

## DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: Frontier – Pendleton site  
Facility Address: Townline Road, Pendleton NY  
Facility EPA ID #: NYD991292053

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 - re-evaluate existing data, or

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

#### **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).

### **Background**

The Frontier Chemical-Pendleton site is located on Townline Road in the Town of Pendleton, Niagara County, New York. This inactive site is currently listed as site number 9-32-043 on the Registry of Inactive Hazardous Waste Disposal Sites in New York State. It is currently listed as a Class 4 site on the Registry, indicating that the site is properly closed, but requires continued management. The site as listed is approximately 22 acres in size. The area evaluated during site investigations is approximately 75 acres in size and is bounded by Townline Road to the west, an abandoned railroad right-of-way to the southeast and Bull Creek to the north. A lake approximately 15 acres in size (Quarry Lake, a former clay quarry) is located in the south-central portion of the site. The area around the site is residential/agricultural. The nearest residences are located less than 100 feet from the site. There is one drinking water well located more than 900 feet from the site.

The site was originally used as a clay brick and tile manufacturing facility. Frontier Chemical Waste Process, Inc. obtained the property and operated the site for the treatment of industrial wastes from 1959 to 1974. The waste treatment involved lime neutralization of plating wastes, pickle liquors and other liquid acid wastes from the plating and metal finishing industries. The treatment operations were carried out in the process area of the site, between Quarry Lake and the abandoned railroad. Resulting mixtures from the waste treatment process were discharged into Quarry Lake for settling of the neutralization products. Other operations performed at the site included chemical oxidation, chemical product recovery, incineration and distillation. Various drummed and tanked wastes were stored on-site for transfer. Much of the process area was filled and graded following termination of the waste processing and treatment operations between 1974 and 1977. Over 50 barrels containing pyridine were excavated and removed from site during 1984-85 in a Superfund Removal Action.

In 1980, two retention ponds were constructed for the rehabilitation of Quarry Lake. This was accomplished by batch-treating lake water in the ponds with a 50% caustic solution and discharging (via direct pipeline) the resultant liquid to the Town of Wheatfield Sewage Treatment Plant. The use of the ponds ceased in the mid-1980s.

The lake was dewatered by pumping the water to the County sewage treatment plant. Under Consent Orders issued in 1984, 1986, and 1988, Frontier was required to remediate the Quarry Lake by excavating the contaminated sediment and placing it in a containment area which was to be built on-site. In addition, Frontier was required to investigate suspected disposal areas to the southeast of the lake. Frontier installed 12 additional monitoring wells in 1988 as a part of the investigation. Frontier did not implement and complete the work as required by the Consent Orders, and the facility was found to be in violation of the orders. Consequently, the New York State Department of Environmental Conservation undertook the Remedial Investigation/Feasibility Study, which was completed in 1991.

The Remedial Investigation determined that the bottom sediments of Quarry Lake were contaminated with heavy metals. The process/fill area south of the lake was also contaminated with both organics and heavy metals. The Record of Decision (ROD) was signed in March 1992. A Consent Order was signed with the Potentially Responsible Parties (PRPs) in early 1994.

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Detailed design of the selected remedy was finalized in early 1995 and remedial construction began in August 1995. The remedy included: the construction of a (subsurface) clay barrier wall on the south side of the lake, removal and consolidation of contaminated lake sediments in the former "process/fill area" (south of the lake), capping of the "process/fill area" with a low permeability membrane liner overlaid with soil/grass, surface water drainage improvements to handle lake water control/discharge, installation of a leachate collection system under the "process/fill area" with an underground leachate treatment system with discharge to the local POTW (via sanitary sewer connection and local discharge permit), and a long term operation, maintenance, and groundwater monitoring program to ensure the long term effectiveness of the remedy. The remedial construction was completed in late 1996. Long term remedial activities include operation and maintenance of the groundwater collection and pretreatment system, as well as maintenance of the cap over the "process/fill area". Long term remedial monitoring activities include pre-treatment system effluent sampling and reporting, as well as groundwater monitoring around the "process/fill area" and site perimeter.

The PRP group (which includes Olin, Allied Signal, IBM, Carborundum, DuPont, Dow Chemical, GM, etc.) agreed to implement the DEC's Record of Decision in a 1994 Consent Order. The primary point of contact for the PRP group and the required O&M is Olin Corp.

**References:** Record of Decision, Frontier Chemical-Pendleton, Site No. 9-32-043, NYSDEC, March 1992.

Registry of Inactive Hazardous Waste Disposal Sites in New York State, NYSDEC, 2005.

2. Is **groundwater** known or reasonably suspected to be "**contaminated**"<sup>1</sup> 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?

**X** 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 "contaminated."

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

**Rationale:**

**Groundwater:** Three principal hydrologic units were defined at the site during the RI. These are an upper water-bearing zone, a clay confining unit (intermediate water bearing zone) and a lower aquifer.

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<sup>1</sup> "Contamination" and "contaminated" describes 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).

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Groundwater in the upper water-bearing zone is perched and appears to flow in a radial pattern away from the process area. The horizontal flow is of low volume. Numerous organic contaminants were detected during the RI in the groundwater within the upper zone in the process area. The compounds of greatest significance, due to their frequency and concentration, were chlorinated hydrocarbons and BTX (benzene, toluene, xylene) compounds. The highest BTX compounds concentration found in this zone was toluene at 260 parts per million (ppm). The highest chlorinated hydrocarbon was dichloroethane, at a concentration of 243.6 ppm. Concentrations of these organic compounds exceeded groundwater standards. The concentrations of many metals and cyanide from wells within the process area also exceeded groundwater standards. Wells screened in the upper zone and located outside the process area were free of organic compounds. These wells did contain low levels of inorganic compounds, such as iron and chromium, at concentrations in excess of water quality standards.

Within the clay confining unit, groundwater flow is generally vertical and downward. There is almost no horizontal component of groundwater flow in this unit due to the low hydraulic conductivity of the clay (on the order of  $1 \times 10^{-8}$  cm/sec). The maximum concentration of organics detected during the RI within this unit was tetrachloroethene at 14 ppb; however, the concentration exceeded groundwater standards. The most contaminated well within this unit, located within the process/fill area hot spot, had a total organics concentration of 288.9 ppb. In addition, concentrations of antimony, iron, magnesium and manganese exceeded groundwater standards. These organic and inorganic compounds were found in the groundwater within the process/fill area. The groundwater in wells outside this area did not exceed the groundwater quality standards. In the residential area around the site there are no wells in use at this depth. There is no potential for exposure to the low levels of contaminants in the water in the unit.

In the lower aquifer, organics were detected at levels generally much lower than that found within the upper water bearing zone. Flow within the lower aquifer is generally to the southwest. Acetone was the VOC detected at the highest concentration in this unit during the RI, at 250 ppb. Concentrations of all other organics were less than 50 ppb; however these concentrations exceeded groundwater standards. Several metals were also detected within this unit; however, the concentrations did not exceed the background levels found.

All three units are contaminated; however, most of the contamination is within the upper water-bearing unit in the process area. The groundwater was apparently contaminated by contact with chemicals in the process area and the lake sediments. Fortunately the upper water bearing zone transmits water only very slowly and contaminated groundwater has been confined to the area near the process area. Most of the local residents are served by a municipal water supply system. The closest well used for drinking water purposes is located more than 900 feet from the site. Water from the well was sampled and analyzed during the RI and found to be free of contaminants. As part of the RI, a monitoring well was installed between the site and the general location of this drinking water well. No contaminants were detected in samples from the monitoring well.

Annual routine groundwater samples collected (after completion of the remediation) from groundwater monitoring wells around the perimeter of the "process/fill area" cap and the perimeter of the site have not indicated groundwater contaminants in excess of New York State groundwater SCGs.

**Reference:** Frontier – Pendleton Report #13 – Annual Report – August 2005, Olin Corp.  
RI Report - Draft Final & Appendices, January 1991, URS.

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

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

**Rationale:**

This facility has been in long-term Operations, Monitoring and Maintenance since 1997. The last full review of the site was in April of 2005, and this review determined that the remedy continues to perform properly and is effective. Groundwater monitoring wells sampled as part of the periodic monitoring program did not indicate contaminants of concern above New York State Department of Environmental Conservation (NYSDEC) groundwater Environmental Standards, Criteria, and Guidance Values (SCGs).

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:**

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<sup>2</sup>"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.

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Prior to the remedy construction, groundwater from the process area flowed into Quarry Lake at less than 20 gallons per day. Since remedy completion, this flow has been substantially reduced.

**References:** Record of Decision, Frontier Chemical-Pendleton Site No. 9-32-043. March 1992

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration<sup>3</sup> 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 eco-systems at these concentrations)?

  X   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<sup>3</sup> 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 judgement/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 eco-system.

\_\_\_\_\_ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> 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<sup>3</sup> 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.

**Rationale:**

Periodic groundwater samples collected (after completion of the remediation) from groundwater monitoring wells around the perimeter of the "process/fill area" cap and the perimeter of the site have not indicated groundwater contaminants in excess of New York State groundwater SCGs. As such, no discharge or contaminated groundwater is believed to occur.

**References:** Frontier – Pendleton Report #13, Annual Report, August 2005, Olin Corp.

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

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 eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented<sup>4</sup>)?

\_\_\_\_\_ 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 eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR

2) providing or referencing an interim-assessment,<sup>5</sup> appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, 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 can not 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 eco-systems.

\_\_\_\_\_ If unknown - skip to 8 and enter “IN” status code.

**Rationale:**

N/A

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<sup>4</sup>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.

<sup>5</sup>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 eco-systems.

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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 "area of groundwater contamination."

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

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

**Rationale:**

The 1994 RD/RA Consent Order requires a long term OM&M program which is ongoing, including annual groundwater sampling and analysis.

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 **Frontier Chemical, Pendleton** facility, EPA ID # **NYD991292053**, located at **Townline Road, Pendleton, 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 re-evaluated 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.



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Completed by: Jeffrey A. Konsella Date: 6/6/06  
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Supervisor: Greg Sutton Date: 6/7/06  
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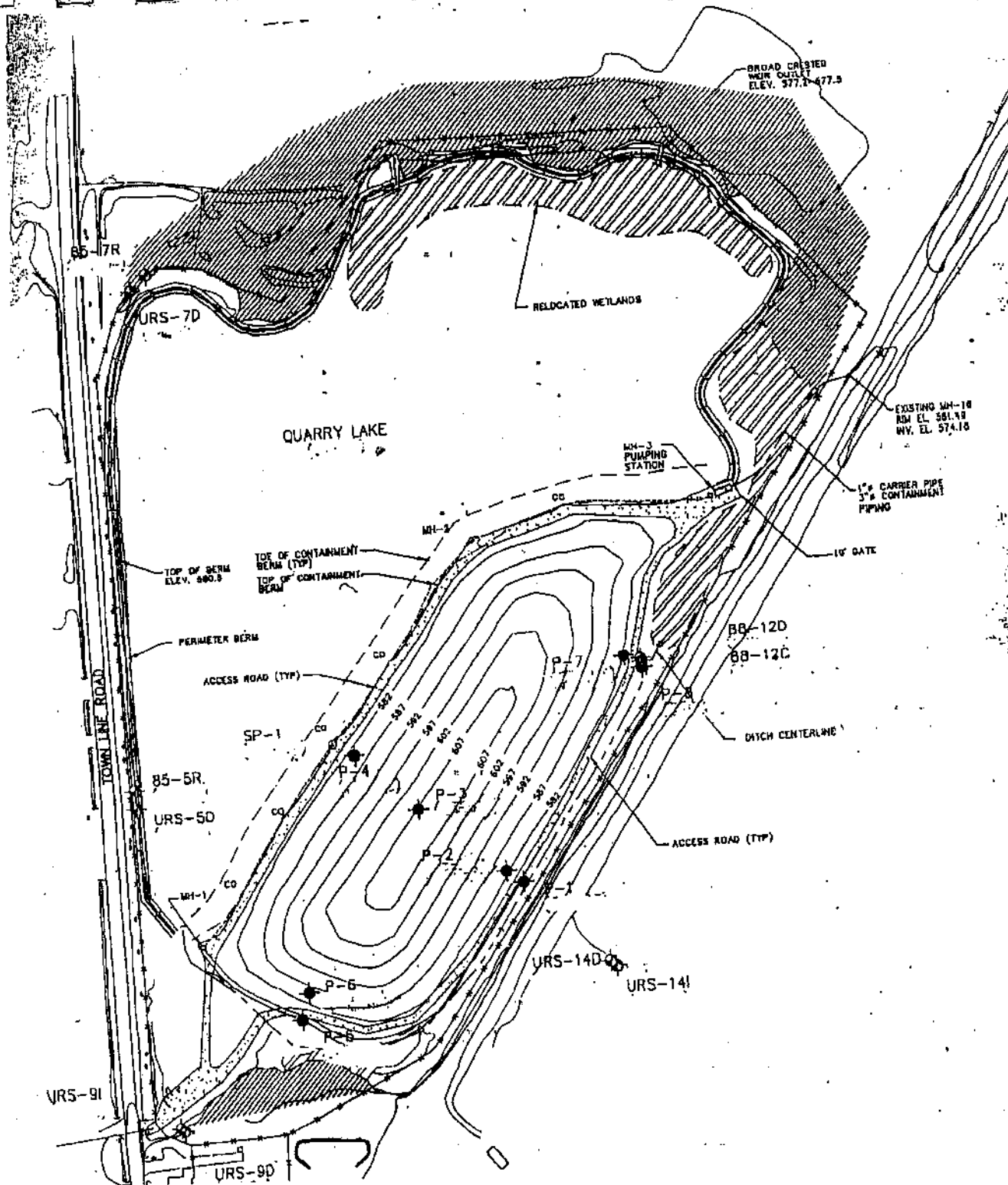
Director: Edwin Dassatti Date: 6/7/06  
Edwin Dassatti, P.E.  
Bureau of Hazardous Waste & Radiation Management  
Division of Solid & Hazardous Materials

**Locations where References may be found:**

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**LEGEND**

- URS-70 MONITORING WELL
- P-1 PIEZOMETER
- (580.24) WATER ELEVATION
- [Hatched Area] CREATED WETLAND AREA
- [Cross-hatched Area] EXISTING WETLAND AREA
- [X-X] 6' HIGH CHAIN LINK FENCE
- [Dashed Line] GRADE ELEVATION CONTOUR
- [CO] GROUND WATER COLLECTION TRENCH & CLEAN OUT
- [U] STANDPIPE
- [U] UTILITY POLE

4/12/2005	PIEZOMETER	elev ft-ms	Mon well
579.55	P-1	580.13	URS-141
576.29	P-2	575.73	URS-14D
578.22	P-3	575.55	URS-91
573.72	P-4	575.58	URS-9D
564.90	SP-1	577.03	85-5R
579.26	P-5	575.24	URS-5D
575.24	P-6	575.38	85-7R
573.95	P-7	575.32	URS-7D
579.63	P-8	576.92	88-12C
		576.13	88-12D

**Piezometer and Well Locations**

