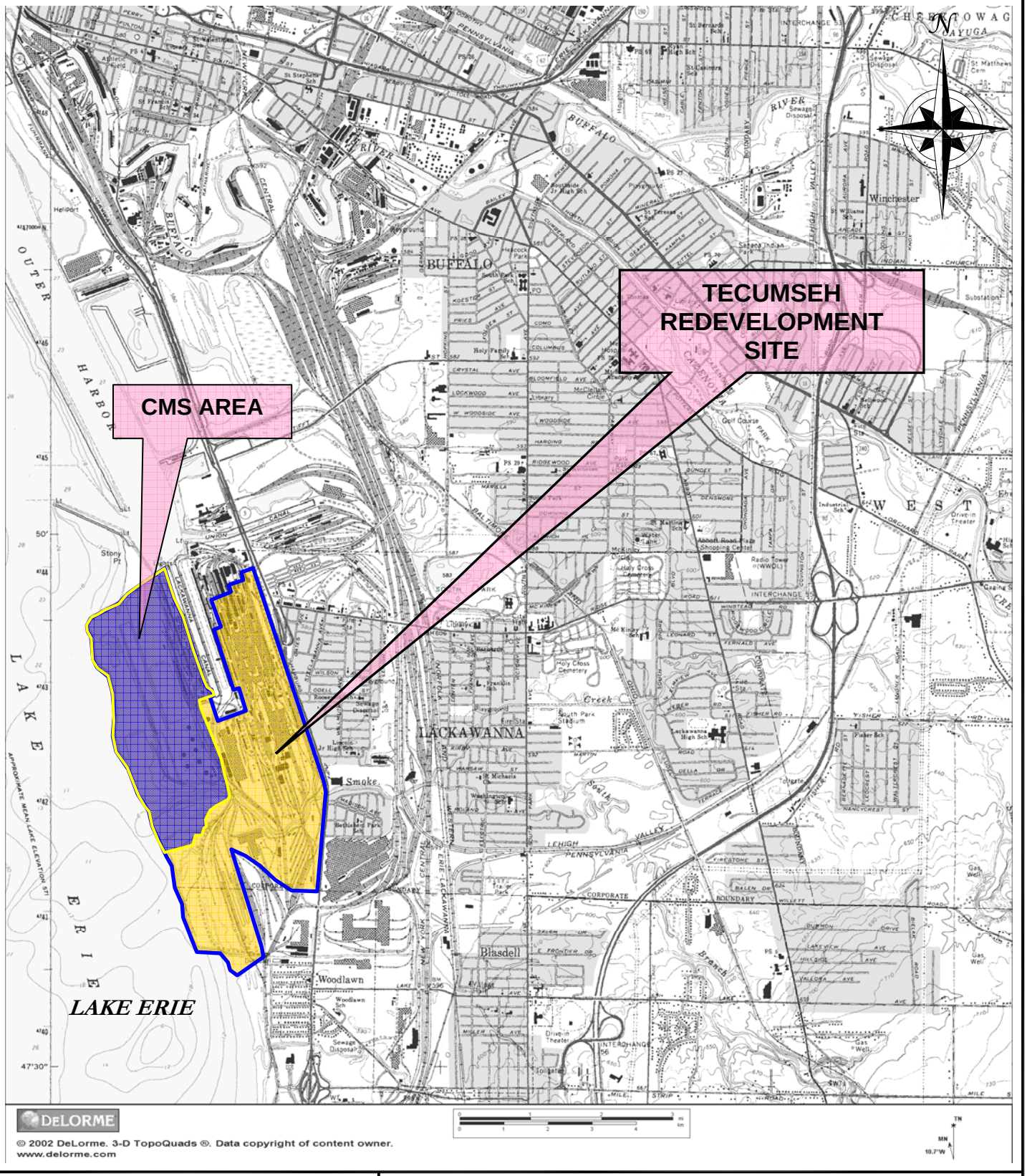
**Stratigraphic Unit:**
F - Fill
S - Sand
R - Rock
CS - Clayey Silt
P - Peat
C - Clay
T - Till

**Drilling Contractor:**
Empire - Empire Soils Inveigations, Inc.
SJB - SJB Services, Inc.
ED - Earth Dimensions, Inc.
Hunt - Huntingdon Analytical, Inc.
Ehmke - Ehmke Well Drillers, Inc.
Baker - Michael Baker Jr., Inc.

**Notes:**
PVC - Schedule 40
NA - Not Available
SS - Stainless Steel

# FIGURES

# FIGURE E-1




FILEPATH=\CAD\TurnKey\Tecumseh Redevelopment\RFI-CMS ORDER\CMS\CMS Work Plan\Appendix E; LTGWM Plan\Figure 1; Site Location and Vicinity Map.dwg


TurnKey Environmental Restoration, LLC

726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-635


PROJECT NO.: 0071-007-110

DATE: APRIL 2008

DRAFTED BY: BCH

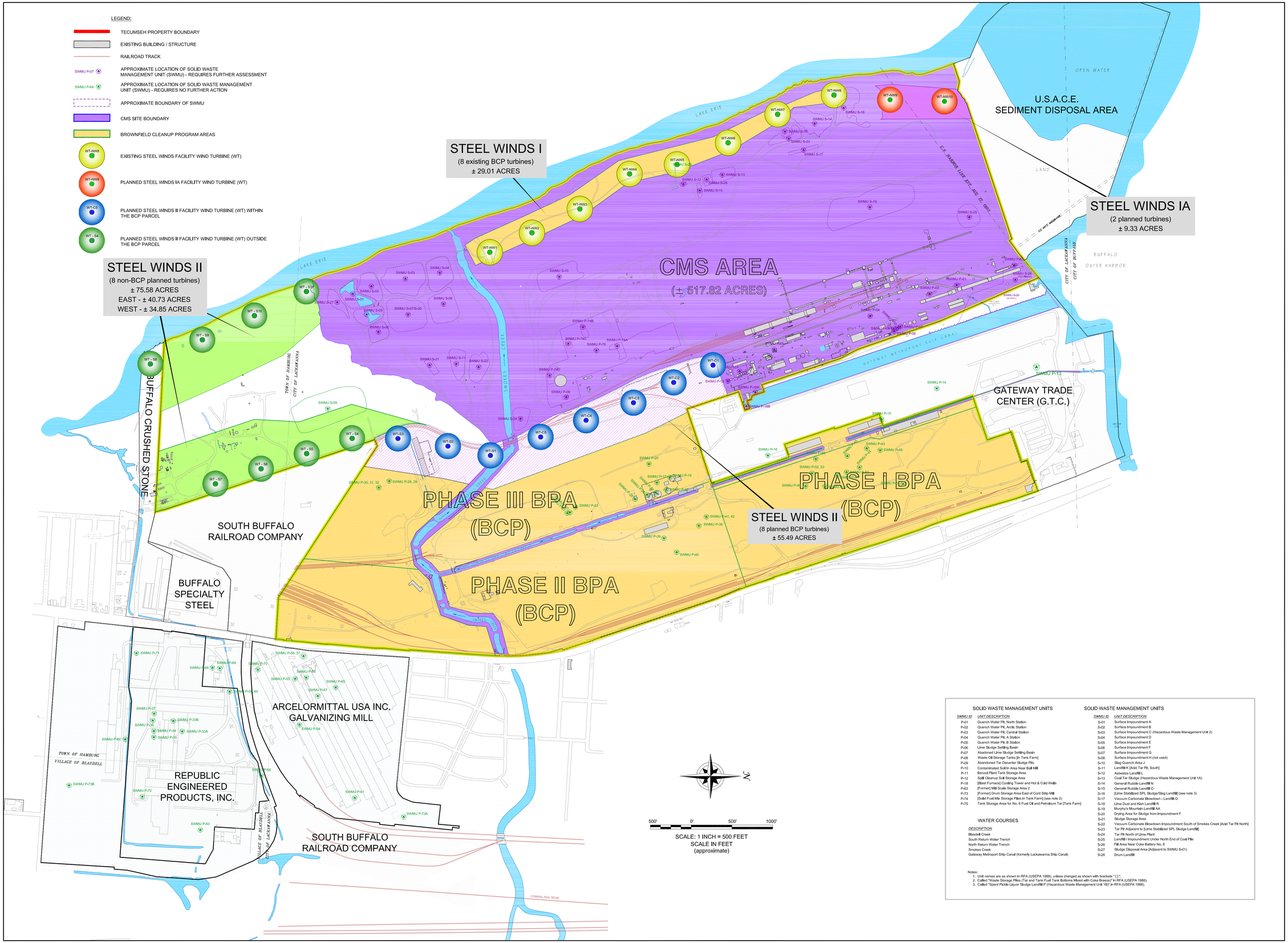
## SITE LOCATION AND VICINITY MAP

CMS WORK PLAN - APPENDIX E

ARCELORMITTAL TECUMSEH LACKAWANNA SITE
LACKAWANNA, NEW YORK

PREPARED FOR

ARCELORMITTAL TECUMSEH REDEVELOPMENT, INC.




SOLID WASTE MANAGEMENT UNITS

| SWMU ID | UNIT DESCRIPTION |
|---|---|
| P-01 | Quench Water Pit, North Station |
| P-02 | Quench Water Pit, Arctic Station |
| P-03 | Quench Water Pit, Central Station |
| P-04 | Quench Water Pit, A Station |
| P-05 | Quench Water Pit, B Station |
| P-06 | Lime Sludge Settling Basin |
| P-07 | Abadoned Lime Sludge Settling Basin |
| P-08 | Waste Oil Storage Tanks [In Tank Farm] |
| P-09 | Abandoned Tar Decanter Sludge Pits |
| P-10 | Contaminated Soil In Area Near Ball Mill |
| P-11 | Benzol Plant Tank Storage Area |
| P-12 | Spill Cleanup Soil Storage Area |
| P-18 | [Blast Furnace] Cooling Tower and Hot & Cold Wells |
| P-63 | [Former] Mill Scale Storage Area 2 |
| P-73 | [Former] Drum Storage Area East of Cord Strip Mill |
| P-74 | [Solid Fuel Mix Storage Piles in Tank Farm] (see note 2) |
| P-75 | Tank Storage Area for No. 6 Fuel Oil and Petroleum Tar [Tank Farm] |

SOLID WASTE MANAGEMENT UNITS

| SWMU ID | UNIT DESCRIPTION |
|---|---|
| S-01 | Surface Impoundment A |
| S-02 | Surface Impoundment B |
| S-03 | Surface Impoundment C (Hazardous Waste Management Unit 2) |
| S-04 | Surface Impoundment D |
| S-05 | Surface Impoundment E |
| S-06 | Surface Impoundment F |
| S-07 | Surface Impoundment G |
| S-08 | Surface Impoundment H (not used) |
| S-10 | Slag Quench Area J |
| S-11 | Landfill K [Add Tar Pit, South] |
| S-12 | Asbestos Landfill L |
| S-13 | Coal Tar Sludge (Hazardous Waste Management Unit 1A) |
| S-14 | General Rubble Landfill N |
| S-15 | General Rubble Landfill O |
| S-16 | [Lime Stabilized SPL Sludge/Slag Landfill] (see note 3) |
| S-17 | Vacuum Carbonate Blowdown - Landfill Q |
| S-18 | Lime Dust and Kish Landfill R |
| S-19 | Murphy's Mountain Landfill AA |
| S-20 | Drying Area for Sludge from Impoundment F |
| S-21 | Sludge Storage Area |
| S-22 | Vacuum Carbonate Blowdown Impoundment South of Smokes Creek [Add Tar Pit North] |
| S-23 | Tar Pit Adjacent to [Lime Stabilized SPL Sludge Landfill] |
| S-24 | Tar Pit North of Lime Plant |
| S-25 | Landfill / Impoundment Under North End of Coal Pile |
| S-26 | Fill Area Near Coke Battery No. 8 |
| S-27 | Sludge Disposal Area [Adjacent to SWMU S-01] |
| S-28 | Drum Landfill |

WATER COURSES

| DESCRIPTION |
|---|
| Blasdell Creek |
| South Return Water Trench |
| North Return Water Trench |
| Smokes Creek |
| Gateway Metroport Ship Canal (formerly Lackawanna Ship Canal) |

Notes:
1. Unit names are as shown in RFA (USEPA 1988), unless changed as shown with brackets " [ ]".
2. Called "Waste Storage Piles (Tar and Tank Fuel Tank Bottoms Mixed with Coke Breeze)" In RFA (USEPA 1988).
3. Called "Spent Pickle Liquor Sludge Landfill P (Hazardous Waste Management Unit 1B)" In RFA (USEPA 1988).

TURNKEY ENVIRONMENTAL RESTORATION, LLC.
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0635

JOB NO.: 0071-007-110

REVISIONS

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|---|---|---|---|
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DATE: APRIL 2008
CHECKED BY:
APPROVED BY:



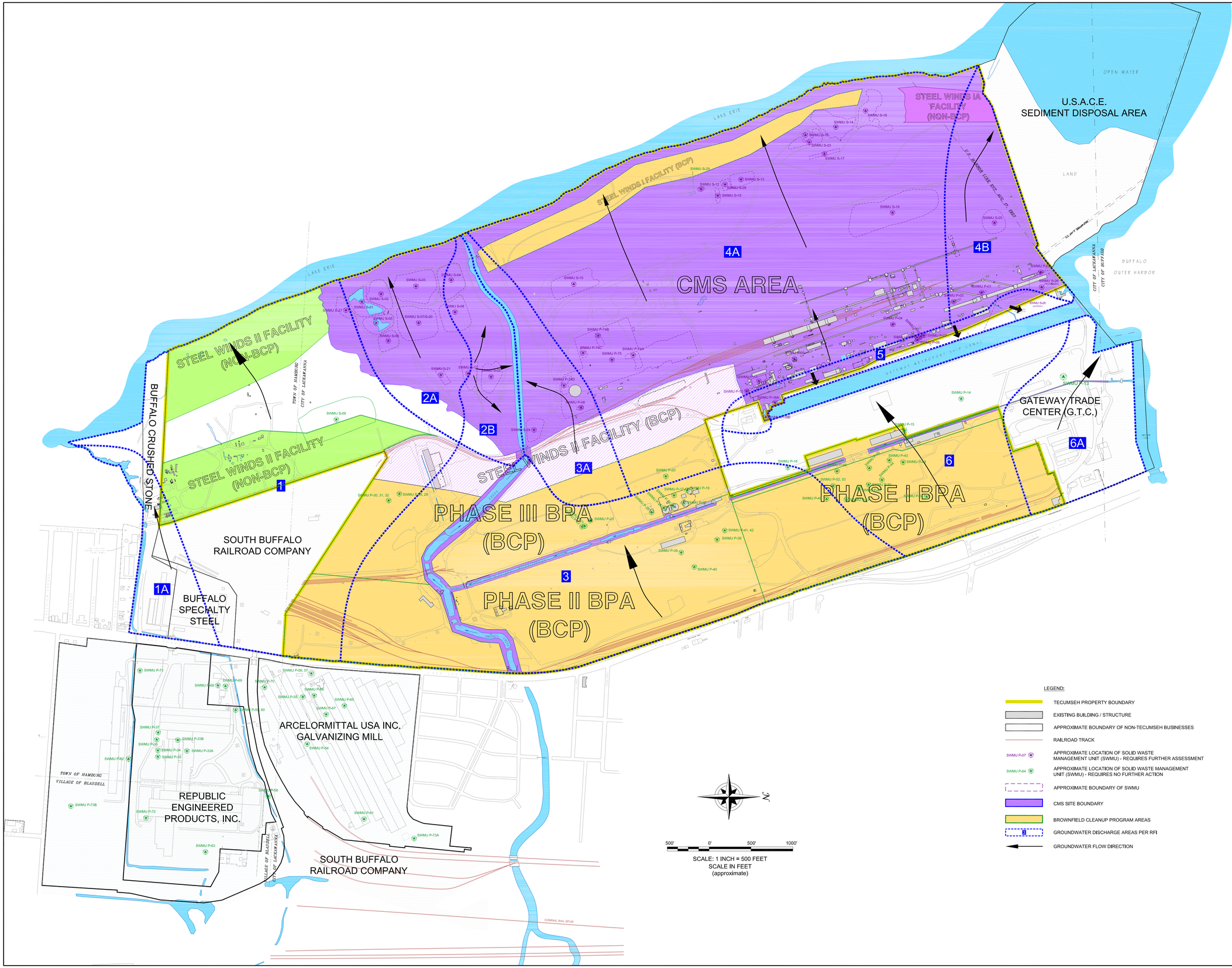
SEAL

# CMS SITE MAP

CMS WORK PLAN - APPENDIX E
ARCELORMITTAL TECUMSEH LACKAWANNA SITE
LACKAWANNA, NEW YORK

PREPARED FOR
ARCELORMITTAL TECUMSEH REDEVELOPMENT, INC.

**FIGURE E-2**




TURNKEY ENVIRONMENTAL RESTORATION, LLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
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# GROUNDWATER DISCHARGE AREAS

CMS WORK PLAN - APPENDIX E
ARCELORMITTAL TECUMSEH LACKAWANNA SITE
LACKAWANNA, NEW YORK

PREPARED FOR
ARCELORMITTAL TECUMSEH REDEVELOPMENT, INC.

**FIGURE E-3**

LAKE ERIE

STEEL WINDS I FACILITY (BCP)

# CMS AREA

(±517.82 ACRES)

4A

4B

5

2A

2B

3A

SWMU S-01
SWMU S-02
SWMU S-03
SWMU S-04
SWMU S-05
SWMU S-06
SWMU S-07/S-20
SWMU S-08
SWMU S-10
SWMU S-11
SWMU S-12
SWMU S-13
SWMU S-14
SWMU S-15
SWMU S-16
SWMU S-17
SWMU S-18
SWMU S-19
SWMU S-21
SWMU S-22
SWMU S-23
SWMU S-24
SWMU S-25
SWMU S-26 (TECUMSEH)
SWMU S-26 (GATEWAY)
SWMU S-27
SWMU S-28
SWMU S-29
SWMU P-02
SWMU P-03
SWMU P-04
SWMU P-05
SWMU P-07
SWMU P-08
SWMU P-09
SWMU P-10
SWMU P-11
SWMU P-12
SWMU P-18A
SWMU P-18B
SWMU P-74A
SWMU P-74B
SWMU P-74C
SWMU P-74D
SWMU P-75 (~18.7 AC)

U.S. HARBOR LINE EST. AUG. 12, 1903

GATEWAY METROPORT SHIP CANAL

LEGEND:

- TECUMSEH PROPERTY BOUNDARY
- CMS SITE BOUNDARY
- EXISTING BUILDING / STRUCTURE
- APPROXIMATE BOUNDARY OF NON-TECUMSEH BUSINESSES
- CURRENTLY MONITORED SWMU
- RAILROAD TRACK
- SWMU P-07 — APPROXIMATE LOCATION OF SOLID WASTE MANAGEMENT UNIT (SWMU) - REQUIRES FURTHER ASSESSMENT
- SWMU P-64 — APPROXIMATE LOCATION OF SOLID WASTE MANAGEMENT UNIT (SWMU) - REQUIRES NO FURTHER ACTION
- APPROXIMATE BOUNDARY OF SWMU
- 4A — GROUNDWATER DISCHARGE AREA PER RFI
- MWN-15A — NETWORK FILL UNIT MONITORING WELL
- MWN-15B — NETWORK SAND UNIT MONITORING WELL
- MWN-15D — NETWORK BEDROCK UNIT MONITORING WELL
- MWN-19B — NETWORK MISCELLANEOUS UNIT MONITORING WELL
- MWS-29A — NON-NETWORK EXISTING MONITORING WELL

N

300' 0' 300' 600'

SCALE: 1 INCH = 300 FEET
SCALE IN FEET
(approximate)

TURNKEY ENVIRONMENTAL RESTORATION, LLC
726 EXCHANGE STREET
SUITE 624
BUFFALO, NEW YORK 14210
(716) 856-0635

JOB NO.: 007-407-110

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DATE: APRIL 2008
CHECKED BY:
APPROVED BY:



# GROUNDWATER MONITORING NETWORK

CMS WORK PLAN - APPENDIX E
ARCELORMITTAL TECUMSEH LACKAWANNA SITE
LACKAWANNA, NEW YORK

PREPARED FOR
ARCELORMITTAL TECUMSEH REDEVELOPMENT, INC.

# FIGURE E-4

# ATTACHMENT E-1

## LOW-FLOW PURGING/SAMPLING STANDARD OPERATING PROCEDURE

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

FIELD OPERATING PROCEDURES

# Low-Flow (Minimal Drawdown) Groundwater Purging & Sampling Procedure

**FOP 031.0**

# LOW FLOW (MINIMAL DRAWDOWN) GROUNDWATER PURGING & SAMPLING PROCEDURES

## PURPOSE

This procedure describes the methods used for performing low flow (minimal drawdown) purging, also referred to as micro-purging, at a well prior to groundwater sampling to obtain a representative sample from the water-bearing zone. This method of purging is used to minimize the turbidity of the produced water. This may increase the representativeness of the groundwater samples by avoiding the necessity of filtering suspended solids in the field prior to preservation of the sample.

Well purging is typically performed immediately preceding groundwater sampling. The sample should be collected as soon as the parameters measured in the field (i.e., pH, specific conductance, dissolved oxygen, Eh, temperature, and turbidity) have stabilized.

## PROCEDURE

1. Water samples should not be taken immediately following well development. Sufficient time should be allowed to stabilize the groundwater flow regime in the vicinity of the monitoring well. This lag time will depend on site conditions and methods of installation but may exceed one week.

2. Prepare the electronic water level indicator (e-line) in accordance with the procedures referenced in the Benchmark's Groundwater Level Measurement FOP and decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Benchmark's Non-disposable and Non-dedicated Sampling Equipment Decontamination FOP. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

3. Calibrate all sampling devices and monitoring equipment in accordance with manufacturer's recommendations, the site Quality Assurance Project Plan (QAPP) and/or Field Sampling Plan (FSP). Calibration of field

instrumentation should be followed as specified in Benchmark's Calibration and Maintenance FOP for each individual meter.

4. Inspect the well/piezometer for signs of vandalism or damage and record condition on the Groundwater Well Purge & Sample Collection Log form (sample attached). Specifically, inspect the integrity of the following: concrete surface seal, lock, protective casing and well cover, well casing and J-plug/cap. Report any irregular findings to the Project Manager.

5. Unlock and remove the well protective cap or cover and place on clean plastic to avoid introducing foreign material into the well.

6. Monitor the well for organic vapors using a PID, as per the Work Plan. If a reading of greater than 5 ppm is recorded, the well should be allowed to vent until levels drop below 5 ppm before proceeding with purging.

7. Lower the e-line probe slowly into the monitoring well and record the initial water level in accordance with the procedures referenced in Benchmark's Groundwater Level Measurement FOP. Refer to the construction diagram for the well to identify the screened depth.

8. Decontaminate all non-dedicated pump and tubing equipment following the procedures referenced in the Benchmark's Non-disposable and Non-dedicated Sampling Equipment Decontamination FOP.

9. Lower the purge pump or tubing (i.e., low-flow electrical submersible, peristaltic, etc.) slowly into the well until the pump/tubing intake is approximately in the middle of the screened interval. Rapid insertion of the pump will increase the turbidity of well water, and can increase the required purge time. This step can be eliminated if dedicated tubing is already within the well.

   Placement of the pump close to the bottom of the well will cause increased entrainment of solids, which may have settled in the well over time. Low-flow purging has the advantage of minimizing mixing between the overlying

stagnant casing water and water within the screened interval. The objective of low-flow purging is to maintain a purging rate, which minimizes stress (drawdown) of the water level in the well. Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen.

10. Lower the e-line back down the well as water levels will be frequently monitored during purge and sample activities.

11. Begin pumping to purge the well. The pumping rate should be between 100 and 500 milliliters (ml) per minute (0.03 to 0.13 gallons per minute) depending on site hydrogeology. Periodically check the well water level with the e-line adjusting the flow rate as necessary to stabilize drawdown within the well. If possible, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 feet or less). If the water level exceeds 2 feet below static and declining, slow the purge rate until the water level generally stabilizes. Record each pumping rate and water level during the event.

    The low flow rate determined during purging will be maintained during the collection of analytical samples. At some sites where geologic heterogeneities are sufficiently different within the screened interval, high conductivity zones may be preferentially sampled.

12. Measure and record field parameters (pH, specific conductance, Eh, dissolved oxygen (DO), temperature, and turbidity) during purging activities. In lieu of measuring all of the parameters, a minimum subset could be limited to pH, specific conductance, and turbidity or DO.

    Water quality indicator parameters should be used to determine purging needs prior to sample collection in each well. Stabilization of indicator parameters should be used to determine when formation water is first encountered during purging. In general, the order of stabilization is pH, temperature, and specific conductance, followed by Eh, DO and turbidity. Performance criteria for determination of stabilization should be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator

parameters. An in-line flow through cell to continuously measure the above parameters may be used. The in-line device should be disconnected or bypassed during sample collection.

13. Purging will continue until parameters of water quality have stabilized. Record measurements for field indicator parameters (including water levels) at regular intervals during purging. The stability of these parameters with time can be used to guide the decision to discontinue purging. Proper adjustments must be made to stabilize the flow rate as soon as possible.

14. Record well purging and sampling data in the Project Field Book or on the attached Groundwater Well Purge & Sample Collection Log (sample attached). Measurements should be taken approximately every three to five minutes, or as merited given the rapidity of change.

15. Purging is complete when field indicator parameters stabilize. Stabilization is achieved after all field parameters have stabilized for three successive readings. Three successive readings should be within ± 0.1 units for pH, ± 3% for specific conductance, ± 10 mV for Eh, and ± 10% for turbidity and dissolved oxygen. These stabilization guidelines are provided for rough estimates only, actual site-specific knowledge may be used to adjust these requirements higher or lower.

    An in-line water quality measurement device (e.g., flow-through cell) should be used to establish the stabilization time for several field parameters on a well-specific basis. Data on pumping rate, drawdown and volume required for parameter stabilization can be used as a guide for conducting subsequent sampling activities.

16. Collect all project-required samples from the discharge tubing at the flow rate established during purging in accordance with Benchmark's Groundwater Sample Collection Procedures FOP. **If a peristaltic pump and dedicated tubing is used, collect all project-required samples from the discharge tubing as stated before, however volatile organic compounds should be collected in accordance with the procedure presented in the next**

**section.** Continue to maintain a constant flow rate such that the water level is not drawn down as described above. Fill sample containers with minimal turbulence by allowing the ground water to flow from the tubing along the inside walls of the container.

17. If field filtration is recommended as a result of increased turbidity, an in-line filter equipped with a 0.45-micron filter should be utilized.

18. Replace the dedicated tubing down the well taking care to avoid contact with the ground surface.

19. Restore the well to its capped/covered and locked condition.

20. Upon purge and sample collection completion, slowly lower the e-line to the bottom of the well/piezometer. Record the total depth to the nearest 0.01-foot and compare to the previous total depth measurement. If a significant discrepancy exists, re-measure the total depth. Record observations of purge water to determine whether the well/piezometer had become silted due to inactivity or damaged (i.e., well sand within purge water). Upon confirmation of the new total depth and determination of the cause (i.e., siltation or damage), notify the Project Manager following project field activities.

## PERISTALTIC PUMP VOC SAMPLE COLLECTION PROCEDURE

The collection of VOCs from a peristaltic pump and dedicated tubing assembly shall be collected using the following procedure.

1. Once all other required sample containers have been filled, turn off the peristaltic pump. The negative pressure effects of the pump head have not altered groundwater remaining within the dedicated tubing assembly and as such, this groundwater can be collected for VOC analysis.

2. While maintaining the pressure on the flexible tubing within the pump head assembly, carefully remove and coil the polyethylene tubing from the well; taking care to prevent the tubing from coming in contact with the ground

surface and without allowing groundwater to escape or drain from the tubing intake.

3. Once the polyethylene tubing is removed, turn the variable speed control to zero and reverse the pump direction.

4. Slowly increase the pump rate allowing the groundwater within the polyethylene tubing to be "pushed" out of the intake end (i.e., positive displacement) making sure the groundwater within the tubing is not "pulled" through the original discharge end (i.e., negative displacement). Groundwater pulled through the pump head assembly CANNOT be collected for VOC analysis.

5. Slowly fill each VOC vial by holding the vial at a 45-degree angle and allowing the flowing groundwater to cascade down the side until the vial is filled with as minimal disturbance as possible. As the vial fills, slowly rotate the vial to vertical. **DO NOT OVERFILL THE VIAL, AS THE PRESERVATIVE WILL BE LOST.** The vial should be filled only enough so that the water creates a slight meniscus at the vial mouth.

6. Cap the VOC vials leaving no visible headspace (i.e., air-bubbles). Gently tap each vial against your hand checking for air bubbles.

7. If an air bubble is observed, slowly remove the cap and repeat Steps 5 and 6.

## ATTACHMENTS

Groundwater Well Purge & Sample Collection Log (sample)

## REFERENCES

United States Environmental Protection Agency, 540/S-95/504, 1995. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.*

Benchmark FOPs:

*007* *Calibration and Maintenance of Portable Dissolved Oxygen Meter*
*008* *Calibration and Maintenance of Portable Field pH/Eh Meter*
*009* *Calibration and Maintenance of Portable Field Turbidity Meter*
*011* *Calibration and Maintenance of Portable Photoionization Detector*
*012* *Calibration and Maintenance of Portable Specific Conductance Meter*
*022* *Groundwater Level Measurement*
*024* *Groundwater Sample Collection Procedures*
*040* *Non-Disposable and Non-Dedicated Sampling Equipment Decontamination*
*046* *Sample Labeling, Storage and Shipment Procedures*

# LOW FLOW (MINIMAL DRAWDOWN) GROUNDWATER PURGING & SAMPLING PROCEDURES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

## LOW FLOW METHOD GROUNDWATER PURGE & SAMPLE COLLECTION LOG

| | |
|---|---|
| Project Name: | WELL LOCATION: |
| Project Number: | Sample Matrix: groundwater |
| Client: | Weather: |

***WELL DATA:*** DATE: TIME:

| | |
|---|---|
| Casing Diameter (inches): | Casing Material: |
| Screened interval (fbTOR): | Screen Material: |
| Static Water Level (fbTOR): | Bottom Depth (fbTOR): |
| Elevation Top of Well Riser (fmsl): | Ground Surface Elevation (fmsl): |
| Elevation Top of Screen (fmsl): | Stick-up (feet): |
| Standing volume in gallons: | |
| [(bottom depth - static water level) x vol calculation in table per well diameter]: | |

Volume Calculation

| Well Diameter | Volume gal/ft |
|---|---|
| 1" | 0.041 |
| 2" | 0.163 |
| 3" | 0.367 |
| 4" | 0.653 |
| 5" | 1.020 |
| 6" | 1.469 |

***PURGING DATA:*** Pump Type:

| | |
|---|---|
| Is equipment dedicated to location? yes no | Is tubing ded… …ion? yes no |
| Depth of Sample (i.e. Level of Intake) (fbTOR): | …roximate Pur… …(gal/… |

| Time | Water Level (fbTOR) | Accumulated Volume (gallons) | pH (units) | Temperature (degrees C) | S…ific … | … | DO (mg… | …mV) | Appearance & Odor |
|---|---|---|---|---|---|---|---|---|---|
| | Initial | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |



***SAMPLING DATA:*** DATE: START TIME: END TIME:

| | |
|---|---|
| Method: low-flow with dedica… | Was well sampled to dryness? yes no |
| Initial Water Level (fbTOR): | Was well sampled below top of sand pack? yes no |
| Final Water Level (fbTOR): | Field Personnel: |

***PHYSICAL & CHEMICAL DATA:***

| | WATER QUALITY MEASUREMENTS | | | | | |
|---|---|---|---|---|---|---|
| Appearance: / Color: | pH (units) | TEMP. (°C) | SC (uS) | TURB. (NTU) | DO (ppm) | ORP (mV) |
| Odor: | | | | | | |
| Sediment Present? | | | | | | |

**REMARKS:**

**PREPARED BY:**