REMEDIAL SYSTEM OPTIMIZATION
FOR
CLAREMONT POLYCHEMICAL CORPORATION SITE

505 WINDING ROAD
OLD BETHPAGE, NASSAU COUNTY NEW YORK 11804

Site Code: 130015
WA# D006130-19

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
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OLD BETHPAGE, NASSAU COUNTY, NY 11804

Report Submittal Date: August 17, 2012
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CERTIFICATION, LIMITATIONS, AND STATEMENT OF INDEPENDENCE

I, Adam Fox, certify that I am currently a Qualified Environmental Professional as defined in 6 Part NYCRR Part 375 and that this report, Draft Remedial System Optimization, was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER -10).

Environmental Contractor: HRP Engineering, P.C.

By: Adam G Fox

Adam Fox, P.E.

EXECUTIVE SUMMARY

The Claremont Polychemical Site, located in Old Bethpage, Nassau County, New York is an approximately 10 acre site located within an industrial area. The site was the historic location of a former manufacturer of pigments for plastics, inks, coated metallic tanks, and vinyl stabilizers. Contamination on-site stems from the discovery of leading drums of hazardous chemicals, primarily volatile organic compounds (VOCs) and associated contamination in the site's subsurface. Remedial Actions were conducted on the site, first by the property owners, and then subsequently under the direction of the USEPA as the site was placed on the National Priorities List in June 1986.

Two Records of Decision (RODs) were issued for the site to document the selection of remedial actions to address the site's contamination. The first ROD addressed the contamination of soil and groundwater. The second ROD addressed the physical removal of source material, specifically wastes found in drums, storage tanks and treatment basins. The removal of wastes specified in the second ROD was completed in 1990. The excavation and on-site treatment of contaminated soil under the first ROD was completed in March 1997.

The remedy to control and treat the contaminated water portion of the first ROD, in the form of an on-site groundwater pump, treat and reinjection system was installed and began operation in February 2000. After 10 years of operation of the groundwater treatment system to control groundwater contamination, day-to-day operations of the facility were transferred from the USEPA to the NYSDEC. Upon transfer, the NYSDEC began the process of a Remedial System Optimization (RSO) which is a multi-tiered approach to improving the efficiency, effectiveness and net environmental benefit of a remedial solution.

HRP evaluated the performance of remediation at the Claremont site in order to assess progress towards closure, determine the efficiency of the treatment process, and identify modifications which could improve efficiency, reduce operating costs, or accelerate site closure. This remedial system optimization (RSO) process included:

1. Compilation of available investigation and remediation data to identify the location of Claremont VOC sources.
2. Review of regional groundwater quality data to understand interactions between on-site Claremont contaminant sources and other off-site sources documented in the area.
3. Testing at various points in the groundwater treatment process to identify the efficiency of the various components of the Claremont GWTS.

Based on this information, HRP derived the following conclusions.

1. The identified VOC plume attributed to Claremont sources persists at trace concentrations and appears limited to the shallow aquifer proximal to monitor well SW-1.
2. The GWTS capture zone controls and extends well beyond the inferred Claremont plume limits.
3. Use of the OBL treatment system to capture the Claremont plume appears unnecessary, since it is captured by the Claremont GWTS.
4. Capture of the Claremont plume with the GWTS could be achieved at lower pumping rates and treatment of the contaminated groundwater could be achieved using only the activated carbon filters.

HRP evaluated four options to optimize and accelerate closure of the Claremont GWTS. Each alternative includes installation of additional wells as an initial step to verify the limits of the Claremont plume. HRP evaluated the four following alternatives on the basis that the additional proposed testing would verify that the limits of the Claremont plume are constrained within the property boundaries.

1. Do-Nothing Option: Operation of the GWTS at its current capacity is best suited for the situation where additional on-site sources require control or operation of the GWTS is desirable (with modification) to control up gradient, off-site groundwater contaminant sources. **Not recommended** due to the high O&M costs.
2. Operate Extraction Well EXT-1 Only: The pumping rate of EXT-1 could be reduced from current levels and capture the identified Claremont plume. The flow rate remains greater than optimal due to the depth of the well. **Not recommended** because O&M costs remain high.
3. Reconfigure EXT-1: Replacement of EXT-1 at a shallow depth in the aquifer or grouting of the bottom portion of EXT-1 would enable pumping at the optimal rate to capture the Claremont plume and minimize operation costs. This alternative is best suited for the situation where the Claremont plume extends beyond the property boundary and continued control is necessary. **Not recommended at this time.**
4. Monitored Natural Attenuation (MNA): MNA allows for the dissipation, dispersion, and natural degradation of the remaining Claremont plume. This alternative minimizes remaining remediation costs and is appropriate if additional testing verifies that the limits of the Claremont plume are confined to the property boundaries. **Recommended given current conditions.**

Implementation of the MNA alternative involves the following recommended steps

1. Installation and testing of the 9 proposed cluster wells to verify the Claremont plume limits within the site boundary.
2. Temporary shutdown of the GWTS while quarterly groundwater monitoring of the Claremont wells is performed for 4 consecutive quarters to document that steady-state conditions suitable for MNA are maintained. Electrical connections to the GWTS should be maintained and the system should remain in an operable state until it is established that the plume is steady or decreasing in size.
3. When groundwater monitoring establishes that the plume is steady and confined to the property boundary, power can be disconnected and the GWTS can be decommissioned.
4. Groundwater monitoring will continue on a semi-annual basis and transition to an annual basis until ambient water quality standards are achieved in the Claremont Plume.

DRAFT REMEDIAL SYSTEM OPTIMIZATION

Claremont Polychemical Corporation Site
Old Bethpage, New York 11804

1.0 INTRODUCTION

Pursuant to the New York State Department of Environmental Conservation (NYSDEC) request, HRP Engineering, PC evaluated the performance and efficiency of remediation at the Claremont Polychemical Superfund site (Claremont) located at 505 Winding Road in Old Bethpage, Nassau County, New York (Figure 1). The evaluation was completed in accordance with Remedial Site Optimization Guidance prepared by the NYSDEC (September 2011). Remedial System Optimization (RSO) is a multi-tiered approach to improving the efficiency, effectiveness and net environmental benefit of a remedial solution.

The Claremont remediation utilizes a groundwater pump and treat system to contain a tetratchloroethylene (PCE) contaminant plume and provide long-term treatment of the on-site groundwater contaminant sources. Recovered groundwater is treated using air stripping and carbon polishing in an on-site treatment plant. Treated groundwater is re-injected into the ground adjacent to the site. HRP completed this RSO in order to:

1. Assess progress towards completion of the remediation
2. Determine the efficiency of the treatment process, and
3. Identify potential system modifications that may improve efficiency, reduce operating costs, or decrease the timeframe to achieve site closure.

1.1 Regulatory Overview

The Claremont Polychemical Corporation manufactured pigments for plastics and inks, coated metal flakes, and vinyl stabilizers on-site from 1966 to 1980. Manufacturing wastes principally included waste inks, resins, organic solvents, mineral spirits, sludges and waste waters that were stored in various drums, storage tanks, and settling basins. Poor waste management practices were first noted by the Nassau County Health Department (NCHD) during a site inspection in 1979. At the time of the inspection, NCHD reported between 2,000 and 3,000 waste drums on the property. Many of the drums were noted to be uncovered, leaking, mishandled or damaged.

The NCHD inspection prompted environmental investigation of the site in 1980 and eventually lead to recognition as a Superfund site by the federal government when EPA included Claremont on the National Priorities List (NPL) in June 1986. After the site was included on the NPL, the EPA completed the following Superfund activities.

- A 1988 *Remedial Investigation and Feasibility Study* (RI/FS) assessed contaminant impacts
- Two *Records of Decision* (ROD) in 1989 and 1990 described specific remedial actions to be undertaken, and
- Two *Explanation of Significant Differences* (ESD) in 2000 and 2003 modified the remediation described in the RODs.

The RI/FS, initiated in March 1988 inventoried site wastes, determined site soil quality, and verified site features. The investigation results revealed soil contamination by PCE in a former "spill area" along the east side of the manufacturing building that constituted a potential threat to groundwater quality (Figure 2).

Based on the RI/FS, the EPA issued two RODs in 1989 and 1990 to address the environmental concerns followed by the two ESDs in September 2000 and April 2003. Collectively, the RODs and ESDs established the following 8 Operable Units (OUs) that defined the scope of the site remedy.

Regulatory Document	Operable Unit	Description	Completion Date
1990 ROD	OU-I	Treatment and disposal of wastes in USTs	1991
	OU-II	Removal and disposal of hazardous materials	1989-1990
	OU-III	Treatment of PCE contaminated soil using low-temp enhanced volatilization	1989-1990
1989 ROD	OU-IV	Treatment of on-site groundwater contaminant plume(s)	Activated 2000, ongoing
	OU-V	Treatment of off-site portion of Claremont contaminant plume	Initiated September 2000 and modified by 2000 ESD, ongoing
1990 ROD	OU-VI	Decontamination of former Claremont process building	1998-2000
2003 ESD	OU-VII	Remediation of contaminated soil beneath manufacturing building using soil vapor extraction and institutional controls	2002-2003
	OU-VIII	Removal and disposal of construction demolition debris, decommissioning of settling basin, and abandonment of a diffusion well	2003

In general, the 1989 ROD implemented groundwater remediation (OU-IV, OU-V), and the 1990 ROD provided for the removal of industrial wastes or soil remediation (OU-I, OU-II, OU-III, OU-VI). After the groundwater pump and treat system (GWTS) was activated in 2000, the EPA released two ESDs in September 2000 and April 2003. The 2000 ESD modified the 1989 ROD to enable use of a down gradient treatment system associated with the Old Bethpage Landfill to collect and treat contaminated groundwater that had migrated beyond the reach of the Claremont system (OU-V). The 2003 ESD required additional remediation of soil contamination subsequently identified beneath the site building, established institutional controls to prevent contaminant exposure and restrict the site to commercial/light industrial uses, and removed demolition debris from the site (OU-VII, OU-VIII).

The installation and activation of the GWTS was a joint effort between the EPA and the Army Corps of Engineers (ACOE). On behalf of the EPA and ACOE, Science Applications International Corporation (SAIC) operated and maintained the GWTS from activation in 2000 to May 2011. The EPA and ACOE relinquished operation of the Claremont GWTS to NYSDEC in May 2011. HRP currently operates the system on behalf of NYSDEC.

1.2 Project Objectives and Scope of Work

The primary objective of the RSO is to evaluate the efficiency and progress of remediation at the site. The efficiency and progress of remediation is comprised of two components:

1. Subsurface remediation performance, and
2. Treatment system efficiency.

The subsurface performance relates to the capture of the PCE contaminant plume emanating from the site and long-term remediation of Claremont contaminant sources. Site closure can be achieved when Claremont contaminant sources no longer contribute to groundwater contamination at levels above the applicable standards. The progress towards site closure was determined by:

- Evaluating the degree of capture of the on-site contaminant plume,
- Assessing the status of long-term source remediation and need for further system operation, and
- Identification of operational modifications that could reduce costs or accelerate cleanup.

The system treatment performance relates to the efficiency and performance of the GWTS components. This was evaluated by:

- Determining contaminant removal efficiency and operational costs of the existing treatment system and components,
- Assessing process or treatment modifications that could increase treatment efficiency and/or reduce life-cycle operational costs, and
- Identifying sustainability considerations that could be incorporated into the remediation efforts.

1.3 Report Overview

This RSO provides a comprehensive review of the environmental remediation history of the site and an evaluation of the current status of remediation. The remainder of the report is organized in the following manner.

Section	Description
2.0 Description of Conceptual Model and Remedial Action	Describes environmental setting, Claremont manufacturing operations and potential contaminant sources, investigation results, remediation goals, and scope of site remediation
3.0 Findings and Observations	Presents results of the subsurface remediation performance and treatment system performance evaluation as they pertain to project objectives
4.0 Recommendations	Provides recommendations that could improve remediation efficiency, reduce operation costs, and/or decrease the timeframe to achieve site closure

2.0 DESCRIPTION OF CONCEPTUAL MODEL AND REMEDIAL ACTION

The conceptual site model (CSM) describes the interaction between potential contaminant sources and the environment. The primary components of the CSM include the site location and environmental setting, location of contaminant sources and the distribution of contamination, location of possible receptors, and a summary of remedial actions implemented to address potential contamination exposure risks. The CSM is used as the basis for understanding contaminant transport mechanisms and the current status of site remediation.

2.1 Site Location and Setting

Claremont is located on a 9.5 acre parcel of land in a light industrial area of Old Bethpage (Nassau County), New York. The site is accessed via Winding Road, which runs roughly north-south approximately 350-ft west of the property (Figure 1). Current site features include one 35,000 square feet two-story building (the former manufacturing/processing plant) and a smaller water treatment building with ancillary structures (Figure 2).

The site is situated in an urbanized area bordered by the following business and land uses.

- North: Commercial and light industrial businesses
- South: Bethpage State Park (golf course)
- East: State University of New York – Farmingdale Campus
- West: Mr. Bar-B-Que (former Captree Chemical)

2.2 Environmental Setting

The environmental setting describes the geographic region, geology, surface water drainage, hydrogeology, and groundwater uses in the vicinity of the site.

2.2.1 Physiography and Topography

The Claremont property is located in the central part of Long Island within the Coastal Plains physiographic province. It is situated in a broad, low-lying valley which trends north-south (Figure 1). The valley is approximately 2 miles wide and slopes gently southward toward Great South Bay. Site topography is relatively flat with an elevation of about 120 feet above mean sea level. The land rises steeply approximately 20 to 50 feet along the southern and eastern boundaries suggesting that the property was once a borrow pit. The Old Bethpage Landfill (OBL) creates approximately 200 feet of relief to the west of the site.

2.2.2 Geology

Approximately 1,200 feet of unconsolidated Quaternary, Tertiary and Cretaceous sand and silty sand sediments overlie Precambrian igneous and metamorphic bedrock in the site area. The local stratigraphy (top down) includes glacial, fluvial, and deltaic deposits consisting of the following four geologic units (and thickness).

- Upper Glacial/Manetto Gravel deposits (20 feet),
- Magothy Formation (750 feet),
- Raritan Clay Member (150 feet), and
- Lloyd Sand Member (250 feet).

At the Claremont site, the Upper Glacial/Manetto Gravel is absent and the Magothy Formation (Fm) is the surficial deposit. Fill material overlies the Magothy Fm in a sporadic pattern across the north and east portions of the site to depths of about 2 to 6 feet.

Site-specific subsurface data obtained from the many historic soil borings and wells drilled on-site also characterize the stratigraphy of the Magothy Fm to a maximum depth of 250 feet below ground surface (bgs). These materials have been described as a well-stratified fine to medium sand with silt lenses, abundant peat laminae, and discontinuous sand layers. Borings in the northern portion of the site also encountered numerous interbedded silt and clay horizons. A comparison of site drill logs with logs for municipal supply wells to the north suggest that Claremont is located within a transitional area between the predominantly sandy portion of the Magothy Fm to the south and an interbedded clayey-sand portion to the north.

2.2.3 Surface Water Bodies

The nearest natural surface water body is Massapequa Creek, which lies approximately three miles to the south (Figure 1). A number of anthropogenic ponds are in the immediate area to the north and south. The nearest pond is located adjacent to the Nassau County Firemen's Training Area approximately 2,000-ft down gradient of the site.

2.2.4 Hydrogeology

The Magothy Fm is the uppermost water-bearing unit and the sole-source aquifer supplying potable drinking water to the majority of Long Island. It is an unconfined aquifer and the water table is typically encountered between 65 and 95 feet bgs. The saturated thickness is assumed to be 650 to 700 feet. Local water supply wells are typically screened within the intermediate and lower portions of the Magothy Fm to intercept coarse, gravel-rich layers.

Aquifer recharge occurs through precipitation and up gradient groundwater flow. Nearly 50% of annual precipitation can infiltrate through grassy areas providing recharge and producing seasonal water level fluctuations up to 5 feet. Currently, surface runoff from precipitation likely results in local recharge at the site.

Locally, groundwater flow in the area is affected by the large number of natural and man-made features that surround the site, including:

- The high percentage of open area available for recharge,
- The anthropogenic ponds surrounding the site
- The 15 groundwater recovery wells associated with the variety of remediation systems that operate in the area, and
- The injection wells associated with the Claremont remediation system.

Based on groundwater measurements recorded in monitor wells, groundwater flows across the Claremont site to the south-southeast with typical gradients ranging from 0.001 to 0.002 ft/ft (Figure 3).

2.3 Claremont Manufacturing History and Contaminant Sources

The Claremont Polychemical Corporation manufactured pigments for inks and dyes, coated metal flakes (Durogold), coated aluminum powders, and vinyl stabilizers for 14 years between 1966 and 1980. Based on the documented history, potential contaminant sources and/or release areas are related to manufacturing processes, waste handling and management practices, and storage of miscellaneous debris on the site.

2.3.1 Manufacturing Processes

Claremont produced a wide range of products associated with pigments, metal flakes and powders, and plasticizers. Manufacturing processes included:

- Chemical mixing
- Durogold process
- Solvent recovery
- Dust collection, and
- Potential deep well injection of waste liquids

Chemical Mixing

Claremont mixed a large number of chemicals and metals to form a wide variety of products. Common chemical mixtures included:

- Ketones, alcohols, and naphtha added to resins and pigments to produce inks.
- Resins, dyes, and plasticizers combined to form granules for use as plastic coloring agents.
- Mixing and milling of vinyl powders and pastes produced from ethylene wax, pigments, phthalates, wetting agents, stabilizers and plasticizers.
- Adding metals such as cadmium and barium to plastics.

Durogold Process

Durogold, a main Claremont product, was a coated bronze flake formed with copper and zinc. The Durogold process equipment generated waste water that was conveyed via floor drains to a series of five 5,000-gal concrete tanks for treatment. Wastewater treatment included pH adjustment using soda ash and phosphoric acid, and precipitation of solids. The liquid fraction was then discharged to three leaching basins located outside the southwest side of the building (Figure 2). Sludge containing organic solvents, resins, and mineral spirits were periodically removed from the treatment tanks and placed in drums or aboveground metal tanks.

Solvent Recovery

Claremont reclaimed solvents using a steam distillation process. This type of reclamation commonly generates sludge during the distillation process.

Dust Collection

Pigment dusts were reported to be collected using dust collectors.

Deep Well Injection

Claremont may have disposed of liquid wastes by deep well injection through two diffusion wells located west of the site building (Figure 2). Details concerning the possible use of this well for waste disposal are unavailable.

2.3.2 Raw Material and Waste Handling

The 1989 ROD identified the following raw materials and waste products associated with the Claremont manufacturing operations

Product	Raw Material	Waste Product	Waste Process
Pigment & Ink	Phthalates Vinyl resins Polyethylene resins Ketones Alcohols High flash naphtha	Mineral spirits Vinyl resins Solvent solids	Solvent recovery
Durogold	Copper zinc	Zinc bronze	pH neutralization using phosphoric acid and soda ash neutralization created Cu and Zn carbonates and phosphates
Coated Aluminum Powder	Aluminum Sodium silicate	Solids in low volume	Non-dry process
Vinyl Stabilizers	Barium oxide Cadmium oxide High flash naphtha Ethyl-hexanoic acid Para, tertiary-butyl benzoic acid Toluene Tetrachloroethylene	None	--

Site inspections indicated that many of the manufacturing wastes were stored in drums, above ground storage tanks or debris piles noted on the property. The following provides a summary of the historical raw material and waste handling practices at the site.

Raw Materials

Many of the chemical raw materials were stored in 14 underground storage tanks (USTs) located in a single tank farm on the south side of the main site building (Figure 2). In total, 12 USTs stored raw materials including toluene, methyl-ethyl ketone (MEK), latex, acids, alcohols, and petroleum naphtha. One UST was used to store gasoline and one was used as a spare. An inventory of the USTs and their construction is tabulated below.

UST ID	Construction	Volume (Gal)	Contents	Raw Material Use
1	Steel	6,000	Toluene	Inks
2	Steel	6,000	MEK	Inks
3	Steel	6,000	Mineral Spirits	Stabilizers
4	Fiberglass	6,000	DOP?	Mixing
5	Fiberglass	6,000	Latex	Stabilizers
6	Fiberglass	6,000	Latex	Stabilizers
7	Fiberglass	6,000	Ethyl Hexoic Acid	Stabilizers
8	Fiberglass	6,000	Met. Soap in Mineral Spirits	Stabilizers
9	Steel	6,000	Gasoline	Vehicle Use
10	Steel	6,000	---	Spare
11	Steel	3,000	Isopropanol	Inks
12	Steel	2,000	Propyl Alcohol	Inks
13	Steel	2,000	VM & PM Naphtha	Inks
14	Steel	2,000	Super Flash Naphtha	Inks/Stabilizers

Manufacturing Wastes

Claremont generated organic solvents, inks, resins, and rinse waters as part of the manufacturing processes. Much of this waste was stored in drums and metal above ground storage tanks. During the 1979 inspection, the NCHD noted more than 2,000 drums stored on-site and poor waste handling practices including uncovered and leaking drums. NCHD also identified releases resulting from incidental spills and discharges associated with damaged or mishandled drums in several areas including one large area located east of the main plant referred to as the "spill area" (Figure 2). Following the NCHD inspection, Claremont removed many of the drummed wastes. A waste inventory conducted by the EPA indicated that approximately 700 drums remained on-site in 1988.

Early inspections identified an approximate 20,000 cubic yard debris pile located in the northeast corner of the property (Figure 2). The pile contained various amounts of soil, construction debris, tires, asbestos containing materials, cadmium impacted soil, and brush.

Available reports indicated that the additional site features listed below may have also been used historically to manage sanitary or manufacturing wastes.

- Septic tanks and related leaching pools
- Drywells connected to several roof drains, and
- 2 diffusion wells located outside the western portion of the building.

Little additional information regarding these features is available.

2.3.3 On-site Potential Contaminant Sources

Potential contaminant sources associated with Claremont are related to historical manufacturing processes, waste handling or other site features that have the potential to release contaminants to the environment. These potential on-site contaminant sources or Areas of Concern (AOCs) are tabulated below.

AOC		Description
1		"Spill Area" (east of main building)
2		Aboveground Storage Tanks (ASTs)
3	a	Floor Drains
	b	(2) 5,000-gal Concrete Wastewater Treatment Tanks
	c	Wastewater Treatment Leaching Basins
4		Drywells Connected to Roof Drains
5		Two Diffusion Wells
6		14 Underground Storage Tanks (south of main building)
7		Underground Storage Tank – Fuel Oil
8		Demolition/Construction Debris Pile (northeast corner of site)
9		Interior Sump
10	a	Septic Tanks
	b	Septic Leaching Pools
11		Condensers for Solvent Recovery

2.4 Regional Sources of Contamination

The industrial area surrounding Claremont is characterized by regional groundwater contamination emanating from at least 4 known sites in addition to the Claremont facility. Within 2,000-ft from Claremont, VOC contaminant sources (including TCE, PCE and TCA) have been documented at the four locations listed below (Figure 4).

1. Old Bethpage Landfill Superfund Site (OBL)
2. Nassau County Fire Training Center (NCFTC)
3. Aluminum Louvre Corporation (aka. American Louvre Corporation)
4. Trulite Louvre (former Filtron Corporation)

OBL (also known as the Town of Oyster Bay Solid Waste Disposal Complex) is approximately 400-ft west (sidegradient) of Claremont along the west side of Winding Road. The OBL remediation system utilizes 5 groundwater recovery wells to capture a VOC contaminant plume that emanates from the landfill and extends 2,000-ft or more to the southeast. The 5 extraction wells (TOB R-1 through TOB R-5) are located on the Bethpage State Park Golf Course, approximately 2,000-ft south of Claremont (Figure 4).

The NCFTC, located downgradient from the CPC site, is a NYSDEC class 4 hazardous waste site located at 300 Winding Road about 2,000-ft southwest of Claremont. Class 4 indicates that the site has been properly closed, but requires continued site management for monitoring or system operation. The NCFTC (DEC site code 130042) operates a remediation system consisting of 7 groundwater extraction wells to contain a VOC plume that extends from the Fire Training Center approximately 5,000-ft to the southeast beneath Bethpage State Park Golf Course (Figure 4).

The former Aluminum Louvre Corporation (site code 130195, V00079) located at 161 Sweet Hollow Rd, located upgradient from the CPC site, is a NYSDEC class 2 hazardous waste site under 130195 and class code C under V00079. Class 2 indicates that disposal of hazardous waste has been confirmed to present a environmental threat on-site. Class C indicates that remediation has been satisfactorily completed under the voluntary clean-up program. Site investigations identified TCE impacts to soil at concentrations upwards to 520 mg/kg. Concentrations of TCE in groundwater were noted at levels up to 3,000 ug/l. Maximum levels of PCE were also detected up to 130 ug/l in groundwater. Aluminum Louvre is positioned about 750-ft north (up gradient) of Claremont (Figure 4).

The primary COCs detected at the Trulite Louvre facility (former Filtron Corporation), located upgradient from the CPC site, also include PCE, TCE, and 1,1,1-TCA. The maximum concentrations detected in soil were 7.1 µg/kg of PCE, 58 µg/kg of TCE, and 7.1 µg/kg of 1,1,1-TCA. The maximum concentrations detected in groundwater were 3.5 µg/l of PCE and 68 µg/l of TCE. The plume extends from the east side of the building to the southeast.
In addition to these known contaminant sources, the Nassau County Department of Public Works (NCDPW) identified 4 additional potential contaminant sources in the immediate area (Figure 4), based on review of Toxic and Hazardous Material Storage Records. According to NCDPW, the following businesses located within 1,500-ft north (up gradient) of Claremont used one or more of the VOC compounds detected in regional groundwater.

- The former Captree Chemical facility (currently Mr. Bar-B-Que), 445 Winding Rd
- Hitemco Corporation, 160 Bethpage- Sweet Hollow Rd
- The former Dyna Force Inc. (currently Molloy Brothers Moving & Storage), 195 Bethpage- Sweet Hollow Rd
- The former Life Industries facility (currently GEFA Instrument Corp.), 205 Bethpage- Sweet Hollow Rd

2.5 Previous Site Investigations, Removal Actions, and Remedial Actions

Claremont has a long history of environmental site investigation and remediation that date back to 1980. Discovery of uncovered and leaking waste drums in 1979 prompted the earliest investigations at the site. Subsequent investigations were completed by a number of consultants on behalf of Claremont, NCHD, EPA or NYSDEC.

In response to the inspections and investigations, a number of removal actions and remedial actions were also performed at the site.

2.5.1 Site Investigations

Between 1980 and 1998, several phases of investigation were completed by the consultants listed below on behalf of a variety of entities.

Woodward-Clyde Consultants (1983)
Velzy Associates (1984)
C.A. Rich Consultants (1986)
ACOE (1987/88)
EBASCO (1990)

In total, the scope of site investigations completed at the site included:

- Inventory of site waste materials
- 44 soil borings
- 41 monitor wells
- 16 soil vapor extraction wells,
- 23 test pits, and
- 32 shallow soil samples

Characterization of soil quality at the site consisted of the collection surface soil and subsurface soil samples. Surface soil samples were obtained from the upper 6 inches of soil, whereas subsurface soil samples were collected from 2-foot intervals at various depths to a maximum depth of 82-feet below grade. Available reports summarize sampling data indiscriminately across the site by the various depth intervals that samples were collected. As a result, contaminant levels detected at individual soil sampling locations are not available. Typically, the reports provide a general description that enables a limited interpretation of investigation results at the various AOCs.

In some instances, sampling results could not be related to an AOC. These results reported the following information:

- Relatively low concentrations of pesticides; dieldrin (26 µg/kg), heptachlor (18 µg/kg), DDT (88 µg/kg), DDD (180 µg/kg), and DDE (110 µg/kg) in the western and northern portions of the site.

- Polychlorinated biphenyls (PCBs) at three soil sample locations with a maximum concentration of 1,100 µg/kg. EPA concluded that surficial oil spillage was the most likely source of the PCBs since elevated PAHs, a common constituent of oil, was also present.

- Metals that exceeded typical eastern U.S. soil background levels included arsenic (35 mg/kg), cadmium (14.1 mg/kg), copper (152 mg/kg), lead (90.8 mg/kg), magnesium (29,100 mg/kg), and selenium (2 mg/kg). EPA concluded that selenium, lead, and magnesium exceeded background concentrations generally at the 0-4 feet below grade depth range but with no apparent spatial distribution. The elevated levels of metals were also concluded to be associated with the presence of fill material, vehicular emissions, and surficial spills of fuel-related products.

An overview of the investigation results for the various AOCs is summarized below to the extent possible given the limitations of the data set.

AOC-1: "Spill Area" East of Main Building

Twenty-seven soil borings including 11 shallow samples (5 through 13, 31, 32) and 16 deeper borings (SB-7/ESVE-5, SB-8/ESVE-7, SB-9/ESVE-8, SB-10/ESVE-4, SB-11/ESVE-6, SB-14, SB-15, SB-15/ESVE-10, SB-16, SB-16/ESVE-9, SB-18 through SB-23) were installed in and around the "Spill Area" as part of site investigations (Figure 2). Soil test results detected elevated levels of VOCs and base/neutral acid (BNA) extractable compounds. In general, total VOC concentrations were reported to be greatest to the east of the main building in proximity to the "Spill Area". VOC concentrations decreased rapidly with depth. Maximum VOC levels reported on-site are listed below.

PCE (26,000 µg/kg)
Acetone (14,000 µg/kg)
2-butanone (3,300 µg/kg)
xylenes (150 µg/kg)
1,2-dichloroethene (71 µg/kg)
toluene (82 µg/kg)
4-methyl-2-pentanone (360 µg/kg)

The most prevalent base/neutral acid (BNA) compounds detected in shallow soil (0-2 ft bg) included the phthalates listed below.

bis(2-ethylhexyl)phthalate (70,000 µg/kg)
di-n-butylphthalate (3,900 µg/kg)
butylbenzyphthalate (8,200 µg/kg)

Other BNAs detected in several borings in the "Spill Area" included:

phthalates (270,000 µg/kg),
benzoic acid (120 µg/kg),
2-chloronaphthalene (33,000 µg/kg) and
pentachlorophenol (360 µg/kg)

AOC-2: Aboveground Storage Tanks (ASTs)

Samples of sludge and liquid wastes in the ASTs on the east side of the main building (Figure 2) were collected and analyzed for volatile and semi-volatile organics, metals, pesticides, corrosivity, and reactivity. Although the wastes were found to be non-reactive and not corrosive, a number of contaminants were detected, as indicated below. No further information was available.

Liquids	Sludges
copper (4,110 – 27,600 µg/l)	copper (13,900 – 55,400 µg/kg)
lead (14 – 455 µg/l)	lead (1,040 – 2,430 µg/kg)
zinc (1,250 – 11,500 µg/l)	zinc (6,080 – 14,300 µg/kg)
benzoic acid (11,000 µg/l)	PCE (32,000 – 150,000 µg/kg)
phthalates (11,000 – 730,000 µg/l)	TCE (850 µg/kg)
low level VOCs	acetone (2,600 – 11,000 µg/kg)
	methylene chloride (590 – 1,900 µg/kg)
	1,2-dichloroethene (1,300 – 5,300 µg/kg)
	2-butanone (11,000 – 14,000 µg/kg)
	toluene (2,000 – 18,000 µg/kg)
	Bis-2-ethylhexyl phthalate (100,000 – 33,000,000 µg/kg)

AOC-3: Durogold Waste Water Treatment

Samples of surface soil and sludge wastes were collected from within and around the waste water treatment tanks and leaching basins on the western side of the main building (Figure 2).

Soil Results

Three surface samples (23, 24, 26) and one soil boring (SB-12) were collected from around the tanks. Four soil borings (SB-1/ESVE-14, SB-2/ESVE-15, SB-3/ESVE-13, SB-11) and three shallow surface samples (28, 29, 30) were also collected from the leaching basins (Figure 2).

The following metals exceeded background levels typical of eastern U.S. soil at surface soil sampling locations adjacent to the treatment basins.

cadmium (33.1 mg/kg)	zinc (3,200 mg/kg)
copper (230 mg/kg)	magnesium (29,200 mg/kg)
lead (327 mg/kg)	

The EPA inferred that these concentrations reflected overflow from the wastewater treatment basins, vehicle traffic, and construction debris.

Sludge Results

Samples from the sludge in the wastewater treatment tanks also contained VOCs, SVOCs, and metals at the concentrations reported below.

VOCs	Metals	SVOCs
vinyl chloride (640 µg/kg)	copper (1,670 – 53,400 mg/kg)	phthalates (43,000 – 190,000 µg/kg)
acetone (350 – 22,000 µg/kg)	zinc (630 – 13,200 mg/kg)	
methylene chloride (250 – 2,700 µg/kg)	lead (438 – 2,300 mg/kg)	
1,2-dichloroethene (1,100 – 3,400 µg/kg)		
TCE (330 – 2,200 µg/kg)		
2-butanone (170 – 16,000 µg/kg)		
PCE (7,100 – 25,000 µg/kg)		
toluene (1,400 – 12,000 µg/kg)		

AOC-5: Two Diffusion Wells

During removal of construction debris, SAIC on behalf of ACOE sampled and abandoned one of the diffusion wells located on the west side of the building in 2003 (Figure 2). Groundwater samples collected from the diffusion well prior to abandonment exhibited trace concentrations of TCE, PCE, and bis-2ethylhexyl phthalate below MCLs.

According to the report, “Debris Removal Completion Report, Claremont Polychemical Superfund Site, December 2003, pg.17” completed by SAIC, during their investigation piping was uncovered that was believed to be connected to a second diffusion well. The piping uncovered trended to the west towards an adjacent property. SAIC’s report indicated that no further investigation of the second diffusion well was conducted.

AOC-6: 14 Underground Storage Tanks

Four deeper soil borings (SB-4/ESVE-1, SB-5/ESVE-2, SB-6/ESVE-3, SB-13) and three shallow soil samples (1, 2, 3) were collected from the area of the UST farm (Figure 2). Sampling results detected low concentrations of PCE, chloroform and di-n-butylphthalate (less than 26 µg/kg). Higher levels of bis(2-ethylhexyl)phthalate (50 to 3,000,000 µg/kg) were detected in all samples submitted for analysis.

Samples of the tank contents were also obtained as part of the investigations. Eleven of the fourteen USTs contained a sufficient volume of liquid and/or sludge to collect samples. The total volume remaining in the USTs at the time of sampling was estimated at approximately 16,000 gallons. The EPA reported the following representative concentrations of chemicals in the tanks.

UST ID	Compound	Concentration (%)
WST-03	2-butanone Total recoverable petroleum hydrocarbons	92 1.4
EST-04	Toluene Xylenes	2.6 3.6
EST-06	Bis(2-ethylhexyl)phthalate Total recoverable petroleum hydrocarbons	23 14.5

No pesticides or PCBs were detected in any tank samples submitted for analysis.

AOC-8: Demolition/Construction Debris Pile

A large debris pile, consisting primarily of soil, concrete, wood, and other materials associated with construction and demolition activities covered an approximate 300 x 300 foot area in the northern portion of the site. The debris pile was irregular in shape and in some locations was 22 feet above grade. Other smaller debris piles were also present primarily in the northern portions of the property (Figure 2).

Investigations of the large northeastern pile included:

- 3 deeper soil borings (SB-7, SB-8, SB-9)
- 4 shallow surface samples (15, 16, 17, 18)
- 3 monitor wells (EW-7C, EW-7D, EW-19D)
- 23 test pits excavated in a 50 x 50-ft grid across the pile

One soil boring (SB-1) and one monitor well (EW-8D) were also installed in the area of a smaller debris pile in the northwest portion of the property (Figure 2).

No location specific sampling results from these soil borings and shallow surface samples as provided in the available reports. However, sampling results from the test pits provided useful information. The EPA considered the debris to represent incidental disposal and not of site origin. Material was excavated from the test pit until native soil was encountered or to the maximum reach of the excavator. A series of grab samples and composite samples were collected for a variety of analyses including VOCs, SVOCs, herbicides, metals, and asbestos.

Test results identified the following contaminants in one or more samples:

- Chrysotile asbestos (0.6%) based on qualitative analysis
- TCLP cadmium (11.0 mg/l)

Further testing in the area of the TCLP cadmium detections defined an area of approximately 24 x 36-ft that was characteristically hazardous for cadmium.

AOC-9: Interior Sump

Samples of sludge from a sump exhibited low levels of calcium (10,300 µg/kg), sodium (291,000 µg/kg), and bis(2-ethylhexyl)phthalate (360 µg/kg). No other VOCs were detected.

During completion of the interior decontamination, a pit measuring approximately 20 inches in diameter and 2 feet deep was discovered in the northern portion of the building (Figure 2). In May 2002, EPA conducted a soil gas investigation beneath the building. Ten soil gas samples were collected from the shallow subsurface at depths of less than 5 feet. The survey identified concentrations of combustible gases that approached a potential explosion hazard including levels of the following VOCs that posed a possible health risk.

PCE (550,000 µg/m^3),
TCE (620,000 µg/m^3),
Toluene (22,000 µg/m^3), and
Xylene (5,300 µg/m^3)

Sampling of the pit contents detected PCE, TCE, toluene, xylene, and cadmium that prompted further characterization. Soil samples were collected from 16 soil borings (SB-1 through SB-16) installed beneath the building slab at depths ranging from 0 to 20-feet below grade. VOC (PCE, TCE, toluene, and xylenes) and cadmium impacted soil was identified across an area of approximately 80 x 100ft and extended to a depth of 20 feet. A second smaller area of impacted soil was identified further to the south. Cadmium was detected in the shallow soils at concentrations ranging from 530 mg/kg to 6,500 mg/kg. The highest VOC concentrations were generally found just below the base of the pit in the concrete floor. Soil boring SB-11, located closest to the pit, exhibited the contaminant concentrations summarized below:

Compound	Contaminant Concentration (mg/kg)	
	SB-11 (0-4')	SB-11 (4-8')
PCE	300	160
TCE	150	8.9
Toluene	16	57
Xylene	190	40
Cadmium	2,500	224

Following completion of a soil vapor extraction (SVE) pilot test, EPA concluded that SVE was an effective remedial strategy for this release area.

AOC-11: Condensers

Water samples were collected from two condensers and two floor drains within the building (Figure 2). All samples showed elevated levels of inorganics. Principal contaminants included copper (17.9 – 43,000 µg/l) and zinc (up to 12,200 µg/l).

Groundwater Test Results

Groundwater sampling was conducted on two occasions in April 1989 and June 1989. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. The EPA reported that PCE was the most prevalent VOC detected in site groundwater. The maximum concentration of PCE was detected near the up gradient property boundary and the levels gradually attenuated to the southeast in the direction of groundwater flow. Contaminant concentrations that exceeded federal and/or New York State Ambient Water Quality Standards (AWQS) were generally observed in the shallow portion of the aquifer (0-45 feet). Maximum concentrations of these compounds are tabulated below.

Compound	Concentration (µg/l)	NYSDEC TOGS 1.1.1 GA Standard (µg/l)
PCE	1,300	5
TCE	260	5
Trans-1,2-dichloroethene	830	5
Vinyl Chloride	7	2
1,1,1-TCA	100	5
1,1-Dichloroethane	17	5
Benzene	60	1
Ethylbenzene	160	5
Total Xylenes	40	5 (individual isomers)
Acetone	540	50 (guidance value)
Methylene Chloride	14	5

The frequency and concentrations of SVOCs and pesticides were much lower than those generally detected for VOCs. The highest detected compound was bis(2-ethylhexyl)phthalate (92 µg/l) and this was comparable to the concentration detected in an up gradient monitor well (88 µg/l). No PCBs were detected in groundwater.

Several metals were detected at concentrations exceeding MCLs including arsenic (56.5 µg/l), chromium (159 µg/l), lead (464 µg/l), and manganese (3,130 µg/l). Chromium and lead were also detected at concentrations above MCLs in groundwater samples collected from up gradient monitoring wells.

2.5.2 Removal Actions

For the purpose of this report a removal action has been defined as an activity undertaken to mitigate an immediate health risk or an imminent threat of a release. Aside from removal of waste drums following the 1979 NCHD site inspection, the removal actions implemented at Claremont were defined by Operable Units I, II, and VI in the 1990 ROD.

OU I and II: Disposal of UST Contents and Hazardous Materials

Between September 1988 and August 1991, the following wastes from drums, ASTs, the waste water treatment basins, and USTs were removed and disposed as part of OU I and OU II.

Removal Action	Volume	Disposition
547 drums containing flammable liquids	Consolidated into 123 drums	Off-site incineration
Waste water from ASTs	16,200 gal	Off-site disposal
Copper/zinc sludge from waste water treatment basins	10,050 gal	Off-site reclamation
Empty fiber drums	371 drums	Off-site recycling
Liquid waste and flammable liquids from UST removals	12,644 gal liquid 1,400 gal flammables	Off-site treatment and disposal

OU VI: Decontamination of Former Process Building

Between July 1998 and October 2000 the manufacturing building was decontaminated by power washing walls and interior building structures in order to remove heavy metal contamination. The decontamination process included removal and disposal of:

- 32 tons of mixed debris,
- 2,000 linear feet of asbestos material and 187 cubic feet of asbestos tank coatings, and
- 90 cubic yards of steel piping shipped to a recycling facility

2.5.3 Remedial Actions

The first documented remedial action was completed on-site in 1980 by Claremont before the site was declared a federal Superfund Site. Impacted soil was excavated from the upper 10 feet of a 75 x 75 foot area in the "Spill Area" and placed on plastic sheeting. Over time the plastic sheeting deteriorated and the final disposition of the soil was not documented (1990 ROD). No detailed information on this soil removal was available.

Subsequent remediation was defined by 5 Operable Units (OU III, OU IV, OU V, OU VII, OU VIII) described by the EPA in the RODs (1989, 1990) and ESDs (2000, 2003). Remediation described by OU IV and OU V includes the active operation of the groundwater pump & treat system (GWTS) at the site and is described in more detail in Section 2.7. Summary of remediation completed under operable units OU III, OU VII, and OU VIII is provided below.

OU III: Treatment of PCE Contaminated Soil with Low-Temp Enhanced Volatilization

In accordance with the 1990 ROD, PCE contaminated soil was dug from the "Spill Area" (AOC 1), thermally treated on-site and used to backfill the excavation. In

December 1996, approximately 8,762 tons of PCE contaminated soil was excavated, treated, and backfilled.

During excavation, free-product dense non-aqueous phase liquid (DNAPL) and light non-aqueous phase liquid (LNAPL) were encountered in the soil matrix at approximately 9-feet below grade near the western portion of the excavation area. Laboratory analysis confirmed the presence of NAPL in a verification sample that detected 9,600,000 µg/kg of PCE, which was reported in the *OU III Remedial Action Report* as almost 1% by weight. Elevated concentrations of Toluene (2,900,000 µg/kg) were also detected. The NAPL was contained in an approximate 1-foot thick layer of soil atop a localized clay lense and was limited in extent. Although the clay lense appeared to prevent any further migration of the contaminants, soil was excavated to a total depth of about 25-feet below grade. Post-excavation verification samples confirmed removal of the contaminated soil, as evidence by the average levels of residual PCE in confirmatory soil samples (< 200 µg/kg).

OU VII: Remediation of Contaminated Soil Beneath the Building

The remediation of contaminated soil detected beneath the building (OU VII) was defined by EPA in the 2003 ESD. During the building decontamination, an interior sump (AOC-9) was discovered in the northern portion of the building (Figure 2). Subsequent soil sampling detected PCE at levels up to 300 mg/kg (SB-11) along with other VOCs and metals. A pilot test was conducted in 2002 to evaluate the feasibility of SVE. The SVE system operated at an extraction rate of approximately 500-600 cubic feet per minute and removed approximately 1,200 pounds of VOCs. Operation of the SVE system was suspended shortly after startup because of unsafe conditions within the Building (e.g., substantial roof leaks, ponded water, water damage, and portions of the roof collapsed).

Based upon the results of the pilot test, EPA concluded that SVE combined with institutional controls were an effective strategy to address the contaminant impacts. SVE would be used to address the VOC contaminated soil. Institutional controls, recorded on the property deed, would require that the concrete floor remain in-place as a barrier to the underlying cadmium contaminated soil. The deed restriction would also limit the site to commercial or light industrial use.

OU VIII: Removal of Debris Piles, Treatment Basins, and Abandonment of Diffusion Wells

The 2003 ESD also defined disposal of the demolition/construction debris pile, removal of the Durogold waste water treatment tanks, and abandonment of the diffusion wells (OU VIII). The remediation was completed by SAIC on behalf of the ACOE in 2003.

Construction Debris Piles

Miscellaneous debris was segregated from the piles and disposed. Remaining soil was screened and re-graded over the area. This process enabled the on-site re-use of 19,303 CY of screened soil and provided for segregation and disposal of the following materials.

- 300 tires
- 423 tons of miscellaneous woody material and construction debris
- 30 tons municipal waste

- 6,992 tons concrete
- 152 tons steel (recycled)
- 454 tons hazardous waste (TCLP cadmium)

Waste Water Treatment Tanks

Prior to closure of the tanks, water and sediment samples were collected from three of the tanks and analyzed for VOCs, SVOCs, and metals. Analysis of the water samples detected arsenic above the MCL and PCE (0.53 and 4.3 µg/l). Contaminants detected in the sediment samples at concentrations above the EPA MCLs included acetone, bis(2-ethylhexyl)phthalate, arsenic, beryllium, chromium, copper, iron, mercury, nickel, selenium, and zinc.

Based on the sampling results, the closure included:

- Evacuation of water from the tanks and treatment using the on-site GWTS
- Removal of sediments and placement into 55-gallon drums for off-site disposal.
- Mixing of portland cement with residual sediments in the bottom of the treatment tanks to stabilize the remaining materials
- Collapsing the tank walls below grade and covering with clean fill.

Abandonment of Diffusion Well

Prior to abandonment, a groundwater sample was collected from the diffusion well located outside the west side of the main building (Figure 2) and analyzed for VOCs, SVOCs, and metals. TCE, cis-1,2-dichloroethene, and bis(2-ethylhexyl)phthalate were detected at concentrations below EPA MCLs. SAIC abandoned the diffusion well in accordance with all NYSDEC requirements. The second diffusion well was not found, but was believed to located beneath pavement on the adjacent property to the west.

2.6 Clean-Up Goals and Site Closure Criteria

The clean-up goals and site closure criteria were established by EPA in the 1989 and 1990 RODs. The following three clean-up goals were established in the RODs.

1. Reduce the concentration of contaminants in various media and structures to levels protective of human health and the environment
2. Eliminate long-term sources of groundwater contamination
3. Extraction and treatment of contaminated groundwater to contain the migration of the plume and achieve federal and state standards for VOCs

The site closure criteria are determined by the *DER-10/ Technical Guidance for Site Investigation and Remediation* (NYSDEC, May 2010). According to section 6.4(b) of the DER-10, a remediation is considered complete and a groundwater treatment system may be shut down when the following two conditions have been satisfied.

1. The remedial action objectives have been met, or continued operation of the system is no longer effective
2. The system has achieved a bulk reduction in contamination.

The applicable state standards to be applied at Claremont are the NYSDEC groundwater (GA) standards in accordance with NYSDEC Division of Water Technical

Operation and Guidance Series (TOGS) 1.1.1 – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Table 1 summarizes the chemical concentrations in the groundwater influent including the values of pH, hardness, metals, and target VOCs.

2.7 Description of Existing Remedy

The existing remedy was defined by two operable units (OU IV, OU V) described in the 1989 ROD and 2000 ESD. OU IV pertained to the capture and treatment of the on-site portion of the Claremont contaminant plume. OU V described the capture and treatment of the portion of the Claremont plume that had migrated off-site. The existing on-site GWTS addresses the on-site Claremont plume (OU IV). The OBL groundwater treatment system is currently used to collect and treat the off-site portion of the Claremont plume (OU V).

The on-site GWTS is designed to extract groundwater from 3 recovery wells (EXT-1, EXT-2, EXT-3) to contain the on-site portion of the Claremont plume (Figure 5). The treatment process was engineered to remove solids, metals, VOCs and SVOCs. Treated groundwater is re-injected into the ground via four injections wells and galleries (IW-1, IW-2, IW-3, IW-4).
The following provides a description of the on-site GWTS.

2.7.1 System Description

The on-site GWTS consists of three extraction wells (EXT-1, EXT-2, EXT-3) installed adjacent to the southern property boundary (Figure 5). Groundwater from the extraction wells is pumped to the treatment plant designed to treat a maximum flow of 500 gallons per minute (gpm). The plant provides infrastructure for the following processes during treatment.

- Flow and chemical equalization
- Metals precipitation
- Sand filtration
- VOC removal using air stripping and carbon filtration (liquid and vapor),
- Treated water injection into the ground.

Each of these processes is described in more detail below.

The current operation of the system is different from the initial plant start-up design. This is due to the difference between the actual influent groundwater conditions and those anticipated in the Design Basis for the GWTS. The treatment units that are no longer in operation are:

- metal precipitation system
- sand filter

Flow and Chemical Equalization
Each extraction well pump delivers groundwater to the plant through dedicated piping which meets at a common header pipe inside the plant. The groundwater then flows to the equalization (EQ) tank located outside the treatment plant building. The EQ tank provides both flow and chemical equalization.

Groundwater from the equalization tank is pumped to the top of two reaction tanks which are at the head of two separate but identical treatment trains within the facility. The maximum design flow rate for each treatment train is 250 gpm. The flow rate from the influent pumps is monitored and set at the HMI (Human-Machine Interface control system) operating through the main control panel (MCP). The pumps are controlled by individual variable frequency drives.

Metals Precipitation System

The original design of the GWTS called for the precipitation of metals from the influent water. This process would start in the reaction tanks where influent water would be mixed with metered solutions of sodium hydroxide (pH controlled) and potassium permanganate (flow controlled). The process flow would continue from the reaction tank into the flash mix and flocculation tanks where additional caustic and polymer would be added to aid metal precipitation. The system flow would continue through the plate clarifier to separate the developed solids from the supernatant liquid.

Currently, the concentration of metals in the extracted groundwater is minimal (<2 parts per million [ppm]) and therefore, the water does not require the addition of chemicals in the treatment process. The addition of potassium permanganate and sodium hydroxide for metal hydroxide precipitation is not necessary and is offline. The sodium hydroxide and polymer addition in the flash mix and flocculation tanks has been discontinued also.

The flash and floc mix tanks now act as flow through tanks. The inclined plate Lamella clarifier is used to remove most of the solids in the wastewater by gravity settling. Settled material in the form of sludge is collected in the bottom of each Lamella clarifier and transferred by sludge transfer pumps to the sludge storage tank. Effluent from the clarifier, typically less than 20 mg/l TSS, flows to the gravity filters for further solids removal.

The removal of sludge from the bottom of the clarifiers is currently accomplished by manually pumping the sludge to the sludge storage tank. Once the level in the storage tank cone becomes approximately 60% to 80% full, the operator can dewater the sludge in the filter press or in drums.

The decant from the sludge storage tank, filtrate from the filter press, overflow from the sand filters and water collected by the floor drains are transferred to the water recycle tank. Two 100 gallon per minute (gpm) centrifugal pumps, that are activated by a level control in the recycle tank, transfer wastewater back to the equalization tank for treatment.

Sand Filters

Sufficient hydraulic head at the Lamella Clarifier effluent trough allows for unassisted flow through the Settling Filters, located downstream of the clarifier. Filtration is provided by screened nozzles and slotted risers. When required, the effluent from each clarifier can be directed to either filter.

In the original design, the settling filters were utilized as sand filled polishing filters with a continuous backwash process. As no metal hydroxides are precipitated, the sand filters are no longer required and the sand media has been removed.

Air Strippers

Effluent from the filters, flows by gravity into two air stripper feed tanks. The level in these tanks is set to maintain enough volume to continuously supply water to the air stripper feed pumps (each rated at 300 gpm). At any one time, two of the three pumps operate to deliver water to the top of the air stripper tower.

The original system design allowed for the introduction of hydrochloric acid (HCl) into the pump discharge line prior to the in-line static mixer, upstream of the air stripper. The acid was to reduce the pH of the wastewater to a range of 6 to 8 and to prevent the fouling of the air stripper media. Due to the lack of pH adjustment at the head of the treatment process, the acid addition has been terminated.

The packed-tower air stripper removes volatile organic compounds (VOC) from pumped groundwater by counter-current flow against forced air through high surface area media.

Vapor Phase Carbon

Vapor effluent from the air stripper tower is conveyed to one of two vapor phase carbon adsorbers, (the second unit is off line as a spare), for the treatment of off-gas from the air stripper and reduces volatile air emissions to within regulatory limits. To maximize the efficiency of the vapor-phase adsorbers, and to increase their carbon life, the relative humidity in the vapor stream.

Liquid Phase Carbon

Effluent from the air stripper tower enters the carbon adsorber feed tanks prior to being pumped through the liquid-phase granular-activated carbon system (L-GAC). Under normal operation, 2 of 3 carbon adsorber feed pumps transfer water from the carbon adsorber feed tanks to two liquid-phase carbon adsorbers.

The sand filter effluent is valved to allow for its bypass of the air stripper feed system and flow directly to the L-GAC feed tanks.

The L-GAC system removes any semi-volatile organics and residual volatile organics remaining after air stripping. The adsorbers operate in parallel. The design of the system is such that each adsorber can be removed from service while the system remains operational.

Injection Well System

Two treated water storage tanks receive effluent from the liquid-phase carbon adsorbers. The treated groundwater is transferred to an injection-well and gallery system via two centrifugal pumps (configured in a lead/lag arrangement) at approximately 250 gpm each (a third pump is a spare). The total volume pumped into the injection system is monitored and totalized. The flow rate is also monitored.

The injection pump discharge is also valved to allow for water from the treated water tanks to recycle to the equalization tank. This recycle mode is used as a safety measure to deal with plant operational problems and to prevent the discharge of untreated water back to the aquifer. In the event of a chemical spill in the plant reaches the plant sump, the “Recycle mode” would be used until the condition is rectified to prevent the discharge of spilled materials to the aquifer.

Floor Drain and Sump System

The floor drain and sumps are part of the plant wide spill/overflow containment system. As such, the system is required to be in automatic operation mode while the plant is unmanned. The floor drain system in the GWTP consists of 10 floor drains (FD), 4 elevated hub drains (HD), a fiberglass trench drain, 13 vents and 6 floor cleanout ports (FCO). All are connected below the concrete plant floor to the drainage piping system. The system drains to the outdoor sump system.

The drains consist of flush floor grates connected to below-surface drain ports connected to the piping system. The piping manifold conveys the water and waste by gravity to the outdoor, below-ground sump. The floor cleanouts are below-surface plugged connections to the piping manifold. The vents are open ended connections to the piping manifold which rises through the floor to a suspended manifold which penetrates the roof and is open to the atmosphere. The hub drains (HD) collect water from specific equipment (e.g. air compressor drains, HVAC, pump mechanical seals). These drains are above-surface, screened bowls piped to the floor drain manifold

The sump system consists of 2 below-surface tanks. The first tank (~190 gal.) is a flow-through tank used to collect debris and heavy solids; this tank drains to the main sump (~1100 gal). The main sump contains a submersible pump which discharges to the plant water recycle system through a flexible hose connection. A level float switch system controls the pump operation.

The pump can be operated in manual or auto mode. In manual mode, the pump will continuously run until there is a high-high level condition in the Recycle Water Tank. In the Auto mode, the pump will operate by level control. A low level in the sump will shut off the pump and a high level in the sump will activate the pump. A high-high level condition in the sump will activate an alarm system in the control room.

2.7.2 Operation and Maintenance Program

The Operation and Maintenance Program for the site includes routine inspections that are prescribed on the Plant Maintenance Log (Appendix A). The Maintenance Log summarizes the frequency of maintenance for the plant equipment in table format. The table describes each of the plant systems, the number of units and equipment within each system component, and the necessary maintenance actions that are required. The actions may include items such as inspections, calibration, cleaning, exercise, and/or fluid level checks. Typical maintenance frequencies are daily, weekly, monthly, quarterly, or as needed. The last column is for comments as related to the maintenance.

2.7.3 System Monitoring

The groundwater treatment system goals and objectives are based the RODs developed for the site (Section 2.6). In order to ensure these goals are being met, the groundwater that flows through the treatment system is sampled at various locations, the wells associated with the treatment system are also sampled, and weekly air monitoring is conducted.

Monthly plant discharge (PD) samples are taken for organic analysis in compliance with the NYSDEC discharge permit. Quarterly groundwater (GW) samples are taken for organic analysis (from 44 monitoring wells and extraction wells), and quarterly process water (PW) samples are taken for organic, inorganic, and generic analysis.

The NYSDEC discharge permit requires the plant effluent to have an average monthly pH between 5.5 and 8.5. The treatment plant effluent is monitored for pH and temperature on a weekly basis in order to obtain a monthly average in compliance with the NYSDEC discharge permit requirements. These readings are obtained from discharge samples taken from a controlled point with calibrated portable meters. The remaining permit parameters are analyzed with the PD sampling, monthly. A list of these parameters are included in Section 3.3.

Weekly air monitoring readings are taken with a PID of the influent and effluent air streams to the active vapor phase carbon vessel following the air stripper.

In addition, the injection wells are sounded to determine the depth of the wells on a routine basis. Water elevations in the injection wells are also normally recorded on a daily basis as is the daily total flow discharged to the well field.

3.0 FINDINGS AND OBSERVATIONS

The remedial system optimization (RSO) review found a well-operated plant. The observations below are based on past reports, data collected in various investigations and monitoring activities, O&M program, and current plant operations since the NYSDEC management of Claremont in June 2011.
The RSO included evaluation of the following two aspects of the remediation.

1. Subsurface remediation performance
2. Treatment system efficiency

The results of the evaluations in these areas are provided below.

3.1 Subsurface Remediation Performance

Pursuant to the site's 1989 Record of Decision, performance of the subsurface remediation is evaluated on the ability of the existing remedy (groundwater recovery) to achieve the overall goals of the remediation and progress the site towards closure in a timely manner. The objectives of the remediation include:

1. Reduction of VOC contamination from Claremont sources to levels protective of human health and the environment
2. Elimination of long-term Claremont sources of groundwater contamination
3. Containment of the Claremont plume, and
4. Identification of operational modifications that could reduce operation costs or accelerate clean-up.

The remediation performance was evaluated with respect to these goals through

- Review of current groundwater monitoring data to identify the extent of groundwater impact and influences from regional contaminant sources
- Analysis of site investigation data and source remediation measures to identify on-site contaminant sources contributing to the groundwater impact and to determine the effectiveness of the prior remedial measures
- Groundwater modeling to estimate the current capture zone and develop potential pumping scenarios to optimize plume capture

3.1.1 Groundwater Monitoring

Groundwater monitoring data was used to determine:

- Trends in contaminant levels since the onset of remediation, and
- Current distribution of contamination.

Changes in contaminant concentrations provide a good indication of the overall effectiveness of the groundwater recovery strategy. Identification of the current distribution of the groundwater plume enables interpretation of the affects of regional contaminant sources and provides information related to the degree of plume capture when coupled with groundwater modeling results.

Groundwater Contaminant Trends

Assessing overall trends in contaminant concentrations over time is an important aspect of evaluating the effectiveness of the remediation. Contaminant concentrations detected in shallow monitor wells (SW-1, EW-1A, EW-4C) located down gradient of Claremont VOC sources and the three extraction wells (EXT-1, EXT-2, EXT-3) prior to or shortly after activation of the GWTS are compared to current levels in the table below.

Well	Description	Contaminant	Initial Concentration (µg/l)/ Date	Recent Concentration (µg/l) / Date
SW-1	Down gradient monitor well	PCE	7,100 / Aug. 2001	23 / April 2012
EW-1A	Down gradient monitor well	PCE	690 / July 1992	3.1 / April 2012
EW-4C	Cross-gradient monitor well	TCE	4,200 / Aug. 2001	20 / April 2012
EXT-1	Extraction Well	PCE	300 / Nov. 2001	1.9 / Feb. 2012
EXT-2	Extraction Well	PCE	330 / Nov. 2001	7.6 / Feb. 2012
EXT-3	Extraction Well	PCE	32 / Aug. 2001	5.4 / Feb. 2012

In all instances, the contaminant levels have substantially declined over the past 12 years of pumping. Each of the monitor wells is located down gradient or side gradient of known Claremont contaminant sources. Monitor wells SW-1and EW-1A are located down gradient of the Durogold waste water treatment tanks and leaching basins (AOC 3). Well EW-4C is located side gradient of the “Spill Area” (AOC 1). The large decline in groundwater concentrations suggest that the site remedial measures and/or the existing groundwater recovery have been largely effective at reducing Claremont source concentrations to levels at or near the applicable standards.

Similar results are observed in the contaminant levels detected in the three extraction wells (EXT-1, EXT-2, EXT-3). The extraction well results further support the overall effectiveness of the on-site remedial measures.

Contaminant Distribution

Contaminant isopleths maps for PCE and TCE were used to assess the extent of current site impacts and further evaluate the affect of regional groundwater contaminant sources on the plume observed in the vicinity of Claremont. PCE and TCE were selected for evaluation because they are critical contaminants of concern at the site and they are pervasive in groundwater in the area. The isopleths maps include two figures depicting the lateral and vertical distribution of the PCE (Figure 6) and TCE (Figure 7) plumes. Available data from the former Aluminum Louvre site (a documented contaminant source to the north) has been included to assist evaluation of regional groundwater impacts.

The lateral view of the PCE contamination depicts two distinct plumes (Figure 6) with contaminant levels above groundwater criteria. One of these plumes is centered at SW-1 and appears to emanate from the southwest corner of Claremont. The second appears to originate from the former Aluminum Louvre site and extend to the southeast in the direction of groundwater flow. This plume impacts the northeast corner of Claremont and on-site monitor well clusters EW-7 and EW-4. Cross section A-A', located east of Claremont, shows a PCE plume migrating from the up gradient former Aluminum Louvre site, penetrating to depths of about 100-ft below the water table and extending towards the EW-4 well cluster in the southeast portion of the site. As shown in cross section B-B', these two PCE plumes appear to be separate as evidenced by the trace levels of PCE separating the two plumes and the difference in the plume depths. The smaller PCE plume appears to originate in the vicinity of SW-1 and penetrates shallow depths of about 20-ft below the water table (cross section C-C').

TCE contamination (Figure 7) in groundwater is more extensive and at higher concentrations than PCE. The lateral isopleth map also depicts two distinct TCE plumes. The locations of the TCE plumes are consistent the PCE plumes. Cross section A-A', shows the primary TCE plume emanating from the former Aluminum Louvre site and penetrating to depths more than 70-ft below the water table. The TCE plume appears to extend to the southeast as far as EW-14D. Cross sections B-B' and C-C' show a shallow plume local to the Claremont site in the vicinity of SW-1 and a deep TCE plume along the east side of the property that may emanate from the former Aluminum Louvre site.

3.1.2 Evaluation of On-site Source Remedial Measures

Based on available data, the most significant VOC sources detected on-site include the "Spill Area" (AOC 1), the Durogold waste water treatment tanks and basins (AOC 3), and the interior sump (AOC 9) for the following reasons.

1. During remediation of the "Spill Area", NAPL was detected at depths of about 9-ft bg in the western portions of the excavation.

2. Surrounding the interior sump in the northern portion of the building, concentrations of PCE were also detected at levels indicative of NAPL (300 mg/kg).

3. Although no significant concentrations of PCE or TCE were reported in soils surrounding the Durogold waste water treatment tanks and leaching basins, monitor well SW-1 exhibits the highest concentrations in groundwater that may be attributed to on-site contaminant sources. This suggests that a contaminant source may be in the vicinity of the treatment components (AOC 3).

The effectiveness of the remedial measures conducted in these areas is evident based on the verification sampling results for the "Spill Area" (average concentration <200 ug/kg), the contaminant mass removed from the sump area by SVE (1,200-Lbs VOCs), and the significant declines in groundwater contaminant levels at SW-1 (7,100 – 23 ug/l PCE) since implementation of the on-site remedial measures.
The combination of this data suggests that the site VOC sources have been substantially remediated so that levels in groundwater are at or very near the NYSDEC Ambient Water Quality Standards.

3.1.3 Groundwater Modeling

HRP revised and updated a groundwater flow model previously created by SAIC. The revised model (Groundwater Vistas, version 6.11) incorporated the following updated input data.

- Extraction well pumping data from July 2011
- Injection rates to the infiltration galleries and injection wells based on flow meter readings
- Adjustments to hydraulic conductivity values to be consistent with values obtained from previous aquifer pump tests

Following these adjustments to input data, the model was calibrated to groundwater elevation data collected from the site in July 2011. The calibrated model was used to assess the extent of the capture zone produced by the three site extraction wells (EXT-1, EXT-2, EXT-3) and to optimize pumping strategies for the site. Further details on the modeling process are provided in Appendix B.

The three dimensional geometry of the capture zone was estimated using particle traces in the calibrated model. The maximum width of the capture zone was found to be approximately 1,200-ft and extends beyond both the eastern and western property boundaries of Claremont (Figure 8). The vertical limit of the capture zone extends to a depth of about 260-ft bg, below the depths of the diffusion wells, the deepest potential on-site contaminant release point.

Based on the modeling results and evaluation of contaminant distribution (Figures 6, 7), the capture zone appears to extend well beyond the lateral and vertical limits of the Claremont plume and provides a limited control of the plume migrating from the former Aluminum Louvre site. Along cross section B-B' (Figures 6, 7) the 1,200-ft capture zone extends well beyond the approximate 230-ft width of the Claremont plume that surrounds SW-1. Similarly, the 260-ft vertical limit of the capture zone extends well below the 20-ft depth of the plume (cross section C-C', Figures 6, 7).

3.2 Treatment System Efficiency

3.2.1 Mass Removal

The historic mass removal rate for PCE and its daughter product TCE that have been removed from the groundwater by the GWTS are depicted on Chart 1. Each constituent has two graph lines depicted on the chart. The line with the square data points depicts the mass removal rate of the chemical in kilograms per day (kg/day), and the line with the triangle points depicts the cumulative mass of contaminant removed from the beginning of the data collection.

For PCE, depicted by the red graph line, the graph indicates that the daily removal rate of PCE ranged from 0.25 to 0.01 kg/day from September 2002 to July 2009. After July 2009 the daily rate of PCE being removed from the groundwater is steady at approximately 0.01 kg/day. As shown on the graph, there was an initial increase in PCE continuously being removed from the groundwater (September 2002 to January 2004). However, since November 2010 the cumulative rate of removal from PCE has increased minimally.

For TCE, depicted by the blue line on the graph, the graph indicates that the daily removal rate of TCE ranged from 0.60 to 0.1 kg/day from September 2002 to July 2009. After July 2009, the daily rate of TCE has increased to 0.18 kg/day, then decreased to 0.07 kg/day (February 2012), and increased slightly to 0.09 kg/day (March 2012). As shown on the graph, there was an initial increase in TCE continuously being removed from the groundwater (September 2002 to January 2004). Since January 2004 the cumulative rate of removal from TCE has continued to increase.

3.2.2 Flow

The treatment system design goal was for the treatment and re-injection of 500,000 gallons per day. This goal is consistently met, as the average plant flow is 550,000 gallons per day. Groundwater Modeling has indicated that a 5% reduction in this pumping rate will maintain capture of the groundwater plume emanating from sources on the CPC site. This 5% reduction appears to be an adequate safety factor that allows for full capture of the plume.

3.2.3 Discharge Compliance

Initial site monitoring included the collection of samples after each of the treatment units. During previous Remedial System Optimization Reports prepared for the GWTS, the monitoring was reduced to the following frequency to reduce operating costs:

Monthly

- Effluent – VOCs

Quarterly

- Extraction Wells – VOCs
- Effluent – Metals and VOCs

Annually

- Extraction Wells – Metals and VOCs
- EQ Tank – Metals and VOCs
- Carbon Influent – Metals and VOCs
- Carbon Effluent A & B – Metals and VOCs
- Effluent – Metals and VOCs

The table below summarizes the August 2011 sampling results, which was the last annual plant wide sampling event. The results provided in the table below, were utilized for the analysis of each component of the GWTS effectiveness, which is discussed below.

August 2011 Annual Plant Wide Sampling									
Parameter	Effluent Limitation (ug/l)	EXT-1	EXT-2	EXT-3	EQ Tank Influent	007 - GAC Carbon Influent	008A - GAC Carbon A Effluent	008B - GAC Carbon B Effluent	009 - Plant Effluent
Barium	2000	99.7	77.6	98.7	98.6	92	NA	NA	80.4
Iron	600	342	151	153	447	36.7	NA	NA	42.9
Manganese	600	437	276	250	249	415	NA	NA	4.6
cis-1,2-Dichloroethylene	5	1.2	2.2	3.8	3.5	<5	<5	<5	<5
Tetrachloroethylene	5	2.1	6.8	6.7	5.6	<5	<5	<5	<5
Trichloroethylene	5	4	17	100	95	<5	<5	<5	<5
Benzene	0.7	(<5)	(<5)	(<10)	(<5)	(<5)	(<5)	(<5)	(<5)
1,1,1-Trichloroethane	5	<5	<5	3.6	3.2	<5	<5	<5	<5
Chlorobenzene	5	<5	<5	(<10)	<5	<5	<5	<5	<5
Chloroform	7	<5	<5	(<10)	<5	<5	<5	<5	<5
trans-1,2-Dichloroethylene	5	<5	<5	(<10)	<5	<5	<5	<5	<5
Methylene chloride	5	<5	<5	1.9	<5	<5	<5	<5	<5
1,1-Dichloroethane	5	<5	<5	(<10)	<5	<5	<5	<5	<5
1,1-Dichloroethylene	5	0.87	1.2	4	3.6	<5	<5	<5	<5
Toluene	5	<5	<5	(<10)	<5	<5	<5	<5	<5
Ethylbenzene	5	<5	<5	(<10)	<5	<5	<5	<5	<5
Bis(2-ethylhexyl)phthalate	4,200	NA	NA	NA	NA	NA	NA	NA	2.8
Di-n-butyl phthalate	770	NA	NA	NA	NA	NA	NA	NA	<4

During the initial start-up phase, sampling was conducted throughout the GWTS processes in order to determine the treatment system efficiencies of each treatment unit. Remedial System Evaluations performed for the EPA/ACOE recommended that the interim sampling be stopped in order to save monitoring costs. As part of the RSO, HRP collected an additional sample from the air stripper feed tank during the May 2012 routine sampling event. The additional sample allowed for an analysis of the VOC removal efficiency for the metals treatment system and the air stripper. Further evaluation is included below. The results of the analysis are included in the following table:

May 2012 VOC Process Water Sampling										
Parameter	Effluent Limitation (ug/l)	EXT-1	EXT-2	EXT-3	EQ Tank Influent	006 - Air Stripper Inlet	007 - GAC Carbon Influent	008A - GAC Carbon A Effluent	008B - GAC Carbon B Effluent	009 - Plant Effluent
cis-1,2-Dichloroethylene	5	1.8	2.3	3.5	2.4	2.2	<1	<1	<1	<1
Tetrachloroethylene	5	2.2	7.5	5.0	4.6	3.4	<1	<1	<1	<1
Trichloroethylene	5	5.8	21	85	37	29	0.31 J	0.16 J	0.16 J	0.18 J
Benzene	0.7	(<1)	(<1)	(<1)	(<1)	(<1)	(<1)	(<1)	(<1)	(<1)
1,1,1-Trichloroethane	5	0.61 J	0.89 J	2.4	1.2	0.9 J	<1	<1	<1	<1
Chlorobenzene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	7	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethylene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	0.16 J	0.53 J	0.26 J	0.24 J	<1	<1	<1	<1
1,1-Dichloroethylene	5	1	1.3	3.2	1.9	1.2	<1	<1	<1	<1
Toluene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-ethylhexyl)phthalate	4,200	NA	NA	NA	NA	<19	NA	NA	NA	<19
Di-n-butyl phthalate	770	NA	NA	NA	NA	<19	NA	NA	NA	<19
Note: J Flagged Values are outside of Laboratory Calibration Curve and are estimated.										

Influent

To evaluate the treatment system's contaminant removal rate, HRP reviewed available treatment system inlet (Charts 1, 1a, 1b, 1c and 2) and effluent analytical results from quarterly O&M sampling. As anticipated with a groundwater extraction system, the influent concentrations of the main Constituents of Concern (COCs) have diminished over time. As indicated in Chart 1, the main COC for the site, tetrachloroethylene has diminished significantly over time. Current influent concentrations to the GWTS hover at 5 ug/L, which is the drinking water standard.

To date approximately 1.73 billion gallons have been processed through the treatment system.

Extraction Wells

In May 2011, during the transfer of the site operations from EPA to NYSDEC, the former site operator replaced the Equalization Tank level controllers, which formerly controlled the extraction well pumps, with level transducers located in the extraction wells. The level transducers allow the extraction pumps to maintain a static water level in the extraction wells and a more consistent capture zone. Each well pump is controlled by a well transducer that maintains a groundwater elevation of 38.3 to 46.7 feet MSL. The transducers in each of the extraction wells are not communicating with the HMI due to an earth ground fault. The fault does not inhibit flow, but it does cycle the transducer on/off.

Equalization

The equalization tank is being fully utilized and represents no issues associated with the GWTS. A constant elevation at approximately 80% capacity is maintained to provide elevation head to the inlet of the metals removal system. This allows for less work by the influent pumps.

Metals Removal System

As indicated in Chart 3, the influent concentration to the GWTS of the two primary metal COCs (iron and manganese) has decreased over the long-term operation of the system to a point where after the initial start-up of the system, lower than expected concentrations of metals were present in the groundwater extracted from the three extraction wells. The metal precipitations system currently operates as a flow through system and no chemical additions or mixing is conducted. Solids are allowed to settle in the lamella plate clarifier and are periodically pumped to the sludge holding tank for decanting.

The metals treatment system provides agitation as well as surface area that allows for the aeration of the process water which ultimately assists in the removal of VOCs. Sampling in May 2012 indicates that the metals treatment system provides approximately 21% removal of the influent concentration of TCE and 26% of PCE.

Sand Filter

Since the elimination of the metals precipitation processes, the sand in the sand filter has been removed. The screened nozzles and slotted risers remain in the unit which provides some solids removal. However, the treatment system operators spend time almost daily back washing the screens with compressed air to unclog the screens. It is recommended that this unit process be removed in order for a more efficient treatment process that eliminates the need for the manual backwashing operations.

Air Stripper

The air stripper has shown no deterioration during its operation since 2000. There has been no fouling encountered through the system. The water passes through the unit is at a pH of 5.5 and the exterior of the tank is painted white, which prevents the accumulation of bacterial growth. The 50 foot tower requires a dual feed system to pump the effluent from the sand filter to the head of the tower. In addition, a blower is used to blow air up the 500 foot column to aerate the water as is cascades through the stripper tower's media.

The May 2012 sampling indicates that the Air Stripper provides approximately 98% removal of TCE and 70% removal of PCE from its influent.

Liquid Phase Carbon

Plant monitoring of the influent to the liquid phase carbon has indicated that the effluent discharge requirements for VOCs are being met prior to polishing of the treated groundwater by the liquid phase carbon. The plant monitoring has indicated that the liquid phase carbon is primarily acting as a media bed filter for metals and sediment removal. Concentrations of manganese are decreased by two levels of magnitude by the liquid phase carbon. While the liquid phase carbon is providing this filtering, the influent concentrations are well within the facility's discharge permit effluent limitation. Operation and Maintenance of these vessels includes quarterly backwashing operations or when the differential pressure across the vessels exceeds 5 psi. This occurs every 2-3 months.

2011-2012 TYPICAL CONCENTRATIONS- PRIMARY CONSTITUENTS OF CONCERN										
Sampling Location	METALS				VOCs					
	Iron		Manganese		TCE		PCE		1,1-DCE	
	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
EXT 1	348.5	355	434.5	437	4.48	5.4	1.65	1.9	0.82	1
EXT 2	151	151	276	276	16.33	19	6.27	7.6	0.98	1.1
EXT 3	153	153	250	250	92.67	96	4.93	5.4	3.33	3.6
GAC Inlet	36.7	36.7	415	415	nd <5	nd <5	nd <5	nd <5	nd <5	nd <5
GAC Outlet	na	na	na	na	nd <5	nd <5	nd <5	nd <5	nd <5	nd <5
Plant Effluent	42.9	42.9	4.6	4.6	0.26	0.43	1.8	1.8	nd <5	nd <5
Effluent Limitation	600		600		5		5		5	

During the backwash operations, 150 to 200 pounds of carbon is discharged. The carbon is collected and placed in drums for off-site treatment/disposal. After drying in the filter press, the amount of carbon removed is approximately 2/3 of a drum. The backwashing operations amount to the majority of the downtime of the system.

There is a pin-hole leak in LCA-V2 that would require shutting the entire plant down to repair as the vessel would need to be empty in order to weld a patch onto the carbon steel tank. Based upon these complications and the influent concentrations to this system meeting the facility's discharge permit effluent limitations, it is recommended that these vessels be taken out of service and removed from the treatment train.

Injection System

The injection system flow is restricted to the two (2) infiltration galleries so that flow to IW-1 and IW-3 is maximized in order to keep the injection wells from silting in. The ball valves that control flow between the injection wells and the infiltration galleries are closed at 50% to each gallery which maximizes the flow to the injection wells without them overflowing.

Additional capacity is provided with the infiltration galleries. However, the entire injection system flow is limited by the existing injection pump system capacity. The discharge from the treated water tanks is a six (6) inch PVC pipe that is split to four 2" PVC pipes that feed each of the injection well systems. The 2" PVC pipes were installed to house the paddle flow meters that record the discharge to each injection well system. Paddle wheel flow meters are inaccurate measurement devices and often show discrepancies between the total plant effluent meter readings and the combined paddle wheel measured flow readings. In addition, the four 2" PVC pipes provide a choke point for the injection well system. These smaller diameter pipes prevent an additional flow from being able to be processed by the treatment system. It is recommended that the injection system discharge manifold be rebuilt to utilize a 6" line as well as house magnetic flow meters to more accurately record the discharge to each injection well system.

Remote Operation of System

The treatment system is provided with a Citect SCADA System as the GWTS operation interface of those processes that can be remotely operated. The Citect system allows the GWTS to be operated via a computer interface. This computer is housed at the treatment system but may be accessed and controlled remotely. The system allows for the control of the extraction wells and the equalization tank which controls the flow to the remainder of the system. Therefore, if there is an alarm in a downstream treatment unit, the entire system would be required to be shut-down in order to accommodate the fix to the critical alarm. Currently, there are no controls which would allow flow to be diverted to one treatment train or the other in the event of an alarm. The remote operation has limited functionality, and includes those functions listed in Table 4.

A review of the Programmable Logic Controllers (PLC) for the GWTS was conducted by Process and Water, Inc. to determine its life expectancy and capability to be updated and/or reused during a reconfiguration of the system. The results of the review indicate:

- The main PLC control panel housing is in excellent condition;
- The Allen Bradley 5/20 PLC (main PLC) is an older unit which, replacement parts will become increasingly scarce, as the PLC 5 series is being retired by Allen Bradley
- The obsolete and no longer used Allen Bradley Panelview 14p that was replaced by the current Citect SCADA System is still housed at the plant; and
- The Siemens Model 95 Motor Control Center (MCC) is in good condition and does not need any upgrades in the near future.

When the facility is reconfigured, the main PLC should be replaced with a newer model as replacement parts for the current system are becoming increasingly more difficult to acquire.

3.3 Regulatory Compliance

Water Permit

The plant is currently operating under an equivalency permit from the New York State Department of Environmental Conservation (NYSDEC). While the permit requires periodic submittal of discharge monitoring results, monthly discharge monitoring reporting is not required. Historically all analyzed parameters have been below noted permit limits. The effluent limitations are summarized in the table below.

Water Discharge Permit Effluent Limitations		
Parameters	Discharge Limitations	Units
pH (range)	5.5 – 8.5	SU
Tetrachloroethylene	5	ug/l
Trichloroethylene	5	ug/l
1,2-(cis) Dichloroethylene	5	ug/l
1,2-(trans)Dichloroethylene	5	ug/l
Methylene Chloride	5	ug/l
1.1 Dichloroethylene	5	ug/l
1,1-Dichloroethane	5	ug/l
Chloroform	7	ug/l
1,1,1-Trichloroethane	5	ug/l
Benzene	0.7	ug/l
Toluene	5	ug/l
Chlorobenzene	5	ug/l
Ethylbenzene	5	ug/l
Bis(2-ethylhexyl)phthalate	4200	ug/l
Di-n-butyl phthalate	770	ug/l
Arsenic, Total recoverable	50	ug/l
Barium, Total recoverable	2000	ug/l
Lead, Total recoverable	50	ug/l
Selenium, Total recoverable	40	ug/l
Iron, Total recoverable	600*	ug/l
Manganese, Total recoverable	600*	ug/l
Nitrogen, Total (as N)	10	mg/l
Solids, Total Dissolved	1000	mg/l
Antimony (Total recoverable)	3	ug/l
Chromium, Hexavalent	100	ug/l
Note: *The combined concentration of Total Iron and Manganese may not exceed 1,000 ug/l		

The plant's water discharge permit expires December 31, 2013; therefore, a request for permit reauthorization must be submitted to the NYSDEC's DER and BWP by July 1, 2013.

Air Permit

No air permit is required for the system operation, in particular, 6 NYCRR Part 375-1.7 states that "no permit is required when the substantive compliance is achieved as indicated by the NYSDEC approval of the work plan". Based on a review of the information pertaining to the treatment system, VOC air emissions from the treatment system should be negligible, therefore substantive requirements of an air permit would be achieved and no air permit would be required. Additionally, there is no requirement for an air permit for the air stripping operations at the site as “air strippers and soil vents required under the provisions of an order on consent or stipulation agreement, or in operation at a superfund site” are considered trivial sources under 6 NYCRR 201-3.3(c)(29).

Each of the major components that make up the operation and monitoring of the GWTS were analyzed and are summarized in Table # below. From this summary, the major cost components were further analyzed to determine the individual components that make up each major line item. The major cost components that were further analyzed were the electricity, plant operators, plant and groundwater monitoring, and the reporting and management line items. Each of these major cost components are discussed below:

3.4 Major Cost Components or Processes

Each of the major components that make up the operation and monitoring of the GWTS were analyzed and are summarized in the Table below. From this summary, the major cost components were further analyzed to determine the individual components that make up each major line item. The major cost components that were further analyzed were the electricity, plant operators, plant and groundwater monitoring, and the reporting and management line items.

The costs that were reviewed during the RSO Process were those costs of operation since the system was turned over from the EPA to the NYSDEC as the costs with EPA have significantly higher operation and overhead costs. As these costs are higher, they would naturally skew the cost savings outlined in this RSO.

Each of these major cost components are discussed below:

Major Cost Components	
Cost Component	Cost/Year
Utilities	
Electricity	$74,000
Natural Gas	$600
Internet/Phone	$2,650
Cell Phones	$240
Water	$600
Trash	$250
Sprinkler Testing	$200
Subtotal	$78,540
Operation & Maintenance	
Operators	$412,000
Treatment Chemicals	None
Maintenance Supplies	$1,000
Yard Maintenance	$150
Snow Plowing	$2,500
Backflow/Sprinkler Inspections	$950
Subtotal	$416,600

Major Cost Components	
Cost Component	Cost/Year
Monitoring	
Quarterly Groundwater Monitoring	$2,200
Annual Process Monitoring	$2,500
Quarterly Process Monitoring	$1,250
Monthly Discharge Monitoring	$100
Subtotal	$6,050
Reporting & Management	
Quarterly Groundwater Monitoring	$16,800
Monthly O&M Reports	$14,400
Budgeting & Scheduling	$30,500
Subtotal	$61,700

Electricity

The electrical usage to operate the facility is approximately $74,000 per year. To analyze what components of the system make up this HRP performed a comprehensive Energy Audit which the full report is included as Appendix C. The significant cost components that contribute to the electrical costs are the pumps the 18 pumps and the four (4) exhaust fans which require approximately 429,126 kWh/year to operate. This is approximately 88% of the plants electrical usage or an approximate annual cost of $64,800.

The energy audit also identified replacement of ballasts for the existing facility lighting ($20 in annual savings) and the installation of a thermostat on the heat tape on the external piping which would save approximately $1,730 annually.

Operators

The operator component consists of approximately $412,000 in expenditure for the direct salaries of the two operators who physically man the site for approximately 40 to 50 hours per week. These two operators have been manning the GWTS since system start-up in 2000, therefore they have detailed experience with all components of the facility. Because the site is a Superfund site, two operators have been tasked with plant operations from a health & safety perspective. For those instances in which an issue arises at the plant and an alarm is triggered, an auto dialer is installed to contact the operators where the treatment system may be monitored/reset remotely via remote access or the operators physically respond to the site. The operators typically respond to alarms within 30 minutes.

The treatment system is provided with a Citect SCADA System as the GWTS operation interface of those processes that can be remotely operated. The Citect system allows the GWTS to be operated via a computer interface. This computer is housed at the treatment system but may be accessed and controlled remotely. There are several O&M tasks that require manual operation as part of the routine O&M of the system, these tasks include:

- Rotating Influent Pumps (two of the three pumps work at any one time)
- Rotating Effluent Pumps (two of the three pumps work at any one time)

The system could be operated remotely by a management consultant and only periodic inspections of the facility would be required. However upgrades to the plant would be required to achieve this functionality.

Monitoring

During the current contract, monitoring has been reduced to VOCs only and the sampling methodology has been reduced from using dedicated bladder pumps which require compressed nitrogen to operate to using passive diffusion bags. This change has resulted in approximately $9,000 of annual monitoring savings.

All laboratory analysis is being provided as a separate call-out contract directly to the NYSDEC, which provides savings as there is no mark-up for the pass through of the invoice through a contract engineering firm.

Reporting & Management

The Reporting and Management tasks that are associated with OUIV are commensurate with the size of the operations at site and are not anticipated to be reduced unless reporting is condensed or operations of the GWTS cease.

Operation of OU V

The capture of off-site groundwater contamination (OU V) is conducted by recovery wells operated by the Old Bethpage Landfill treatment system. An agreement between Old Bethpage and the NYSDEC provides that the NYSDEC contributes 60% of the total annual operational costs of the system. These contributions are approximately $1,200,000 annually.

Safety Record

Because the site is listed on EPA's National Priorities List, the two site supervisors act as the facilities Site Safety & Health Officers (SSHO). The SSHO's oversee all field activities associated with the project and are responsible for site accessibility and safety. The SSHO's are responsible for enforcing standard operating procedures including safety protocols, and reporting any deficiencies to the Program Manager.

Field work at the GWTS is conducted in accordance with the approved Site Safety and Health Plan (SSHP). Site safety inspections are performed daily and the reports are filed on-site. Comprehensive safety inspections are performed routinely and maintained in accordance with the SSHP. Personnel who work on-site at the GWTS are Hazardous Waste Operations & Emergency Response (HAZWOPER) 40-hour trained. The SSHO have also received an additional 8 hours of supervisor training, and each year all personnel whom work on-site receive their 8-hour HAZWOPER refresher training.

The SSHO's are also trained in:

- Hazard Communications
- Respiratory Protection
- Hearing Conservation
- First Aid/CPR

The overall safety record of the site activities is excellent. HRP does not have a record of any reported incidents at the site since operations were taken over by HRP in May 2011.

4.0 RECOMMENDATIONS

Overall, the RSO evaluations revealed a well operated GWTS that is accomplishing remedial objectives and bringing the site into compliance with site closure criteria. The following recommendations are provided to further reduce remediation costs and potentially accelerate site closure.

4.1 Recommendations to Achieve or Accelerate Site Closure

The results of the evaluation are very encouraging, but a thorough understanding of the environmental site history is limited by the manner in which the data is presented in the available investigation and remediation reports. Based on available reported data, the evaluation of subsurface remediation performance provided the following conclusions.

- On-site remedial measures have effectively reduced nearly all observed site groundwater contaminant levels to concentrations at or near NYSDEC Ambient Water Quality Standards.
- The identified VOC contaminant plume attributed to Claremont sources is characterized by low concentrations of PCE and TCE in shallow portions of the aquifer local to monitor well SW-1.
- The GWTS capture zone extends well beyond the limits of the identified Claremont contaminant plume.
- Use of the OBL treatment system to capture the identified Claremont plume does not appear necessary.
- Comprehensive interpretation of site investigation and remediation data is limited by the presentation methods provided in available reports. However, available data suggest that on-site soil remediation has been effective at significantly reducing contaminant mass at the most likely VOC sources including the “Spill Area” (AOC 1) and the interior sump (AOC 2).

Based on the results of the RSO, the site appears close to achieving site closure goals and modifications to the current remediation approach are warranted. HRP identified the four following options to optimize the remediation and accelerate site closure. Each alternative includes well installation as an initial step to verify the identified extent of the Claremont plume. HRP evaluated these alternatives on the basis that the results of the well installation (discussed in Section 4.1.1) will indicate that the Claremont plume is confined to the site property. The results of the evaluation as well as the anticipated costs are provided in Tables 3 and 4 and summarized below.

1. Do-Nothing Option: Continued operation of the GWTS at current pumping rates controls the identified Claremont plume, encompasses other potential site sources (if present), and enables some limited system reconfiguration to reduce operation & maintenance (O&M) costs. The flow rate is greater than necessary to capture the identified Claremont plume and O&M costs are the highest of the four alternatives. This option is best suited for the situation where additional on-site sources require control or GWTS operation is desirable (with modification) to control up gradient, off-site groundwater contaminant sources.

2. Operate Extraction Well (EXT-1) Only: Operation of only extraction well EXT-1 is capable of controlling the identified Claremont plume. Under this scenario, both EXT-2 and EXT-3 would cease operation and EXT-1 would be pumped at approximately 115-120 gpm. The flow rate of the treatment system would be reduced about 33%, which enables significant reconfiguration of treatment leading to reduced O&M costs. Since the well remains unchanged, the well pumping rate is higher than optimal and O&M costs remain high.

3. Reconfigure EXT-1: Installation of a new extraction well near EXT-1 and screened approximately 20-feet below the water table is capable of controlling the identified Claremont plume at a significantly lower pumping rate (approximately 50-70 gpm). Alternatively, the bottom portion of the existing EXT-1 could be grouted to the desired depth to potentially achieve the same results. This alternative continues system operation at the optimal pumping rate providing the maximum reduction to O&M costs. The option is best suited for the situation where the Claremont plume extends beyond the property boundaries and continued capture of the Claremont plume is necessary.

4. Monitored Natural Attenuation (MNA): MNA allows for the dissipation, dispersion, and natural degradation of the low VOC levels detected within the identified Claremont plume. It enables full termination of GWTS operations and implements monitoring of site conditions until ambient water quality standards are achieved in the Claremont source area. The MNA alternative minimizes remaining remediation costs for the site and is appropriate if additional testing verifies that the limits of the Claremont plume are confined within the property boundary.

4.1.1 Sampling

The installation of nine additional monitor wells is recommended as an initial step in each optimization alternative in order to verify the identified limits of the Claremont plume. The purpose of the sampling is provided below followed by a description of the proposed scope.

The results of the RSO revealed several data gaps in the monitoring well array, which may result in an incomplete understanding of the following items.

1. Contaminant distributions in groundwater,
2. Delineation of the on-site PCE groundwater contaminant plume, and/or
3. Investigation of groundwater contamination source areas.

Monitoring wells DW-1, SW-1, DW-2 and EW-5 are located down gradient of Claremont. However, no monitoring wells are located down gradient of the following site features:

1. The Claremont building, which includes floor drains (AOC-3A), interior sump (AOC-9), condensers (AOC-11), and the former UST farm (AOC-6),

2. Within the areas of the wastewater treatment basins and leaching basins (AOC-3B and AOC-3C), drywells (AOC-4), diffusion wells (AOC-5), and septic tanks and leaching pools (AOC-10A and AOC-10B),

3. Within the eastern spill area (AOC-1) and nearby ASTs (AOC-2)

During recent groundwater sampling events in February and April 2012, PCE concentrations in the three extraction wells ranged from 1.9 to 7.6 µg/l. PCE levels in the nearest monitoring wells (DW-1, DW-2, EW-1 [A, B, and C], EW-2 [A, B, C, and D], EW-5, and MW-8 [A, B, C]), excluding SW-1, ranged from 0.42 to 3.1 ug/l. The concentrations of PCE detected in the extraction wells are expected to be significantly less than those detected in monitoring wells due to dilution. The higher contaminant levels in the extraction wells may suggest an unknown and/or uninvestigated residual source of PCE.

In addition, PCE was detected in monitoring well SW-1 at 23 µg/l. SW-1 is located directly up gradient of extraction well EXT-1, which identified PCE at 1.9 µg/l. Therefore, the highest PCE concentration detected in a monitoring well is located up gradient of the extraction well with the lowest detected PCE concentration, further supporting the idea that a residual source of PCE may be contributing to the relatively high PCE concentrations detected in the diluted extraction well samples.

As part of each remedial alternative, nine additional monitor wells (Figure 15) are recommended to further assess the groundwater quality adjacent to these critical areas and verify the limits of the Claremont plume. The well locations include the well clusters described below.

- Three wells completed at depths of approximately 70-ft, 110-ft, and 170-ft bg located upgradient of the Durogold waste water treatment leaching basins (AOC 3C),
- Three wells completed at depths of approximately 70-ft, 110-ft, and 170-ft bg located immediately down gradient of the main building (AOCs 3A, 9, 11) and the former UST farm (AOC 6),
- One shallow well (~70-ft bg) completed adjacent to the DW-2 and EW-5 locations, and
- Two wells completed at depths of approximately 70-ft and 110-ft bg located on site, immediately down gradient of monitoring wells SW-1 and DW-1, near the property line.

Costs to develop a work plan, install the wells, dispose well cuttings, survey and sample the wells, and prepare a summary report are estimated at about $ 100,000.

4.1.2 Source Reduction/Treatment

If additional data obtained from the well installations described above are consistent with presently available data, substantial changes to on-site (OU IV) and off-site (OU V) remediation leading to site closure can be achieved.

<u>On-site Groundwater Remediation (OU IV)</u>

Interpretation of current groundwater monitoring data indicates that the on-site Claremont plume is limited to a localized area surrounding SW-1. The RSO evaluation indicates that the current capture zone is larger than needed to contain the on-site Claremont plume. If additional data supports this interpretation, one of the following alternate remediation strategies could be implemented to optimize the site remediation.

1. The pumping rates of the extraction wells could be significantly reduced in order to shrink the capture zone to a width that more closely matches the on-site plume width. Groundwater flow model and particle tracking simulations predict a capture zone approximately 550-feet wide when extraction well EXT-1 is pumped at its current rate of approximately 115-120 GPM and no water is pumped from extraction wells EXT-2 and EXT-3 (Figure 16).
2. Capture of the identified on-site Claremont plume could be more efficiently achieved with operation of a single shallower extraction well located closer to SW-1. Groundwater flow model and particle tracking simulations predict a capture zone approximately 550-feet wide when a shallower extraction well screened approximately 20-feet below the water table is pumped at approximately 55 GPM and no water is pumped from extraction wells EXT-2 and EXT-3 (Figure 17).
3. Operation of the GWTS could be terminated and replaced with MNA if contaminant levels exceeding the NYSDEC Ambient Water Quality Standards are contained within the site boundaries.

A cost benefit analysis of the various alternatives, including the option to maintain operation of the current GWTS under current pumping conditions, is presented as Table 3. Based on the current understanding of contaminant (PCE) concentrations and distribution in groundwater beneath the Site and a comprehensive evaluation of costs, advantages, and disadvantages for each remediation alternative, HRP recommends implementing monitored natural attenuation. In general, this involves continued monitoring of groundwater quality to evaluate the natural degradation of chlorinated compounds. The primary focus of the monitoring will be to evaluate the rate of contaminant degradation, determine if the groundwater contaminant plume remains within the property boundaries, and assess compliance with the Site's remedial objectives. Significant cost savings will be achieved by shutting down the groundwater pump and treat system.

Off-site Groundwater Remediation (OU V)

Current monitoring results reveal two distinct groundwater contaminant plumes in the vicinity of Claremont. One plume appears to emanate from an on-site source in the vicinity of SW-1. The second, larger plume appears to originate from an up gradient location in the vicinity of the former Aluminum Louvre site and extends a long distance downgradient to the southeast. The width of the current groundwater pump and treat capture zone extends beyond the limits of the Claremont plume and provides a limited degree of capture of the larger contaminant plume to the east.

The entire Claremont plume appears to be captured by the on-site GWTS (OU IV) and use of the OBL treatment system does not appear necessary to capture contaminated groundwater previously suspected to be emanating from the CPC Site.

4.2 Recommendations to Improve Performance

The recommendations outlined under Section 4.1, designed to accelerate the closure of the on-site operating units, necessitate the recommendations to improve performance of the GWTS to be broken down by each accelerated closure option. The following sections describe the proposed improvements under each closure option:

4.3 Do Nothing Option - Continue Current Operations

Under the Do-Nothing option, the current GWTS would continue to operate with all three (3) extraction wells operating at their current pumping rates. There are several maintenance and operational improvements that could be made to reduce operating expenditures which are discussed below:

Maintenance Improvements

Several maintenance improvements that are suggested for the site and are outlined in the facility's Monthly Operations & Maintenance Activities Report.

In addition, Injection Well, IW-1 has silted up 100 feet since installation in 2004 (75 feet since 2008). IW-1 is connected to an infiltration gallery which could accommodate flow from the GWTS in the event that the well becomes an unproductive injection point. IW-2 has had increases in its sediment in the past few years. The well should either be equipped with an infiltration gallery or the well should be monitored and redeveloped as conditions worsen to support the current groundwater extraction and injection rates.

Monitoring Improvements

The current monitoring of the GWTS has been streamlined from the initial start-up as part of a previous system optimizations performed by the EPA. This optimization process eliminated sampling in between the metals removal system and the air stripper tower. This process water sampling location should be added on an annual basis to evaluate the removal efficiency of the air stripper. The estimated annual cost for this analysis is $250.

The monitoring of the site's groundwater was evaluated and the analysis for metals was eliminated and the groundwater sampling methodology has been modified. Groundwater was previously collected via dedicated bladder pumps in each monitoring well. Sampling is now conducted using passive diffusion bags. This sampling methodology change has a net annual savings of approximately $12,000 as it eliminates the need for a third sampler to be on-site for one week during every quarterly event.

The results of regional groundwater monitoring should be compiled into one database and reviewed for regional compliance and trends. The centralizing of data would allow for a better understanding and evaluation of the regional plume characteristics. The NYSDEC's EQuIS system has the capabilities to accomplish this task; therefore additional costs are not expected to be incurred as the only cost is manpower from the NYSDEC staff.

Upgrade GWTS to Remote Monitoring

With the removal of several of the more labor intensive treatment units, outlined below, the system could be streamlined to allow for the entire GWTS to be remotely operated. Alarms, automatic diverter valves, and programming of the system's monitoring system would be required to achieve remote operation. The following control items and subsequent connection to the system's control system would be required:

- Actuated valves prior to the ASF tanks
- Actuated valve at the EQ Tank to prevent flow through the gravity feed portion of the system
- Check valve replacement
- Pressure readouts for the liquid carbon system
- Level transducers in injection wells
- Infiltration Gallery flow meter readout
- Level monitor in the infiltration galleries
- Injection well totalizer
- Actuated valves to switch between carbon vessels.
- Influent well pump actuated valving
- Upgrade the facility's Programmable Logic Controller

Modifying the system for remote operation would cost approximately $75,000.

Process Modifications

<u>Check Valves</u>

There are 13 gate style check valves located throughout the system that are either past their useful life or are no longer functional. These check valves should be replaced with a ball valve style check valves. Replacing these valves would reduce the amount of labor required to operate the system, as the current valves require manual closing in order to stop backflow. The cost to replace these valves is approximately $10,500 which includes parts and labor. Cost savings would be at least one trip to the site per month if the system was remotely operated (instead of manually opening and closing check valves), which equates to an estimated $3,000 per year in savings

<u>Eliminate Metals Removal System</u>

The metals removal system is currently not operated as lower than anticipated metals concentrations have been encountered since the GWTS began operation in 2000. The three (3) influent pumps transfer water from the Equalization Tank to the reaction tank at the headworks of the metal removal system while the remainder of flow is conveyed via gravity. There is not a significant amount of energy required for these treatment trains; however, the trains occupy the majority of the building space. Removing the metals removal system would allow for additional process modifications that would simplify the system and allow for the modified system to be housed completely indoors, unexposed from the elements. Capital costs associated with the removal of the system would be substantial as it appears that the system was installed prior to the metal building envelope being fully constructed. A detailed Cost Estimate is presented as Table 4. This table outlines each line item cost associated with these options.

A substantial amount of rigging would be required, and potential removal of the facility roof would be required to remove the tanks. The anticipated costs of the removal would be $59,000, but this would be offset by the tanks salvage value of $156,550. The result would be net gain of $97,550.

If the tanks could not be salvaged for use at other NYS locations, the tanks could be cut up and sold for scrap. There would be a cost savings in the amount of work required for the removal of the tanks if tanks were to be scrapped. The cost of the work for this option is $19,000 and the scrap value of the tanks is $1,350. The anticipated cost for this option is $17,653.

Alternatively, under the Do-Nothing Option, the Metals Removal System could remain in place and remain as a pass-through system. The screens in the sand filters should be removed to reduce operation and maintenance costs. There would be no cost to keep this process equipment in place. However, keeping the metals system in place would not allow for the installation of alternative air stripping operations other than the replacement/rehabilitation of the carbon treatment units discussed below.

Simplifying Air Stripping Operations
If the metals removal system was to be removed, adequate space would be made available to move air stripping indoors and would enable the inlet to the air stripping operations to take advantage of the elevation head created by the Equalization Tank and the metals reaction tank. This would eliminate one stage of pumping which would save approximately $6,000 annually.

The two processes were evaluated:

1. Carbonair STAT Low Profile Air Strippers or
2. Aeromix BREEZE VOC Removal and Air Stripping System.

The Carbonair STAT Low Profile Air Strippers were evaluated was theSTAT 720 model. Influent water is pumped into these units and effluent water leaves after air has been introduced removing VOCs. The STAT 720 has approximate dimension of 114 inches long by 72 inches wide by 12 inches high with a water flow range of 1000 gpm and required air flow of 3,500 cfm (to be supplied by 40 HP blower). These units are tray aerators which allow water to pass through the trays as air is blown through slots in the trays. The units would be directly vented to the atmosphere. For this option, two units would be installed with a total treatment capacity of twice the available influent flow or 800 gpm so the system has redundancy and units can be taken off-line for maintenance without affecting treatment performance. The approximate cost of installation of such a unit is $ 209,700.

The Aeromix BREEZE VOC removal and air stripping system that was evaluated was the Series 7. The system works by adding influent water which is forced to flow in serpentine pattern through multiple aeration chambers. A blower provides the required air through fine or coarse bubble diffusers removing VOCs. These units may be stacked or placed in a waterfall configuration that allows for gravity flow through the units running in series. The Series 7 unit has length of 93 inches, width of 34 inches, and height of 30 inches. Each unit will have a blower with an air flow of 550 cfm. For this option, six units would be installed (3 treatment trains of two tanks each) so that two treatment trains can be operating at once, and one unit would be maintained off-line for maintenance without affecting treatment performance. The approximate cost of installation of such a unit is $92,000.

Liquid Phase Carbon Treatment Removal/Replacement

The Liquid Phase Carbon units are the units that require the most operation and maintenance in the treatment system. The units require backwashing that requires the entire treatment system to be off-line during the backwashing operations. The system is working as a media filter for solids removal; however influent solids/metals concentrations are below the facility's effluent limitations. Removing the liquid phase carbon treatment units would reduce operating costs by approximately $20,000 per year as the electricity to the existing dual feed system would not be required, labor for backwashing would not be required, and backwashed solids would not be required to be shipped off-site.

Carbon replacement has occurred approximately every 6-7 years with the system at a cost of approximately $25,000, which equates to around $4,200 in annual savings. The carbon units could be removed intact and sold for their salvage value or cut up and sold for scrap metal. The anticipated costs of the removal of the units intact would be $22,800, but this would be offset by the tanks salvage value of $16,329. The result of salvaging would be a cost of $6,471.

There would be a cost savings in the amount of work required for the removal of the tanks if they were to be scrapped. The cost of the work for this option is $17,400 and the scrap value of the tanks is $1,930. The anticipated cost for this option is $15,470.

A second alternative to the replacement of the Air Stripping Operations would be to replace the existing Liquid Phase Carbon Treatment. The existing units are performing as both a media filter and for final VOC polishing. The replacement cost would be approximately $250,000 to completely replace the existing units. Alternatively, the existing units still have useful life, but have a few pinhole leaks that may be repaired by a welder. The repair of the existing units and the replacement of their carbon would cost approximately $30,000.

Remove the Vapor Phase Carbon Treatment

The air stripper tower is located outside and the off-gassing vapors are passed through one of two vapor phase carbon units for polishing. During the winter months, the vapor phase carbon is heated to enhance the vapor removal prior to discharge to the atmosphere. The entire GWTS is estimated to remove approximately 0.5 kg of tetrachloroethylene and 65 kg of trichloroethylene per year. Because the air stripping operations do not require an air permit (see Section 3.3) it is recommended that the vapor phase carbon treatment is ceased. Monitoring of the influent and effluent of the vapor phase units is monitored on a weekly basis utilizing a photo-ionization detector (PID). VOCs have not been detected within the range of the PID (1 ppm) during these weekly monitoring events. Removing these units would save approximately $5,000/year in heating costs. If the air stripper tower was replaced, an approximate $6,000 in operating costs associated with the pump and blower operations would be saved per year.

There would be some significant capital costs associated with the removal of the system due to its size. A substantial amount of rigging would be required to remove the tanks and air stripper tower. The anticipated costs of the removal would be $32,800, but this would be offset by the tanks salvage value of $37,162. The result would be net gain of $4,362. If the tanks could not be salvaged for use at other NYS locations, the tanks could be cut up and sold for scrap. There would be a cost savings in the amount of work required for the removal of the tanks if they were to be scrapped. The cost of the work for this option is $24,800 which includes $5,000 for the disposal of the carbon. The scrap value of the tanks is $3,170 so the anticipated cost for this option is $21,630.

The total cost for the process modifications and the monitoring of the system for the next 15 years for the Do-Nothing Option is $2,184,000. The anticipated annual savings are $453,000.

4.3.1 Operate Extraction Well EXT-1 Only

The anticipated flow from the operation of only EXT-1 is 116 gallons per minute, which is half the flow rating for each of the existing individual treatment lines. To accommodate these lesser flows, the system could be streamlined to reduce operating costs. The treatment system reconfiguration would include the following:

1. Upgrade GWTS to Remote Monitoring
2. Remove Air Stripper Tower
3. Remove Gaseous Phase Carbon Treatment
4. Replace Liquid Phase Carbon Units with two (2) 14-200 gpm rated units
5. Replumbing of the system to accommodate modifications

The total cost for the process modifications and the monitoring of the system for the next 15 years for this option is approximately $2,100,000. The anticipated annual savings are $ 453,000.

4.3.2 Reconfigure Extraction Well EXT-1

Under this scenario, the treatment system would operate at approximately 55 gallons per minute to capture the anticipated plume originating from the Claremont Polychemical Site. These pumping conditions would reduce the system treatment requirements to only VOC removal/polishing prior to reinjection. The treatment system reconfiguration would include the following:

1. Upgrade GWTS to Remote Monitoring
2. Remove Air Stripper Tower
3. Remove Gaseous Phase Carbon Treatment
4. Replace Liquid Phase Carbon Units with two (2) 6-100 gpm rated units
5. Replumbing of the system to accommodate modifications

The total cost for the process modifications and the monitoring of the system for the next 15 years for this option is approximately $2,100,000. The anticipated annual savings are $453,000.

4.3.3 Monitored Natural Attenuation

Under this scenario, the treatment system would be shut-down and mothballed for potential use by another regional NYSDEC site. To accomplish this task, the system would be required to be drained and locked off to prevent operation of the system. The remote monitoring of the facility would be required to be maintained for security purposes. This work would include:

1. Draining and pressure washing process equipment
2. Disposal of cleaning fluids
3. De-energizing/locking out electrical equipment
4. Reconfigure remote monitoring of the facility.
5. Disposal of Carbon from the liquid and gaseous phase carbon units.

It is estimated that the decommissioning costs would be approximately $50,000. The anticipated annual savings are $447,000.

4.4 Recommendations to Reduce Costs

Supply Management

There are no supply management recommendations as part of the RSO for the Claremont facility. There are no critical operation and maintenance supplies that cannot be readily ordered as off the shelf items.

Process Improvements or Changes

The process improvements that are recommended is the decommissioning of the plant associated with the transition of the facility to monitored natural attenuation.

Optimize Monitoring Program

With the switch of the monitoring program from dedicated groundwater monitoring pumps to PDBs, the monitoring program has been fully optimized. The same sampling methodology should be included for each of the new monitoring wells indicated in Section 4.1.1.

Maintenance and Repairs

Maintenance and repairs of the facility should not be implemented with the decommissioning of the plant associated with the site being transitioned from active pump and treat to monitored natural attenuation.

4.5 Recommendations for Implementation

HRP evaluated the performance of remediation at the Claremont site in order to assess progress towards closure, determine the efficiency of the treatment process, and identify modifications which could improve efficiency, reduce operating costs, or accelerate site closure. This remedial system optimization (RSO) process included:

1. Compilation of available investigation and remediation data to identify the location of Claremont VOC sources.

2. Review of regional groundwater quality data to understand interactions between on-site Claremont contaminant sources and other off-site sources documented in the area.

3. Testing at various points in the groundwater treatment process to identify the efficiency of the various components of the Claremont GWTS.

Based on this information, HRP derived the following conclusions.

1. The identified VOC plume attributed to Claremont sources persists at trace concentrations and appears limited to the shallow aquifer proximal to monitor well SW-1.

2. The GWTS capture zone controls and extends well beyond the inferred Claremont plume limits.

3. Use of the OBL treatment system to capture the Claremont plume appears unnecessary, since it is captured by the Claremont GWTS.

4. Capture of the Claremont plume with the GWTS could be achieved at lower pumping rates and treatment of the contaminated groundwater could be achieved using only the activated carbon filters.

HRP evaluated four options to optimize and accelerate closure of the Claremont GWTS. Each alternative includes installation of additional wells as an initial step to verify the limits of the Claremont plume. HRP evaluated the four following alternatives on the basis that the additional proposed testing would verify that the limits of the Claremont plume are constrained within the property boundaries.

1. Do-Nothing Option: Operation of the GWTS at its current capacity is best suited for the situation where additional on-site sources require control or operation of the GWTS is desirable (with modification) to control up gradient, off-site groundwater contaminant sources. Not recommended due to the high O&M costs.

2. Operate Extraction Well EXT-1 Only: The pumping rate of EXT-1 could be reduced from current levels and capture the identified Claremont plume. The flow rate remains greater than optimal due to the depth of the well. Not recommended because O&M costs remain high.

3. Reconfigure EXT-1: Replacement of EXT-1 at a shallow depth in the aquifer or grouting of the bottom portion of EXT-1 would enable pumping at the optimal rate to capture the Claremont plume and minimize operation costs. This alternative is best suited for the situation where the Claremont plume extends beyond the property boundary and continued control is necessary. Not recommended at this time.

4. Monitored Natural Attenuation (MNA): MNA allows for the dissipation, dispersion, and natural degradation of the remaining Claremont plume. This alternative minimizes remaining remediation costs and is appropriate if additional testing verifies that the limits of the Claremont

plume are confined to the property boundaries. Recommended given current conditions.

5. Implementation of the MNA alternative involves the following recommended steps

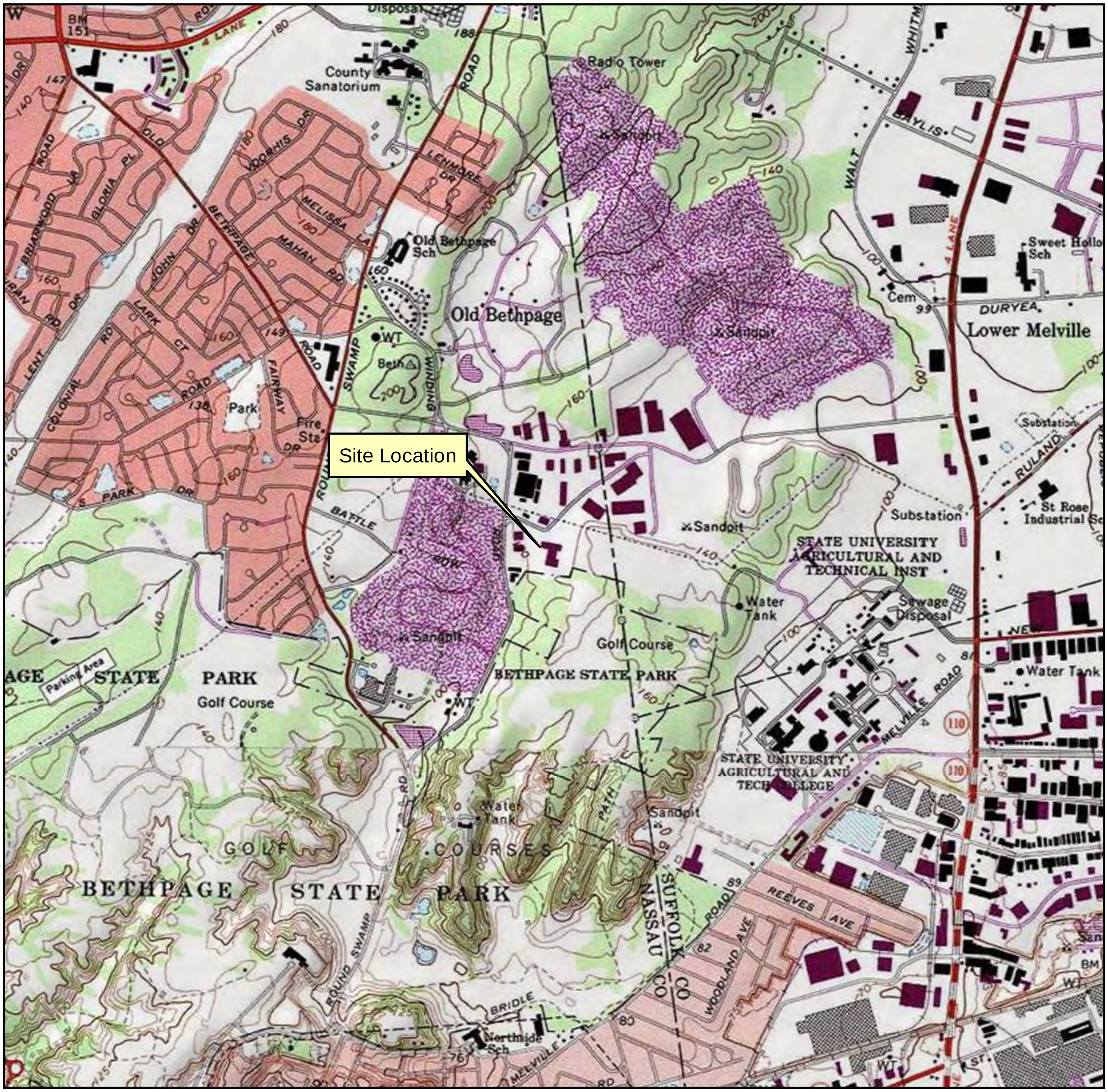
6. Installation and testing of the 9 proposed cluster wells to verify the Claremont plume limits within the site boundary.

7. Temporary shutdown of the GWTS while quarterly groundwater monitoring of the Claremont wells is performed for 4 consecutive quarters to document that steady-state conditions suitable for MNA are maintained. Electrical connections to the GWTS should be maintained and the system should remain in an operable state until it is established that the plume is steady or decreasing in size.

8. When groundwater monitoring establishes that the plume is steady and confined to the property boundary, power can be disconnected and the GWTS can be decommissioned.

9. Groundwater monitoring will continue on a semi-annual basis and transition to an annual basis until ambient water quality standards are achieved in the Claremont Plume.

FIGURES



USGS Quadrangle Information
Quad ID: 40073-G4
Name: Huntington, New York
Date Rev: 1977
Date Pub: 1979

0 1,000 2,000 4,000 6,000 8,000 Feet

1 inch = 2,000 feet

N

Figure 1
Site Location
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM
Site Code 130015
Scale 1" = 2,000'

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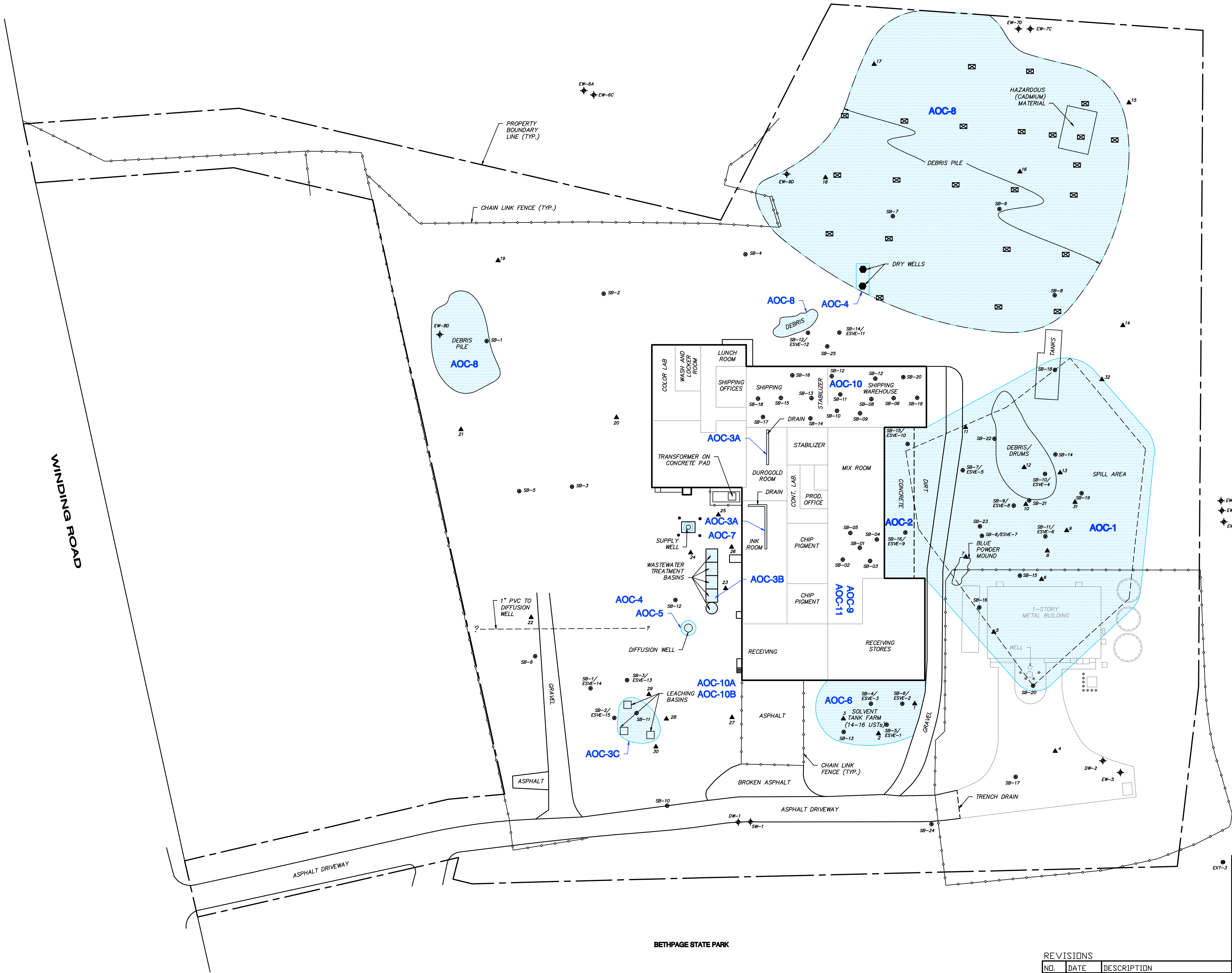

AREAS OF CONCERN

AOC-1 – SPILL AREA (EAST OF BUILDING)
AOC-2 – ABOVEGROUND STORAGE TANKS
AOC-3A – FLOOR DRAINS
AOC-3B – WASTEWATER TREATMENT BASINS
AOC-3C – WASTEWATER TREATMENT LEACHING BASINS
AOC-4 – DRYWELLS
AOC-5 – DIFFUSION WELLS
AOC-6 – UNDERGROUND STORAGE TANK FARM
AOC-7 – UNDERGROUND STORAGE TANK–FUEL OIL
AOC-8 – DEMOLITION/CONSTRUCTION DEBRIS AREA
AOC-9 – INTERIOR SUMP
AOC-10A – SEPTIC TANKS
AOC-10B – SEPTIC LEACHING POOLS
AOC-11 – CONDENSERS

LEGEND

- –SOIL BORING
- –MONITORING WELL
- –GROUNDWATER EXTRACTION WELL
- –SHALLOW SOIL SAMPLE
- –SOIL VAPOR EXTRACTION WELL
- –APPROXIAMTE TEST PIT LOCATOIN

MAP REFERENCE:
DRAWING PREPARED BY AK ASSOCIATES, 143 NORTH LONG BEACH RD., ROCKVILLE CENTER, NY;
TITLE: NA; SCALE 1" = 40'; REVISED MAY 26, 2004; SURVEYED ON MARCH 26, 2004

SITE PLAN

CLAREMONT POLYCHEMICAL CORPORATION

OLD BETHPAGE, NEW YORK

REVISIONS

NO.	DATE	DESCRIPTION

HRP Associates, Inc.
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JDM DESIGNED	JDM APPROVED	1" = 40'± SCALE	
BOB DRAWN	4/30/12 DATE		FIG. 2
JDM CHECKED	NEW9625.OM PROJECT NO.		SHEET NO.

N

200 100 0 200 400
Feet

1 inch = 200 feet

Figure 3
Groundwater Contour Map
April 2012
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM
Site Code 130015
Scale 1" = 200'

Legend

- Monitoring Well
- Extraction Well
- Injection Well
- Oyster Bay Extraction Well
- April 2012 Shallow GW Contour

Note: Contours dashed where inferred.

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Path: J:\N\NEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\GIS\April 2012 GROUNDWATER.mxd

Figure 4
Regional Contaminant Sources
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 500'

Legend

- Extraction Well
- Oyster Bay Extraction Well
- Property
- Site Buildings

500 250 0 500 Feet

1 inch = 500 feet

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Path: J:\NNEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\GIS\Figure 5 - Area Map.mxd

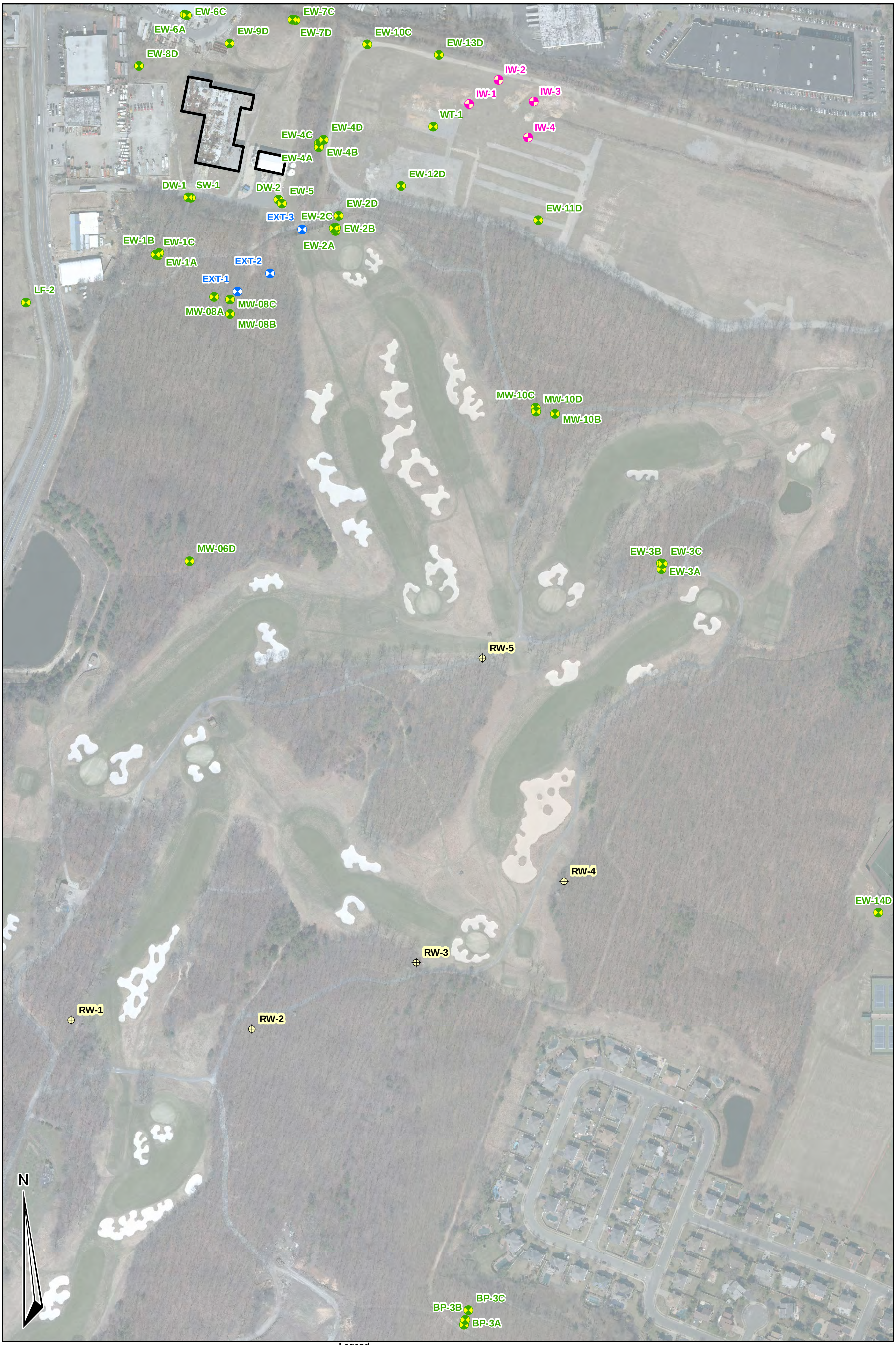

Figure 5 - GWTS Well Network
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 300'

Legend

- Monitoring Well
- Extraction Well
- Injection Well
- Oyster Bay Extraction Well
- Site Buildings

300 150 0 300
Feet

1 inch = 300 feet

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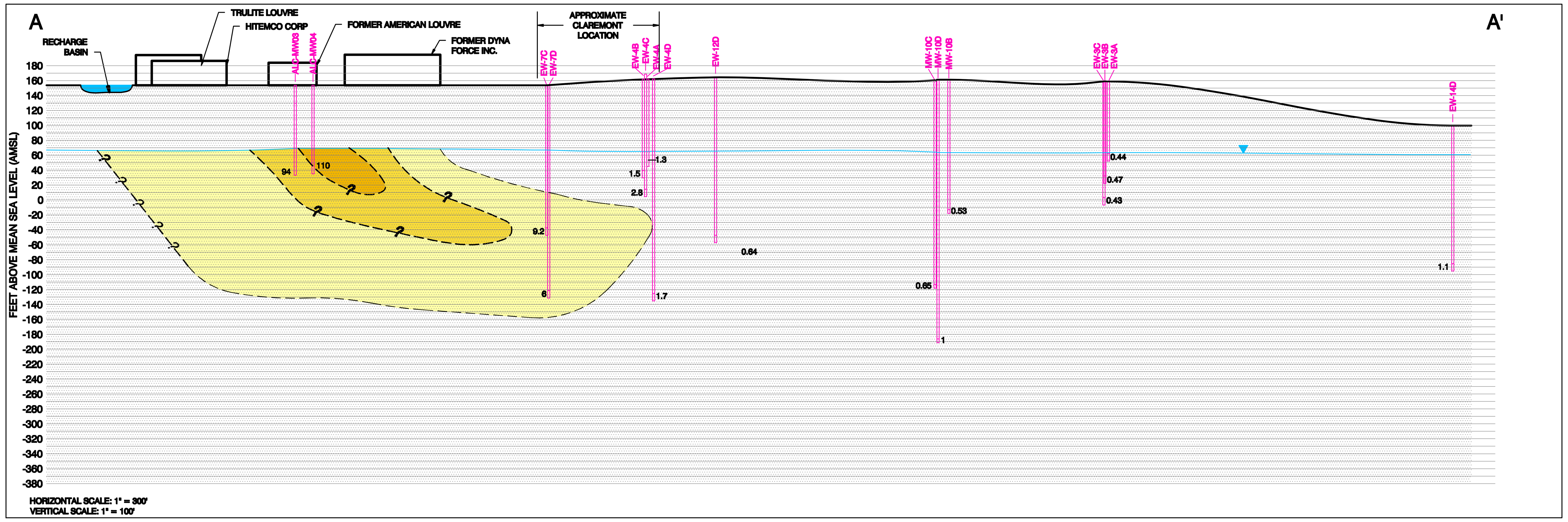
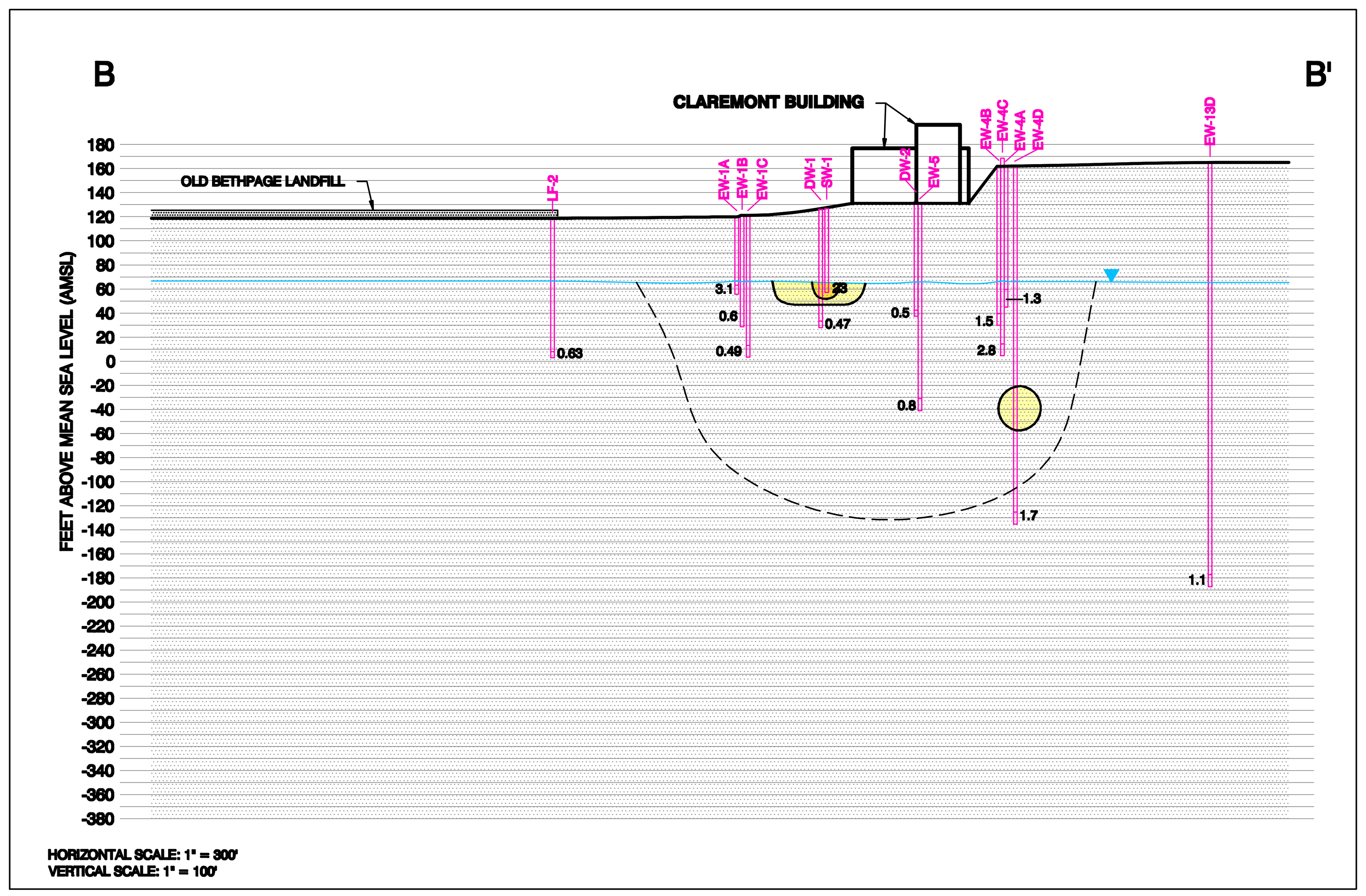




LEGEND

-WATER TABLE

MODEL

-SAND

-CAPTURE ZONE

PCE CONCENTRATION ISOPLETHS

-5 ug/l - 10 ug/l

-10 ug/l - 100 ug/l

->100 ug/l

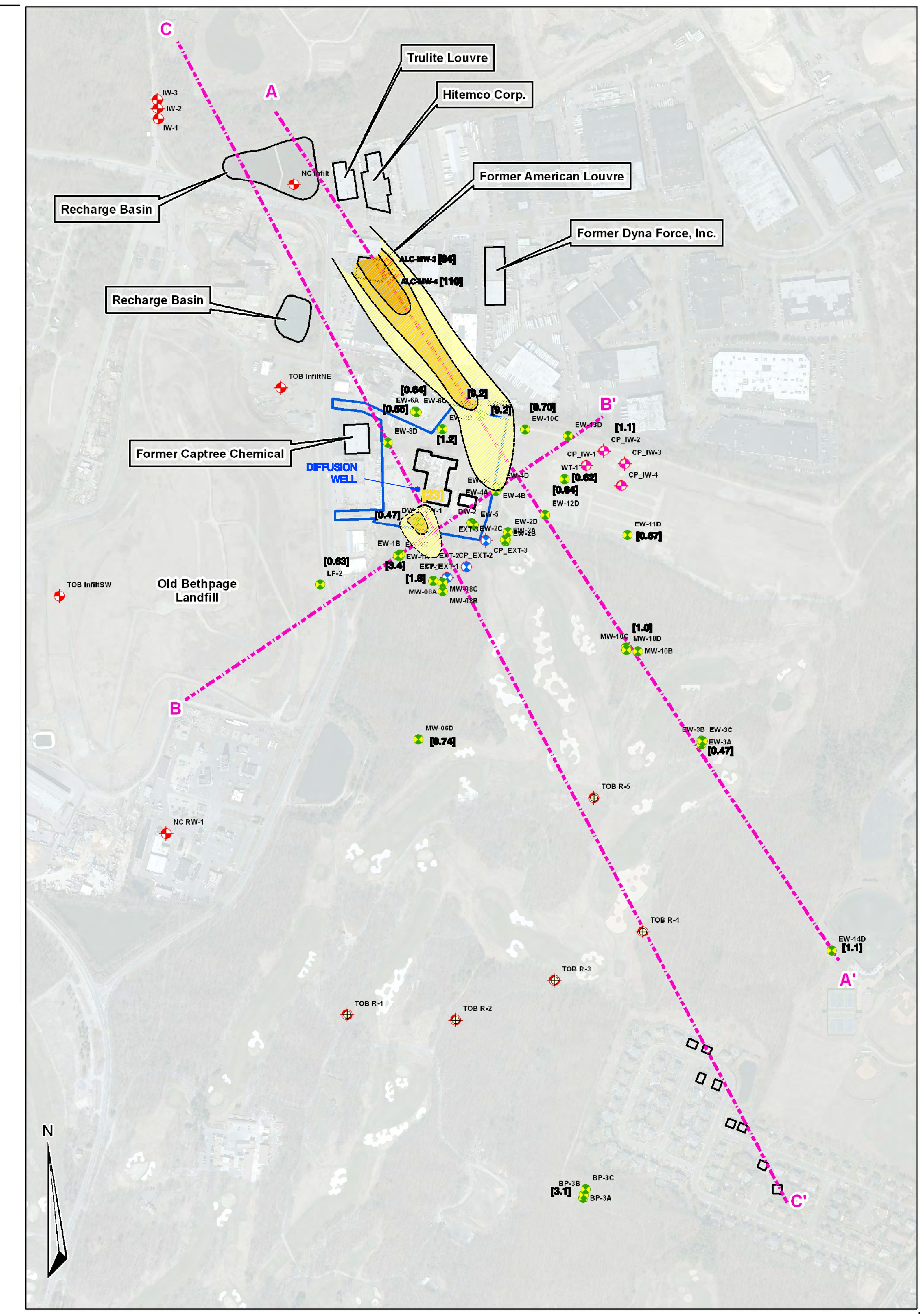
3.1 -PCE CONCENTRATION IN ug/l

1" = 100'

VERTICAL SCALE IN FEET

1" = 300'

HORIZONTAL SCALE IN FEET

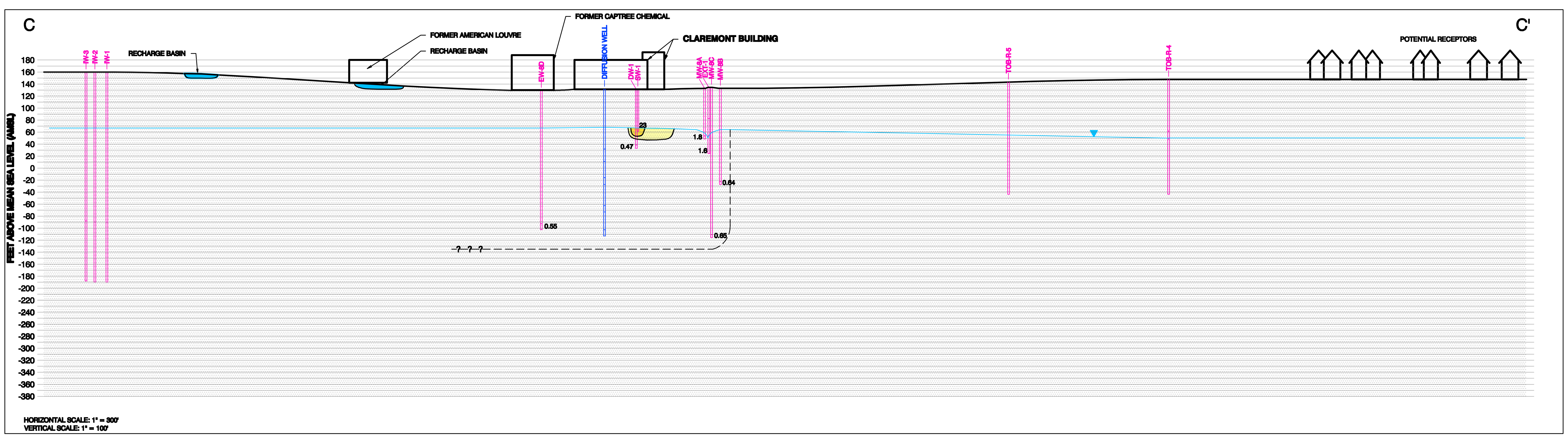


CROSS SECTION LOCATIONS

SCALE 1" = 500'

1" = 500'

PLAN VIEW SCALE IN FEET



NO.	DATE	DESCRIPTION

PCE CONTAMINATION - APRIL 2012

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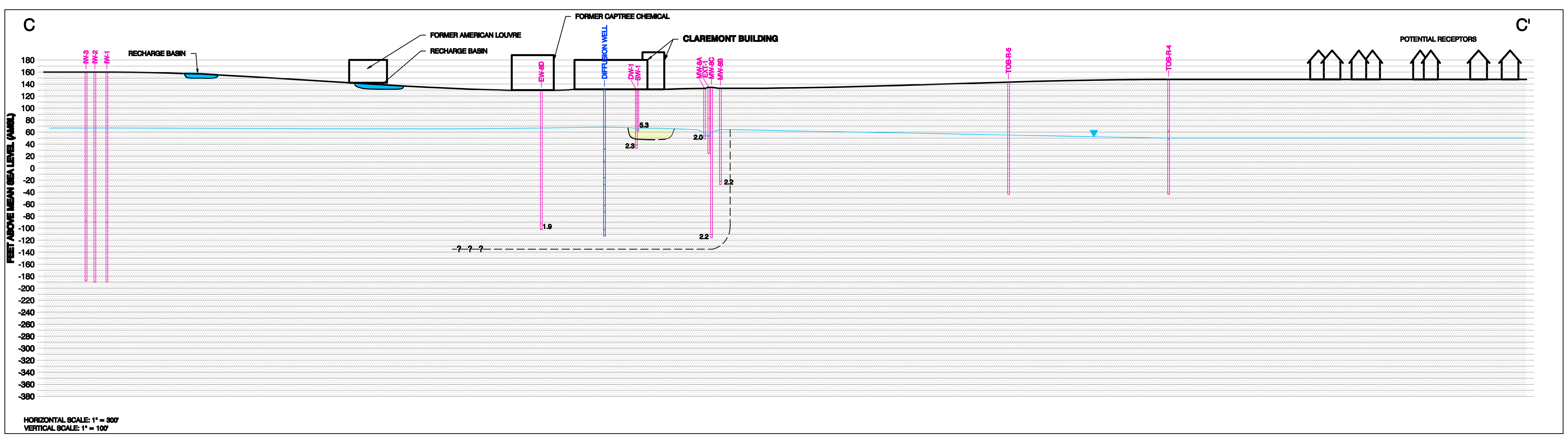
JMP DESIGNED	BPW APPROVED	AS NOTED SCALE
DML DRAWN	MAY 2012 DATE	FIG. 6 SHEET NO.
GTS CHECKED	NEW9625.OM PROJECT NO.	



CROSS SECTION LOCATIONS
SCALE 1" = 500'

1" = 500'
PLAN VIEW SCALE IN FEET

NO.	DATE	DESCRIPTION

TCE CONTAMINATION - APRIL 2012

CLAREMONT POLYCHEMICAL CORP.
OLD BETHPAGE, NEW YORK

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JMP DESIGNED	BPW APPROVED	AS NOTED SCALE	
DML DRAWN	MAY 2012 DATE		FIG. 7 SHEET NO.
GTS CHECKED	NEW9625.OM PROJECT NO.		

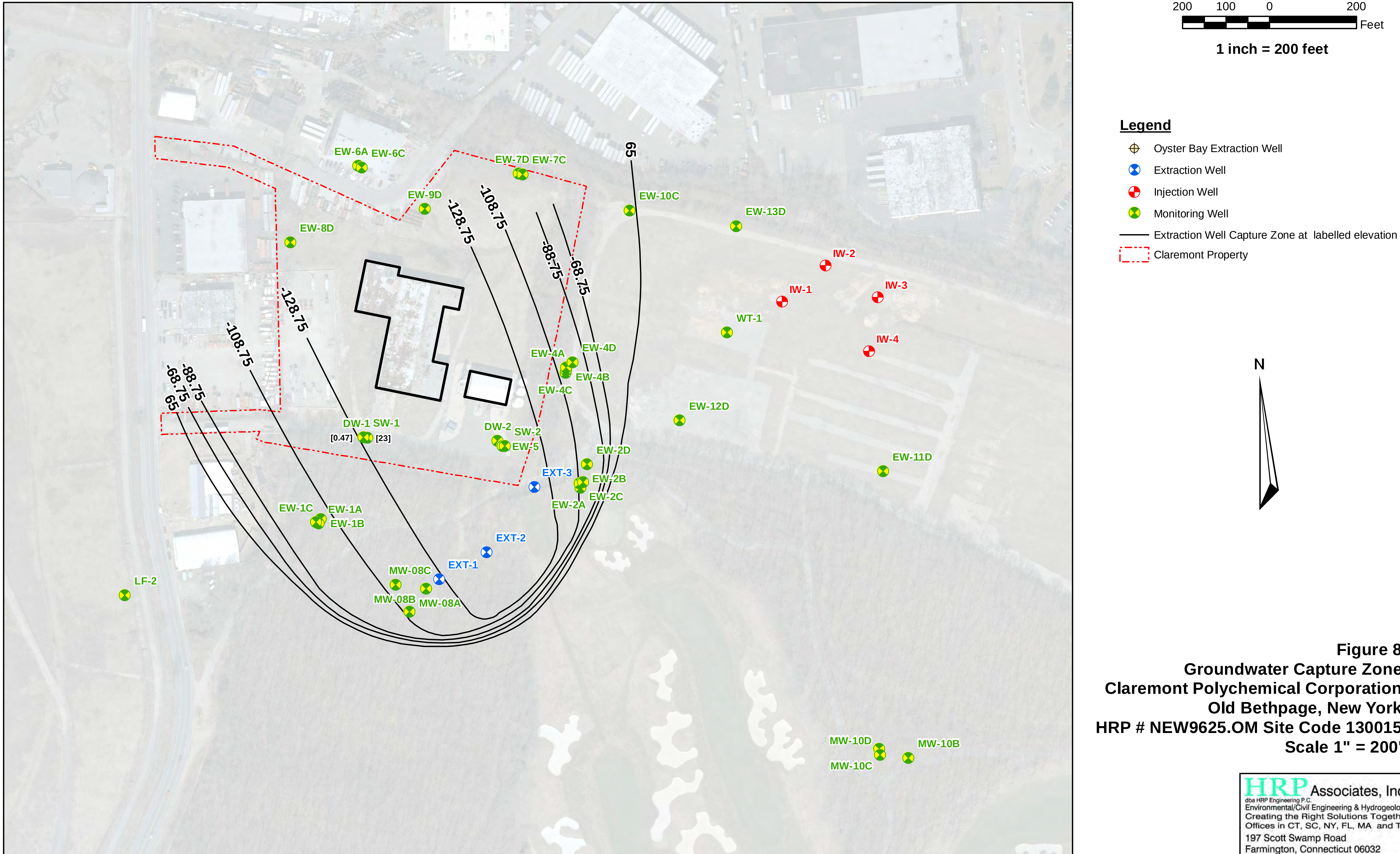

Figure 8
Groundwater Capture Zone
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 200'

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HS-1-1-1(2,3)
LSL-1-3-1 pump on
LSH-1-3-1 pump off
LSH-1-1-1(-2, -3) pump on
LSL-1-1-1 (-2, -3) pump off
KC-1-1-1(2,3) restart delay
LSHH-1-3-1 Pump off
LE/LT-1-1-1(-2, -3)
FQI-1-1-1(2,3)
FE/FT-1-1-1(2,3)
P-1-1-1(2,3)
EXTRACTION WELLS
LSHH-1-3-1-2 — LAHH-1-3-1-1
LSLL-1-3-1-2 — LALL-1-3-1-1
HS-1-3-1-2
LIC-1-3-1
LSHH-1-3-1
LSH-1-3-1
LSL-1-3-1
LSLL-1-3-1
EQ
T-1-3-1
LE/LT-1-3-1
HS-1-4-1-2(-2-2,-3-2)
LSH-1-3-1 pump on
LSL-1-3-1 pump off
KC-1-4-1(2,3) restart delay
LSHH-2-1-1(-2) off
LSLL-1-3-1 off
FIC-1-6-1(2)
KMnO4 feed
Polymer feed
FE/FT-1-6-1(2)
P-1-4-1(2,3)
HS-1-5-1
AE/AIT-1-8-1(-2)
HS-1-8-1-2(2-2)
Reaction
T-1-8-1(-2)
AIC-1-8-1(-2)
ASHH-1-8-1(-2) AAHH-1-8-1-2(-2-2)
ASH-1-8-1(-2)
ASL-1-8-1(-2) To Caustic Pump controls
ASLL-1-8-1(-2) AALL-1-8-1-2(-2-2)
HS-1-9-1-2(2-2)
HS-1-10-1-2(2-2)
Flash
Floc
Clarifier
T-1-10-1(2)
JCL-1-12-1(2)
T-1-9-1(2)
KC-1-11-1(2) interval timer
HS-1-11-1(2)
P-1-11-1(2)
P-1-12-1(2)
LIC-3-1-1
LSHH-3-1-1 LAHH-3-1-1
LSH-3-1-1
LSL-3-1-1
LSLL-3-1-1 LALL-3-1-1
Sludge
T-3-1-1
LE/LT-1-3-1
KC-1-12-1(2) interval timer
LSH-3-1-1 off
LSHH-3-1-1 off
HS-1-12-1(2)
AIC-2-2-1
ASHH-2-2-1 AAHH-2-2-1
ASH-2-2-1 To HCl Pump controls
ASL-2-2-1
ASLL-2-2-1 AALL-2-2-1
AA-2-2-1-2
AS Tower
AE/AIT-2-2-1
LSH-2-5-1
LSA-2-5-1
M-2-6-1
HS-2-6-1
16-LCP-2-1
LSHH-2-8-1-1(-2-1) LAHH-2-8-1-1(-2-1)
LSLL-2-8-1-1(-2-1) LALL-2-8-1-1(-2-1)
HS-2-9-1-2(-2-2,-3-2)
LSH-2-8-1(-2) on
LSL-2-8-1(-2) off
LSLL-2-8-1(-2) off
LSHH-2-11-1(-2) off
KC-2-9-1(-2,-3) delay
GACF
T-2-8-1(-2)
LIC-2-8-1(-2)
LSHH-2-8-1(-2)
LSH-2-8-1(-2)
LSL-2-8-1(-2)
LSLL-2-8-1(-2)
LE/LT-2-8-1(-2)
P-2-9-1(-2,-3)
HS-2-8-1
HS-2-3-1-2(-2-2,-3-2)
LSL-2-1-1(-2) off
LSLL-2-1-1(-2) off
LSHH-2-8-1off
KC-2-3-1(-2,-3) restart delay
P-2-3-1(-2,-3)
HS-2-1-1
LIC-2-1-1(-2)
LSHH-2-1-1(-2)
LSH-2-1-1(-2)
LSL-2-1-1(-2)
LSLL-2-1-1(-2)
LE/LT-2-1-1(-2)
LSHH-2-1-1-2(-2-2) LAHH-2-1-1-1(-2-1)
LSLL-2-1-1-2(-2-2) LALL-2-1-1-1(-2-1)
ASF
T-2-1-1(-2)
Sand Filters
M-1-14-1(2)
Chemical feeds
HS-1-4-1-2(-2-2,-3-2)
Influent pump on and Controls in Auto Mode
10-LCP-5-1
10-LCP-5-2
10-LCP-5-3
10-LCP-5-4
HS-5-1-1(-2)
HS-5-2-1(-2)
HS-5-3-1(-2)
HS-5-4-1(2,-3)
AIC-1-8-1(-2)
LSH-5-2-1
LSL-5-2-1
LAL-5-2-1
NaOH
P-5-2-1(-2)
T-5-2-1
FIC-1-6-1(-2)
LAHH-5-4-1(-2)
LSHH-5-4-1(2)
LSH-5-4-1(2)
LAL-5-4-1(-2)
LSL-5-4-1(2)
Poly
P-5-4-1(-2,-3)
T-5-4-1(2)
FIC-1-6-1(-2)
LSH-5-1-1
LSL-5-1-1
LAL-5-1-1
KMnO4
P-5-1-1(-2)
T-5-1-1
AIC-2-2-1
LSH-5-3-1
LSL-5-3-1
LAL-5-3-1
HCl
P-5-3-1(-2)
LSHH-2-11-1-2(-2-2) LAHH-2-11-1-2(-2-2)
LSLL-2-11-1-2(-2-2) LALL-2-11-1-2(-2-2)
CA
T-2-10-1(-2)
TWT
T-2-11-1(-2)
LE/LT-2-11-1(-2)
LIC-2-11-1(-2)
LSHH-2-11-1(-2)
LSH-2-11-1(-2)
LSL-2-11-1(-2)
LSLL-2-11-1(-2)
HS-2-12-1-2(-2-2)
HS-2-12-1-3(-2-3)
HS-2-13-1
LSLL-2-11-1(-2) off
LSH-2-11-1(-2) on
LSL-2-11-1(-2) off
KC-2-12-1(-2) delay
FE/FT-2-12-1
FIT-2-12-1
FE/FT-2-14-1(-2,-3,-4)
LSHH-2-15-1(-2,-3,-4)
LAHH-2-15-1(-2,-3,-4)
P-2-12-1(-2, -3)
IW-1(-2,-3,-4)
LAHH-3-4-1-2 — LSHH-3-4-1-1
LALL-3-4-1-2 — LSLL-3-4-1-1
LIC-3-4-1
LSHH-3-4-1
LSH-3-4-1
LSL-3-4-1
LSLL-3-4-1
LE/LT-3-4-1
RCY
T-3-4-1
T-3-7-1
LSHH-3-7-1 LAHH-3-7-1
LSH-3-7-1
LSL-3-7-1
P-3-7-1
HS-3-5-1-2(-2-2)
HS-3-6-1
LSHH-1-3-1 off
LSLL-3-4-1 off
LSH-3-4-1 P1 on
LSHH-3-4-1 P2 on
LSL-3-4-1 P2 off
LSLL-3-4-1 P1 off
KC-3-5-1(-2) delay
P-3-5-1(-2)
HS-3-6-1
Alrm LSHH-3-7-1
On LSH-3-7-1
Off LSL-3-7-1
Off LSHH-3-4-1
HS-3-7-1-2
HS-3-7-1-1
PID LEGEND
INSTRUMENTS
Misc. Element
Propeller Flow meter
Generic Flow meter
Gage
Misc. Transducer/meter
MISC. FITTINGS
Piping Expansion/reduction
Flanges
Flex Connector
Pipe union
Wye Strainer
PUMPS
Positive Displacement Pump
Centrifugal Pump
Switch On or Off
Switch Delay
Switch Interlock
VALVES
Ball Valve
Butterfly Valves
Pressure Relief Valve
Plug Valves
Check Valve - Ball
Check Valve - Swing
Check Valve - Spring
Gate Valve
Globe Valve
Solenoid Valve
Actuator
Pressure Regulator
MISCELLANEOUS
Mixer
Motor
Extraction Well
Blower
PLC Connected to PLC
REVISIONS
NO. DATE DESCRIPTION
DML DESIGNED:
DML DRAWN:
AGF REVIEWED:
TRB APPROVED:
NOT TO SCALE SCALE:
4/25/2012 ISSUE DATE:
NEW9625.OM PROJECT NO:
EXISTING SYSTEM PID
CLAREMONT POLYCHEMICAL CORP
505 WINDING ROAD
OLD BETHPAGE, NEW YORK
P.E. SEAL
SUB LOGO
P.E. SEAL
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Ph:(860)674-9570 Fax:(860)674-9624
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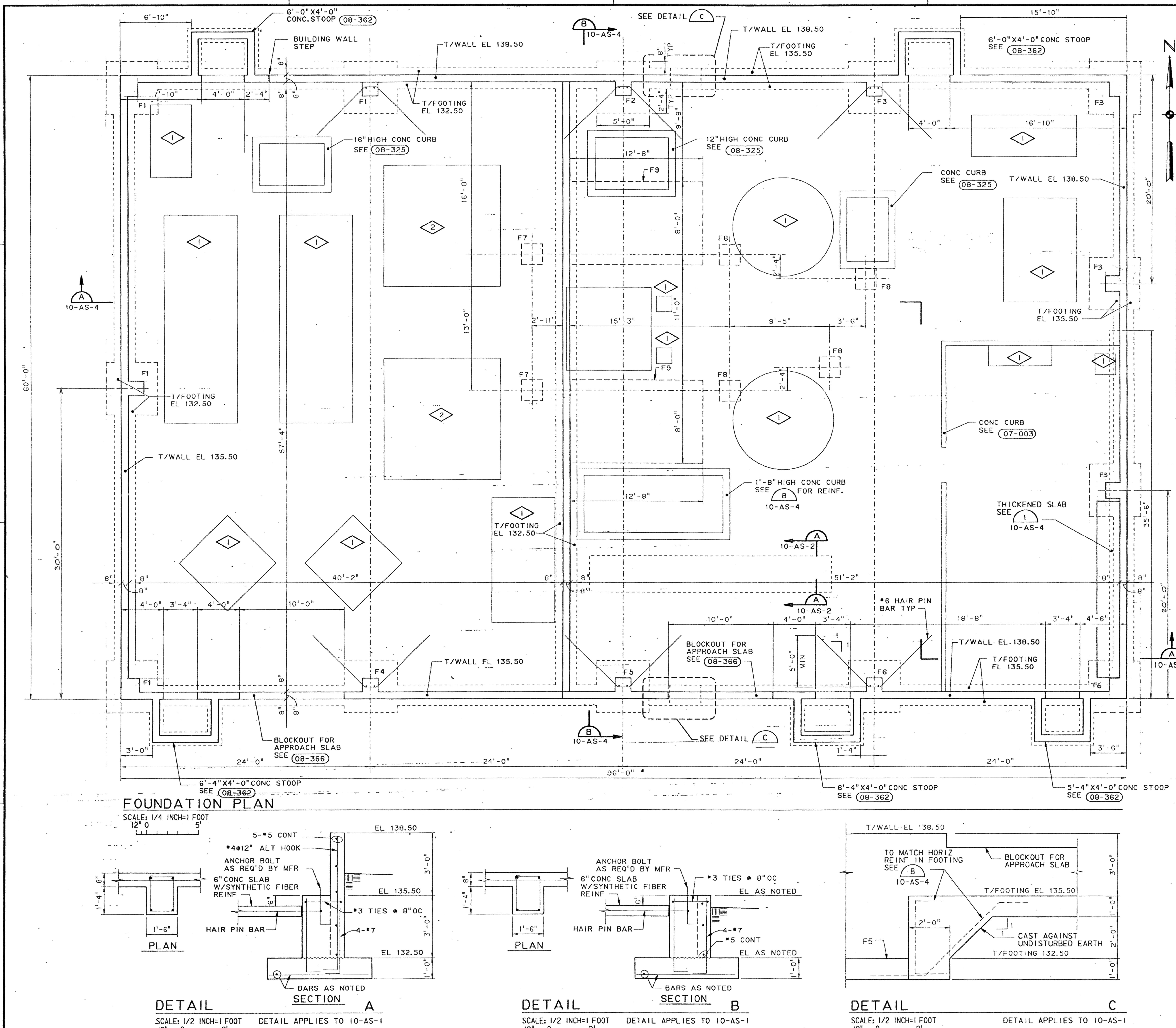
Fig. 9
J:\N\NEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\CAD\Figure 2 Existing PID.dwg, 24036 CIVIL, 6/4/2012 1:21:06 PM, DWG To PDF.pc3



GENERAL NOTES

1. FOUNDATION SHOWN FOR METAL BUILDINGS SYSTEMS ARE MINIMUM FOUNDATIONS FOR POSTED LOADS AND MAY NEED TO BE INCREASED BASED ON THE ACTUAL LOADS OF THE METAL BUILDING SYSTEM BEING USED. IF METAL BUILDING FOUNDATION LOADS EXCEED POSTED LOADS CONTRACTOR SHALL DESIGN FOUNDATION FOR ACTUAL LOADS.
2. VERIFY DIMENSIONS WITH BUILDING MANUFACTURER AND WITH EQUIPMENT SUPPLIED.
3. FOR WALL REINF SEE DWG NO. 10-AS-4.
4. ALL FOOTINGS SHALL BE A MIN OF 12" THICK.
5. FOR CONCRETE CURB LOCATIONS AND FLOOR DRAIN LOCATIONS SEE DWG NO. 10-AS-2.

FOOTING SCHEDULE				DESIGN LOADS IN KIPS				REF NOTE
				GRAVITY		WIND/ SIESMIC		
MARK	SIZE LXWXD	T/FTG ELEV	BOTTOM REINF	V	H	V	H	
F1	5'-0"X5'-0"X1'-0"	132.50	4-*5EW	36	12	5	7	3
F2	5'-0"X5'-0"X1'-0"	132.50	4-*5EW	36	12	5	7	2
F3	5'-0"X5'-0"X1'-0"	135.50	4-*5EW	36	12	5	7	2
F4	5'-0"X5'-0"X1'-0"	132.50	4-*5EW	36	12	5	7	2
F5	5'-0"X5'-0"X1'-0"	132.50	4-*5EW	36	12	5	7	2
F6	5'-0"X5'-0"X1'-0"	135.50	4-*5EW	36	12	5	7	2
F7	2'-0"X2'-0"X1'-0"	135.00	1	N/A	N/A	N/A	N/A	1
F8	2'-0"X2'-0"X1'-0"	138.00	1	N/A	N/A	N/A	N/A	1
F9	12'-8"X8'-0"X1'-0"	138.00	*5@12EW					4

REFERENCE NOTES

1. SEE 08-503
2. SEE DETAIL B 10-AS-1
3. SEE DETAIL A 10-AS-1
4. FOUNDATION FOR CLARIFIER MAX WT=39,800 LB SEE SECTION B 10-AS-4 FOR REINFORCEMENT.

PLAN NOTES

1. CONCRETE EQUIPMENT PAD COORDINATE LOCATION AND SIZE WITH EQUIPMENT SUPPLIED SEE 08-340 OR 08-342.
2. CONC EQUIP PAD FOR FILTER MIN HEIGHT 12" COORD SIZE AND LOCATION W/EQUIP SUPPLIED. SEE 08-342 SIM.
3. MIN HEIGHT OF EQUIP PAD 8" FOR SLUDGE STORAGE TANK. SEE 08-342

AS BUILT NOTES:
1. EQUIPMENT PAD SIZES AND LOCATIONS HAVE CHANGED.
2. CONCRETE REINFORCEMENT HAS CHANGED.
3. FOR REBAR, SEE DRAWING R-1B, DATED 11/6/96
R-1A, DATED 11/6/96
R-1, DATED 11/6/96
R-2, DATED 11/6/96
4. FOR PAD DIMENSIONS, SEE RADIAN INTERNATIONAL LLC DRAWING C-1 REV.0 DATED 08/21/97

REVISIONS
NO. | DATE | DESCRIPTION

DML DESIGNED: | 1" = 5' SCALE:
DML DRAWN: | 3/20/2012 ISSUE DATE:
AGF REVIEWED: | NEW9625.OM PROJECT NO:
TRB APPROVED:

EXISTING PLANT LAYOUT

CLAREMONT POLYCHEMICAL CORP
505 WINDING ROAD
OLD BETHPAGE, NEW YORK

P.E. SEAL

SUB LOGO

P.E. SEAL

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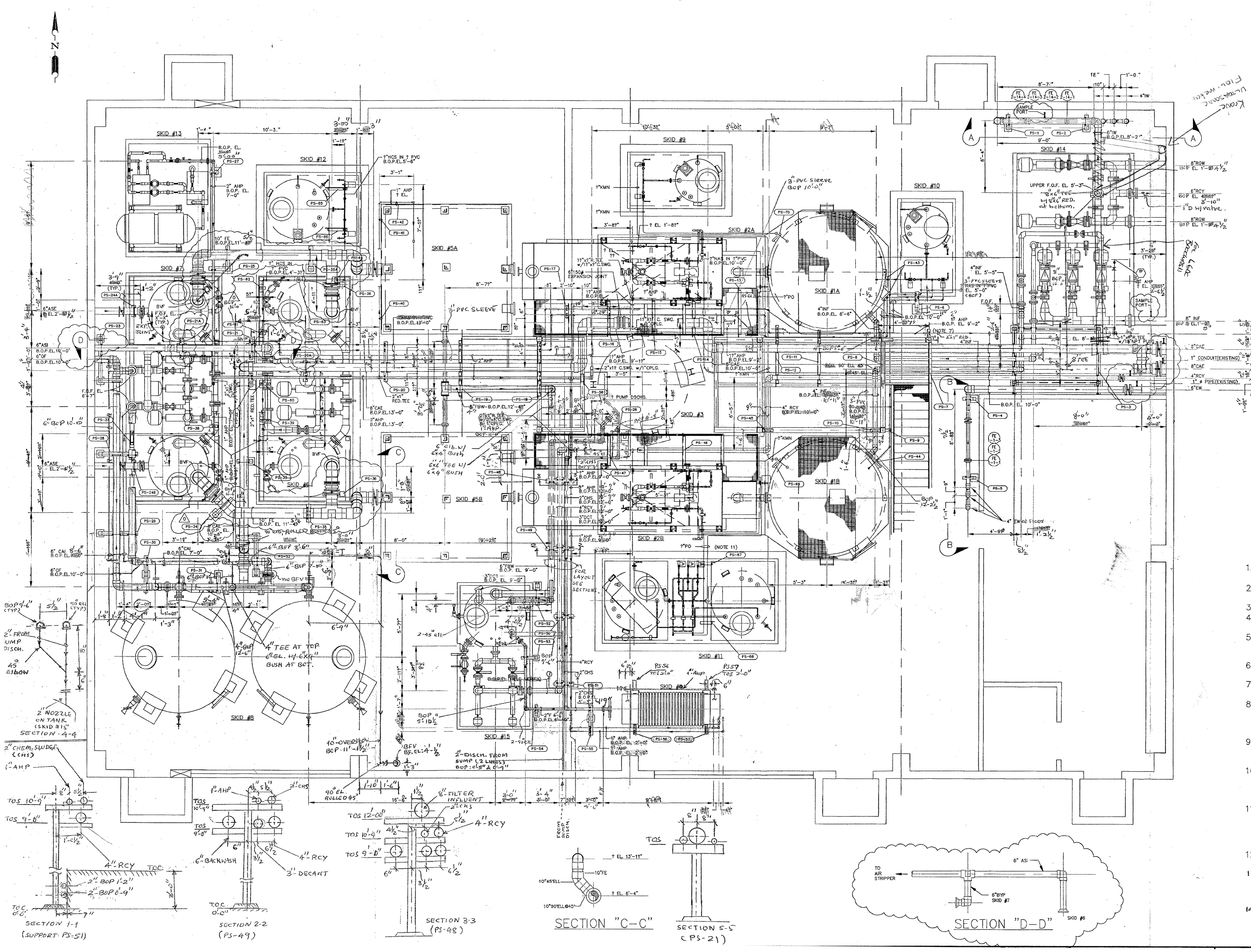
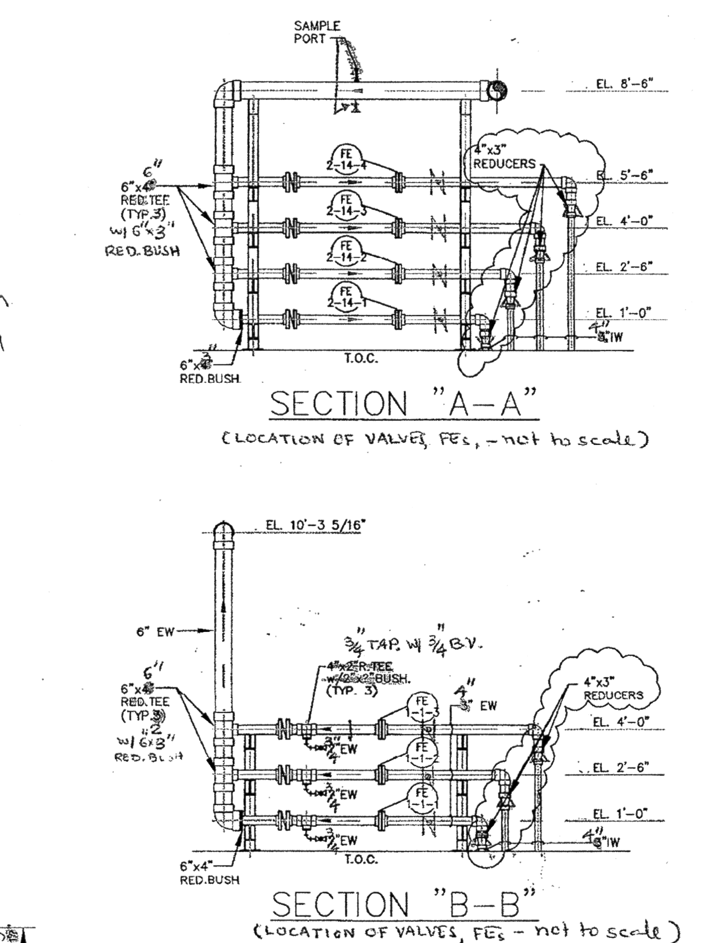
SHEET NO.
Fig 10

J:\NYNEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\CAD\BUILDING PLAN.DWG, FIG 10_EXISTING PLANT LAYOUT_24X36, 6/4/2012 1:27:05 PM, DWG To PDF.pc3





SKID IDENTIFICATION

(CSK)SKID #1A – REACTION TANK No. 1
(CSK)SKID #1B – REACTION TANK No. 2
(CSK)SKID #2A – CLARIFIER PACKAGE No. 1
(CSK)SKID #2B – CLARIFIER PACKAGE No. 2
(CSK)SKID #3 – SLUDGE STORAGE
(CSK)SKID #4 – FILTER PRESS EQUIPMENT
(CSK)SKID #5A – FILTER PACKAGE No. 1
(CSK)SKID #5B – FILTER PACKAGE No. 2
(CSK)SKID #6 – AIR STRIPPER FEED PUMPS
(CSK)SKID #7 – CARBON ABSORBER FEED PACKAGE
(CSK)SKID #8 – LIQUID PHASE CARBON ABSORBER SYSTEM
(CSK)SKID #9 – POSTASSIUM PERMANGANATE FEED SYSTEM
(CSK)SKID #10 – SODIUM HYDROXIDE FEED SYSTEM
(CSK)SKID #11 – POLYMER FEED SYSTEM
(CSK)SKID #12 – HYDROCHLORIC ACID FEED SYSTEM
(CSK)SKID #13 – AIR COMPRESSOR PACKAGE
(CSK)SKID #14 – INFLUENT & INJECTION PUMPING SYSTEM
(CSK)SKID #15 – RECYCLE PUMPING SYSTEM

NOTES

1. PIPE SIZES ARE IDENTIFIED ON THE DRAWING AND FITTING SIZES ARE LINE UNLESS NOTED OTHERWISE.
2. ALL PVC PIPING WILL BE SCHEDULE 80 UNLESS NOTED OTHERWISE.
3. ALL PVC PIPE FITTINGS WILL BE SOCKET TYPE.
4. THERE WILL BE NO INSULATED PIPING INSIDE OF BUILDING.
5. AHP (AIR) PIPE AND FITTINGS ARE THREADED GALVANIZED STEEL. ASTM A53 SCH. 80 PIPE / 6000# FITTINGS SHALL COMPLY WITH ANSI B16.
6. AS PIPING WILL BE FABRICATED ON SITE, DIMENSIONS SHOULD REGARDED AS APPROXIMATE.
7. DROP PIPE w/1" BALL VALVE TO 4'–0" ELEV. FOR CONDENSATE DRAIN OR UTILITY USE.
8. U–BOLTS (ELECTROPLATED STEEL TYPE 24 OF MSS SP–69), MATCHING PIPE SIZES, w/(4) HEAVY HEX NUTS EACH FOR EACH SUPPORT UNLESS OTHERWISE NOTED.
9. PIPE AND PIPE SUPPORT ELEVATIONS ARE RELATIVE TO THE FLOOR ELEVATIONS OVER WHICH THEY ARE LOCATED.
10. WHEN INSTALLING U–BOLTS ON PIPE SUPPORTS, DOUBLE NUT EACH ONE SO AS NOT TO PUT PRESSURE ON THE PIPE, ALLOWING MOVEMENT, UNLESS NOTED OTHERWISE.
11. WHERE NECESSARY FOR SUPPORT PURPOSES OF PO & KMN LINES RUN TUBING INSIDE OF PVC AS DONE WITH THE HCS. SET ELEV. BY FIELD ROUTING, MAINTAINING HEAD CLEARANCE WHEN CROSSING OVER PATHS.
12. ALL EQUIPMENT AND VALVE CONNECTIONS ARE FLANGED UNLESS OTHERWISE NOTED.
13. THE AIR LINES (AHP) TO THE RESPECTIVE EQUIPMENT SKID/ ITSTRUMENTS SHOWN ARE INDICATIVE ONLY AND ARE ROUTED FROM THE 2"/1" AHP HEADER ON THE RACK AS REQUIRED
14. ALL CHEMICAL FEED SYSTEMS DISCHARGING TO THE RESPECTIVE EQUIPMENT ARE FLEXIBLE PE PIPES (1/2" OR 3/8" OD) AND RUNNING THROUGH PVC SLEEVE. SEE DRAWING 10-M-3, SHEET 36 OF 62 FOR SCHEMATIC.

REVISIONS		
NO.	DATE	DESCRIPTION

DESIGNED:	DML
DRAWN:	DML
REVIEWED:	AGF
APPROVED:	TRB
SCALE:	1" = 5'
ISSUE DATE:	4/25/2012
PROJECT NO:	NEW9625.OM

EXISTING PIPING LAYOUT

CLAREMONT POLYCHEMICAL CORP
505 WINDING ROAD
OLD BETHPAGE, NEW YORK

P.E. SEAL

SUB LOGO

P.E. SEAL

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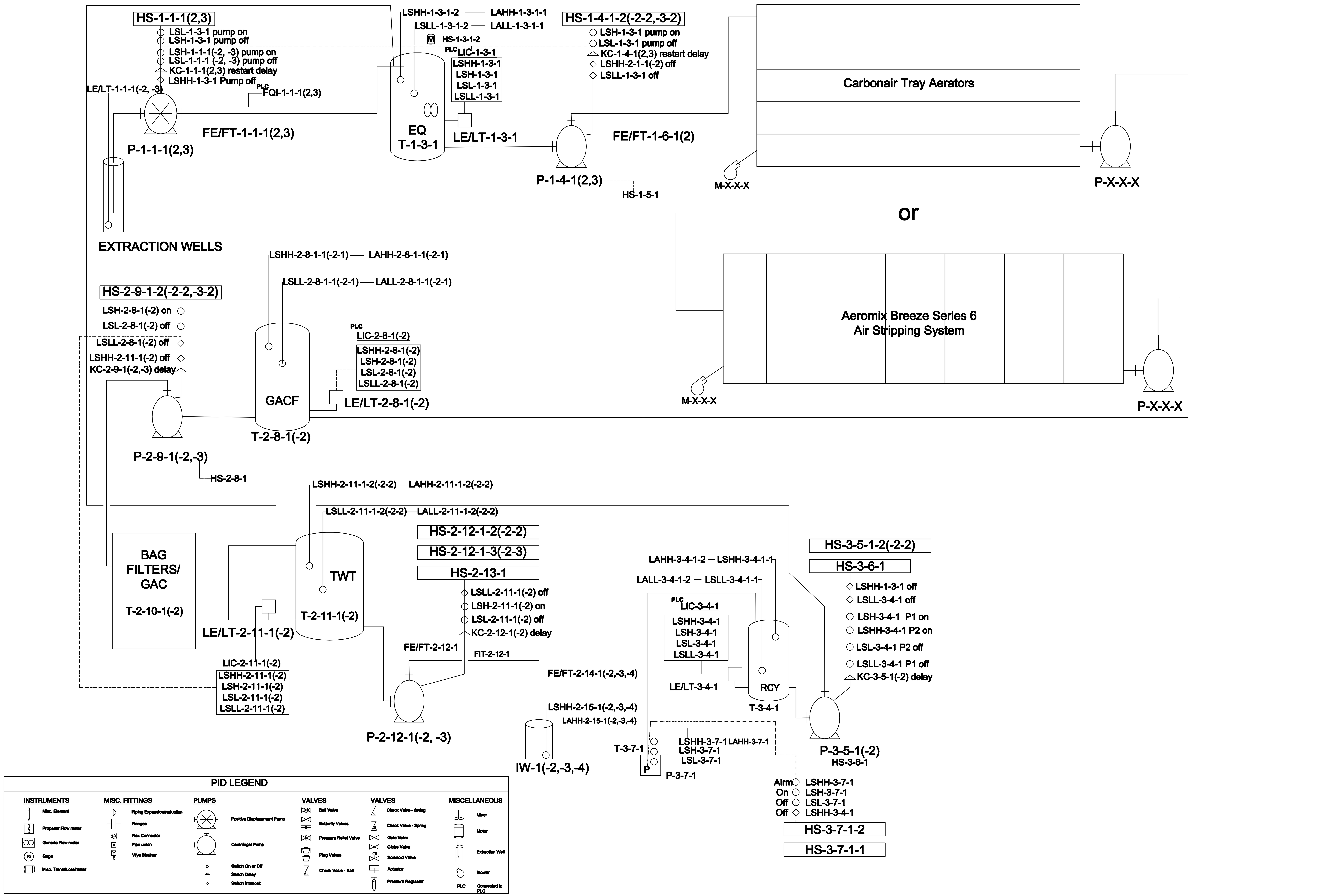
SHEET NO.

Fig. 11

J:\NYNEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\CAD\BUILDING PLAN.DWG, FIG 11 EXISTING PIPING LAYOUT_24X36, 6/4/2012 1:28:10 PM, DWG To PDF.pc3



REVISIONS

NO.	DATE	DESCRIPTION

NOT TO SCALE — SCALE:
4/25/2012 — ISSUE DATE:
NEW9625.OM — PROJECT NO.:
DML — DESIGNED:
DML — DRAWN:
AGF — REVIEWED:
TRB — APPROVED:

PROPOSED SYSTEM PID

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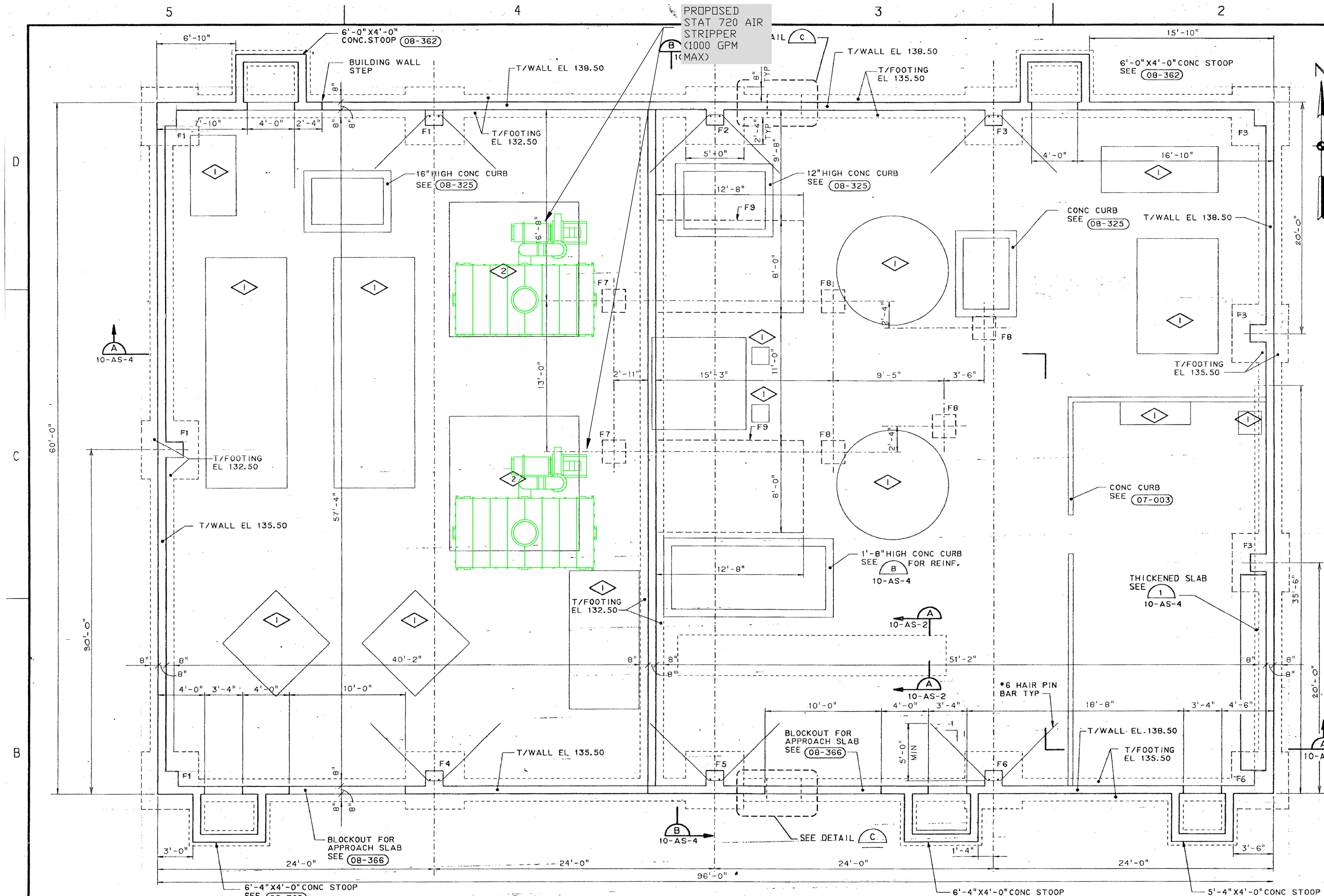
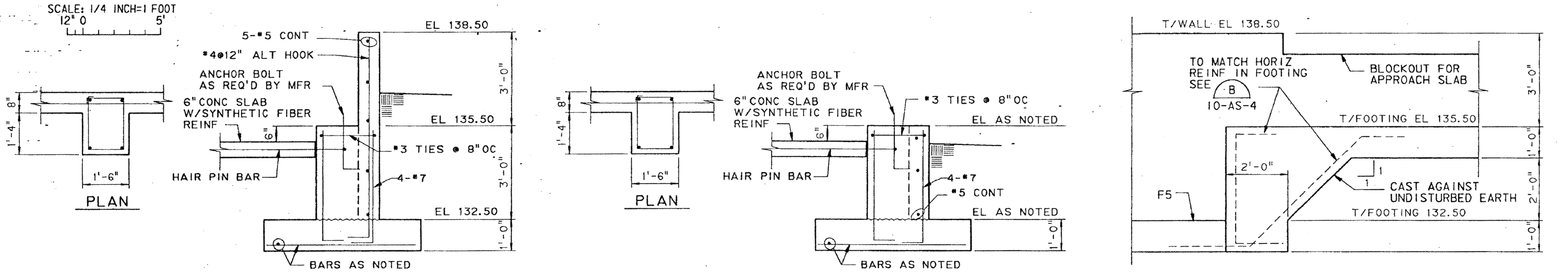
SHEET NO.
Fig. 12

J:\N\NEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\CAD\Figure 5_Proposed System PID.dwg, 24036 CIVIL, 6/4/2012 1:22:51 PM, DWG To PDF.pc3



FOUNDATION PLAN
SCALE: 1/4 INCH=1 FOOT



DETAIL A
SECTION
SCALE: 1/2 INCH=1 FOOT
DETAIL APPLIES TO 10-AS-1

DETAIL B
SECTION
SCALE: 1/2 INCH=1 FOOT
DETAIL APPLIES TO 10-AS-1

DETAIL C
SCALE: 1/2 INCH=1 FOOT
DETAIL APPLIES TO 10-AS-1

GENERAL NOTES

1. FOUNDATION SHOWN FOR METAL BUILDINGS SYSTEMS ARE MINIMUM FOUNDATIONS FOR POSTED LOADS AND MAY NEED TO BE INCREASED BASED ON THE ACTUAL LOADS OF THE METAL BUILDING SYSTEM BEING USED. IF METAL BUILDING FOUNDATION LOADS EXCEED POSTED LOADS CONTRACTOR SHALL DESIGN FOUNDATION FOR ACTUAL LOADS.
2. VERIFY DIMENSIONS WITH BUILDING MANUFACTURER AND WITH EQUIPMENT SUPPLIED.
3. FOR WALL REINF SEE DWG NO. 10-AS-4.
4. ALL FOOTINGS SHALL BE A MIN OF 12" THICK.
5. FOR CONCRETE CURB LOCATIONS AND FLOOR DRAIN LOCATIONS SEE DWG NO. 10-AS-2.

FOOTING SCHEDULE				DESIGN LOADS IN KIPS				REF NOTE
				GRAVITY		WIND/ SIESMIC		
MARK	SIZE LXWXD	T/FTG ELEV	BOTTOM REINF	V	H	V	H	
F1	5'-0"X5'-0"X1'-0"	132.50	4-#5EW	36	12	5	7	3
F2	5'-0"X5'-0"X1'-0"	132.50	4-#5EW	36	12	5	7	2
F3	5'-0"X5'-0"X1'-0"	135.50	4-#5EW	36	12	5	7	2
F4	5'-0"X5'-0"X1'-0"	132.50	4-#5EW	36	12	5	7	2
F5	5'-0"X5'-0"X1'-0"	132.50	4-#5EW	36	12	5	7	2
F6	5'-0"X5'-0"X1'-0"	135.50	4-#5EW	36	12	5	7	2
F7	2'-0"X2'-0"X1'-0"	135.00	1	N/A	N/A	N/A	N/A	1
F8	2'-0"X2'-0"X1'-0"	138.00	1	N/A	N/A	N/A	N/A	1
F9	12'-8"X8'-0"X1'-0"	138.00	#5@12EW					4

REFERENCE NOTES

1. SEE 08-503
2. SEE DETAIL B 10-AS-1
3. SEE DETAIL A 10-AS-1
4. FOUNDATION FOR CLARIFIER MAX WT=39,800 LB SEE SECTION B 10-AS-4 FOR REINFORCEMENT.

PLAN NOTES 1

1. CONCRETE EQUIPMENT PAD COORDINATE LOCATION AND SIZE WITH EQUIPMENT SUPPLIED SEE 08-340 OR 08-342.
2. CONC EQUIP PAD FOR FILTER MIN HEIGHT 12" COORD SIZE AND LOCATION W/EQUIP SUPPLIED. SEE 08-342 SIM.
3. MIN HEIGHT OF EQUIP PAD 8" FOR SLUDGE STORAGE TANK. SEE 08-342

AS BUILT NOTES:

1. EQUIPMENT PAD SIZES AND LOCATIONS HAVE CHANGED.
2. CONCRETE REINFORCEMENT HAS CHANGED.
3. FOR REBAR, SEE DRAWING R-1B, DATED 11/6/96
   R-1A, DATED 11/6/96
   R-1, DATED 11/6/96
   R-2, DATED 11/6/96
4. FOR PAD DIMENSIONS, SEE RADIAN INTERNATIONAL LLC DRAWING C-1 REV.0 DATED 08/21/97

REVISIONS
NO. | DATE | DESCRIPTION

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DRAWN: DML
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SCALE: 1" = 5'
ISSUE DATE: 3/20/2012
PROJECT NO: NEW9625.OM

PROPOSED PLANT LAYOUT

CLAREMONT POLYCHEMICAL CORP
505 WINDING ROAD
OLD BETHPAGE, NEW YORK

P.E. SEAL

SUB LOGO

P.E. SEAL

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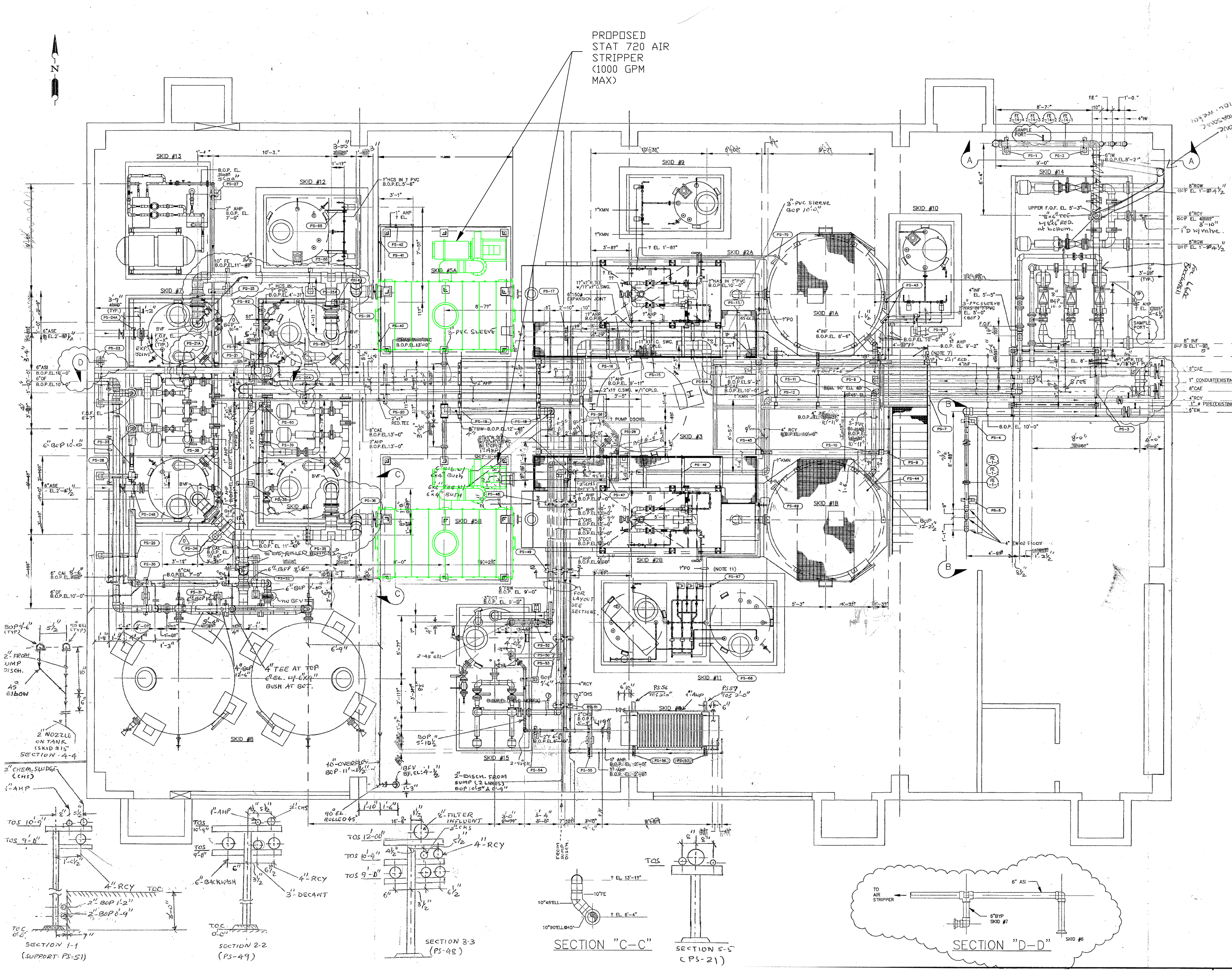
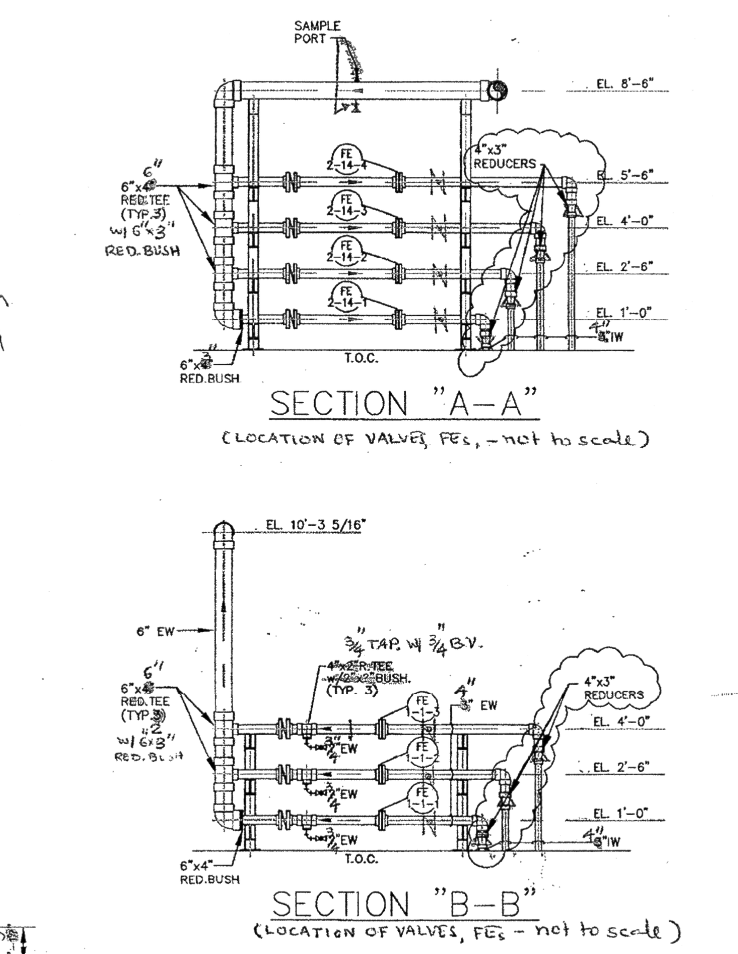
SHEET NO.
Fig 13

J:\N\NEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\CAD\PROPOSED BUILDING PLAN.DWG, FIG 13 PROPOSED PLANT LAYOUT_24X36, 6/4/2012 1:31:21 PM, DWG To PDF.pc3





SKID IDENTIFICATION

(CSK)SKID #1A – REACTION TANK No. 1
(CSK)SKID #1B – REACTION TANK No. 2
(CSK)SKID #2A – CLARIFIER PACKAGE No. 1
(CSK)SKID #2B – CLARIFIER PACKAGE No. 2
(CSK)SKID #3 – SLUDGE STORAGE
(CSK)SKID #4 – FILTER PRESS EQUIPMENT
(CSK)SKID #5A – FILTER PACKAGE No. 1
(CSK)SKID #5B – FILTER PACKAGE No. 2
(CSK)SKID #6 – AIR STRIPPER FEED PUMPS
(CSK)SKID #7 – CARBON ABSORBER FEED PACKAGE
(CSK)SKID #8 – LIQUID PHASE CARBON ABSORBER SYSTEM
(CSK)SKID #9 – POSTASSIUM PERMANGANATE FEED SYSTEM
(CSK)SKID #10 – SODIUM HYDROXIDE FEED SYSTEM
(CSK)SKID #11 – POLYMER FEED SYSTEM
(CSK)SKID #12 – HYDROCHLORIC ACID FEED SYSTEM
(CSK)SKID #13 – AIR COMPRESSOR PACKAGE
(CSK)SKID #14 – INFLUENT & INJECTION PUMPING SYSTEM
(CSK)SKID #15 – RECYCLE PUMPING SYSTEM

NOTES

1. PIPE SIZES ARE IDENTIFIED ON THE DRAWING AND FITTING SIZES ARE LINE UNLESS NOTED OTHERWISE.
2. ALL PVC PIPING WILL BE SCHEDULE 80 UNLESS NOTED OTHERWISE.
3. ALL PVC PIPE FITTINGS WILL BE SOCKET TYPE.
4. THERE WILL BE NO INSULATED PIPING INSIDE OF BUILDING.
5. AHP (AIR) PIPE AND FITTINGS ARE THREADED GALVANIZED STEEL. ASTM A53 SCH. 80 PIPE / 6000# FITTINGS SHALL COMPLY WITH ANSI B16.
6. AS PIPING WILL BE FABRICATED ON SITE, DIMENSIONS SHOULD REGARDED AS APPROXIMATE.
7. DROP PIPE w/1" BALL VALVE TO 4'–0" ELEV. FOR CONDENSATE DRAIN OR UTILITY USE.
8. U–BOLTS (ELECTROPLATED STEEL TYPE 24 OF MSS SP–69), MATCHING PIPE SIZES, w/(4) HEAVY HEX NUTS EACH FOR EACH SUPPORT UNLESS OTHERWISE NOTED.
9. PIPE AND PIPE SUPPORT ELEVATIONS ARE RELATIVE TO THE FLOOR ELEVATIONS OVER WHICH THEY ARE LOCATED.
10. WHEN INSTALLING U–BOLTS ON PIPE SUPPORTS, DOUBLE NUT EACH ONE SO AS NOT TO PUT PRESSURE ON THE PIPE, ALLOWING MOVEMENT, UNLESS NOTED OTHERWISE.
11. WHERE NECESSARY FOR SUPPORT PURPOSES OF PO & KMN LINES RUN TUBING INSIDE OF PVC AS DONE WITH THE HCS. SET ELEV. BY FIELD ROUTING, MAINTAINING HEAD CLEARANCE WHEN CROSSING OVER PATHS.
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REVISIONS		
NO.	DATE	DESCRIPTION

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DRAWN:	DML	ISSUE DATE:	4/25/2012
REVIEWED:	AGF	PROJECT NO:	NEW9625.OM
APPROVED:	TRB		

PROPOSED PIPING LAYOUT

CLAREMONT POLYCHEMICAL CORP
505 WINDING ROAD
OLD BETHPAGE, NEW YORK

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Fig. 14

J:\N\NEW\EN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\CAD\PROPOSED BUILDING PLAN.DWG, FIG 14 PROPOSED PIPING PLAN_24X36, 6/4/2012 1:30:24 PM, DWG To PDF.pc3

AREAS OF CONCERN
AOC-1 – SPILL AREA (EAST OF BUILDING)
AOC-2 – ABOVEGROUND STORAGE TANKS
AOC-3A – FLOOR DRAINS
AOC-3B – WASTEWATER TREATMENT BASINS
AOC-3C – WASTEWATER TREATMENT LEACHING BASINS
AOC-4 – DRYWELLS
AOC-5 – DIFFUSION WELLS
AOC-6 – UNDERGROUND STORAGE TANK FARM
AOC-7 – UNDERGROUND STORAGE TANK–FUEL OIL
AOC-8 – DEMOLITION/CONSTRUCTION DEBRIS AREA
AOC-9 – INTERIOR SUMP
AOC-10A – SEPTIC TANKS
AOC-10B – SEPTIC LEACHING POOLS
AOC-11 – CONDENSERS
LEGEND
–SOIL BORING
–MONITORING WELL
–GROUNDWATER EXTRACTION WELL
–SHALLOW SOIL SAMPLE
–SOIL VAPOR EXTRACTION WELL
–APPROXIMATE TEST PIT LOCATION
–PROPOSED MONITORING WELL(S)
REPUTED TO BE LAND N/F OF THE
NEW YORK STATE AGRICULTURAL SCHOOL
WINDING ROAD
PROPERTY BOUNDARY LINE (TYP.)
CHAIN LINK FENCE (TYP.)
HAZARDOUS (CADMIUM) MATERIAL
DEBRIS PILE
DRY WELLS
DEBRIS
TANKS
LUNCH ROOM
COLOR LAB
WASH AND LOCKER ROOM
SHIPPING OFFICES
SHIPPING
STABILIZER
SHIPPING WAREHOUSE
DRAIN
TRANSFORMER ON CONCRETE PAD
DUROGOLD ROOM
CONT. LAB.
PROD. OFFICE
MIX ROOM
CONCRETE
DIRT
INK ROOM
CHIP PIGMENT
SUPPLY WELL
WASTEWATER TREATMENT BASINS
1" PVC TO DIFFUSION WELL
DIFFUSION WELL
RECEIVING
RECEIVING STORES
LEACHING BASINS
SOLVENT TANK FARM (14–16 USTs)
ASPHALT
GRAVEL
BROKEN ASPHALT
ASPHALT DRIVEWAY
CHAIN LINK FENCE (TYP.)
TRENCH DRAIN
DEBRIS/ DRUMS
SPILL AREA
BLUE POWDER MOUND
1–STORY METAL BUILDING
WELL
70',110',170' WELL CLUSTER
70' AND 110' WELL CLUSTER
BETHPAGE STATE PARK
N
1" = 40'
40 0 20 40 80
APPROXIMATE SCALE IN FEET
SITE PLAN & PROPOSED MONITORING WELL LOCATIONS
CLAREMONT POLYCHEMICAL CORPORATION
OLD BETHPAGE, NEW YORK
REVISIONS
NO. DATE DESCRIPTION
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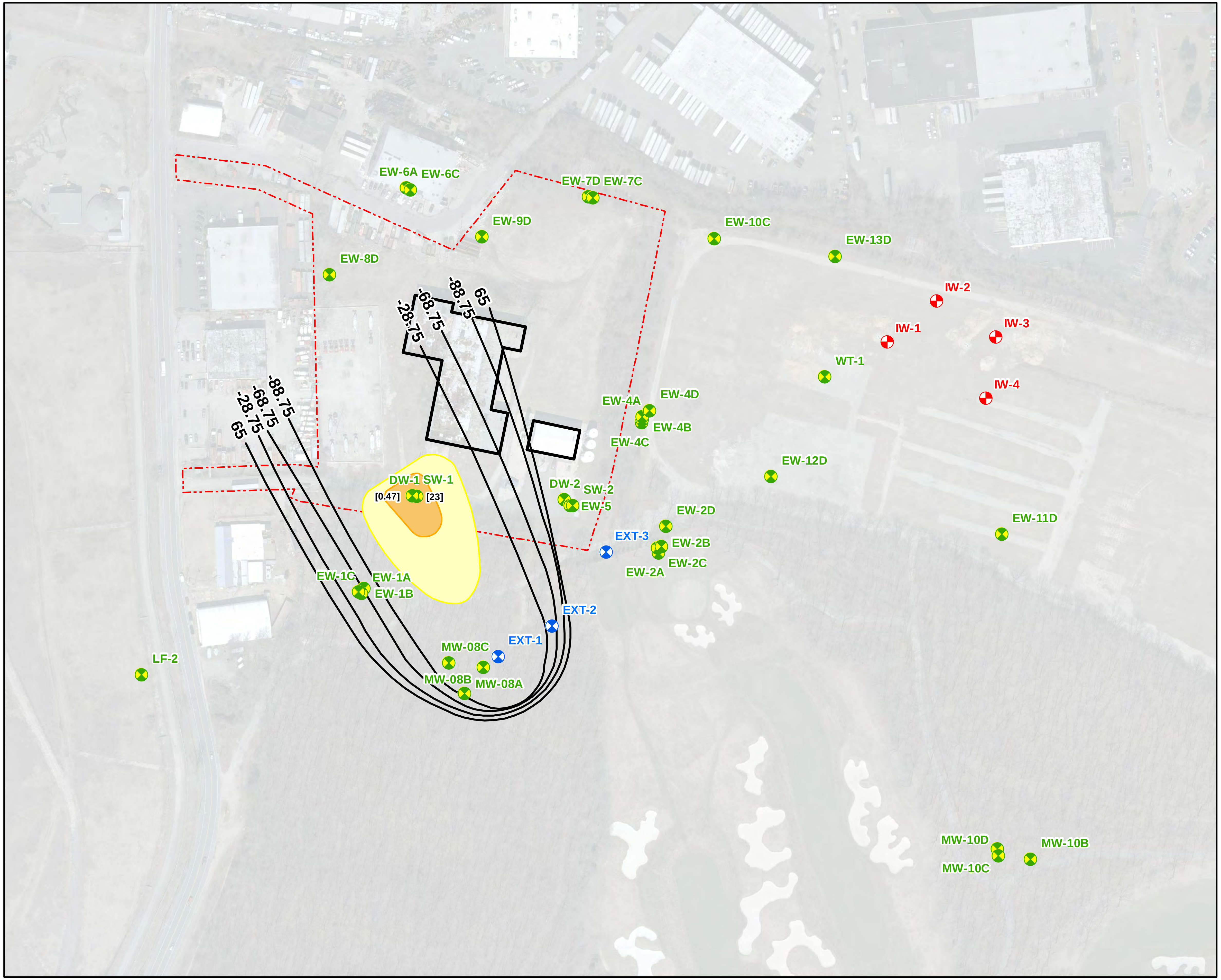
JDM APPROVED
1" = 40'± SCALE
BOB DRAWN
4/30/12 DATE
JDM CHECKED
NEW9625.OM PROJECT NO.
FIG. 15 SHEET NO.
MAP REFERENCE:
DRAWING PREPARED BY AK ASSOCIATES, 143 NORTH LONG BEACH RD., ROCKVILLE CENTER, NY;
TITLE: NA; SCALE 1" = 40'; REVISED MAY 26, 2004; SURVEYED ON MARCH 26, 2004



200 100 0 200

Feet

1 inch = 200 feet

Legend

- Oyster Bay Extraction Well
- Extraction Well
- Injection Well
- Monitoring Well
- Extraction Well Capture Zone at labelled elevation
- PCE Concentration 5 ug/l - 10 ug/l
- PCE Concentration 10 ug/l - 100 ug/l
- Claremont Property
- [23] April 2012 PCE Concentration in ug/l

N

Figure 16
Groundwater Capture Zone
(Only EXT-1 pumping 116 GPM)
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 200'

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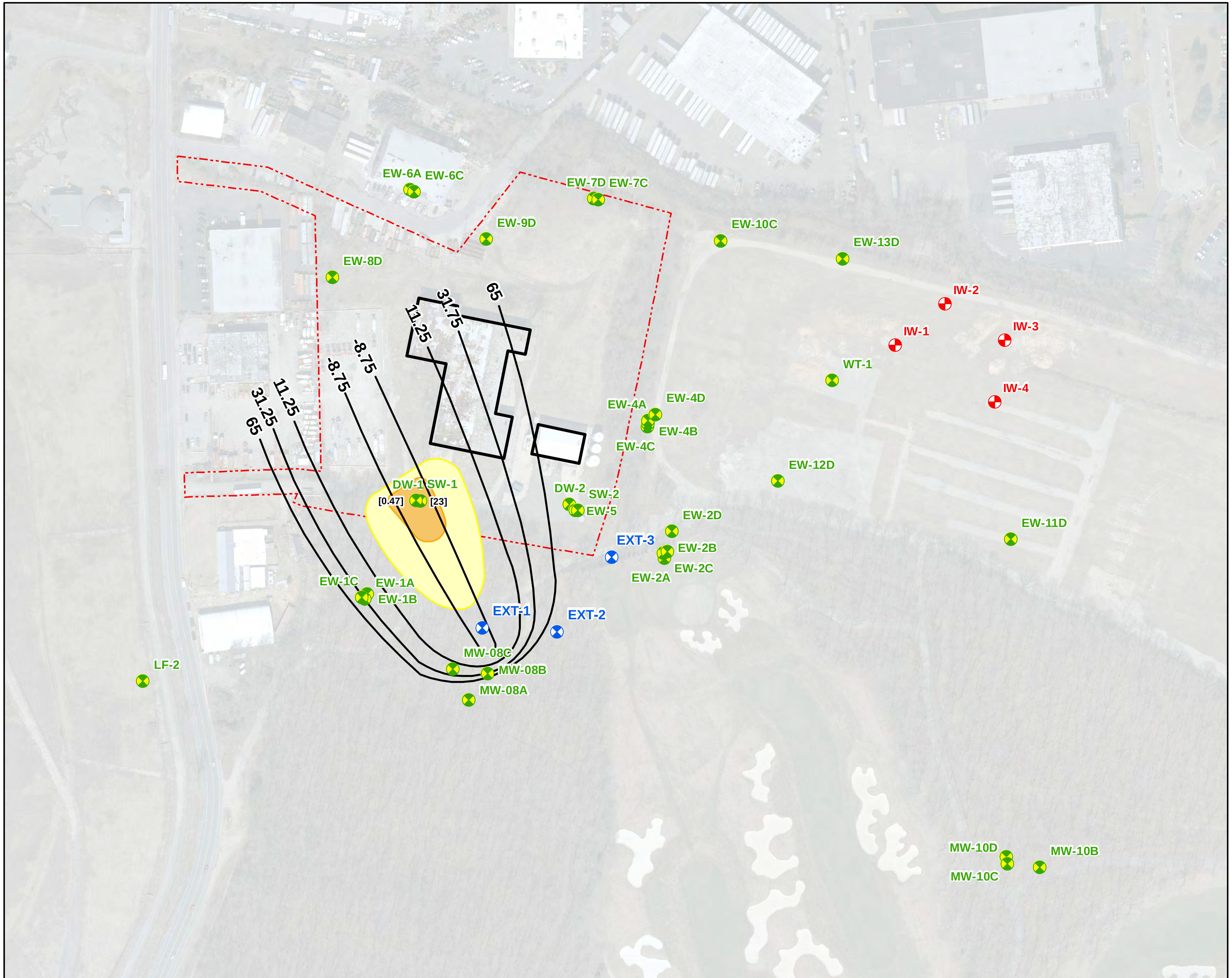
Path: J:\N\NEWEN - NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\CLAREMONT POLYCHEMICAL CORP, OLD BETHPAGE, NY\NEW9625OM\GIS\Groundwater Capture Zone with test run 44zc particle traces - landscape.mxd



1 inch = 200 feet

Legend

- Oyster Bay Extraction Well
- Extraction Well
- Injection Well
- Monitoring Well
- Extraction Well Capture Zone at labelled elevation
- PCE Concentration 5 ug/l - 10 ug/l
- PCE Concentration 10 ug/l - 100 ug/l
- Claremont Property
- [23] April 2012 PCE Concentration in ug/l

Figure 17
Groundwater Capture Zone
(New EXT-1 screened 20' below water table pumping 55 GPM)
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 200'

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TABLES

TABLE 1 Extraction Well Data vs. Groundwater/Drinking Water Standards August 2011						
Parameter	Units	EPA MCLs	NYSDEC TOGS 1.1.1 GA standard**	EXT-1	EXT-2	EXT-3
pH	SU		6.5-8.5***	4.61	4.39	4.21
Tetrachloroethylene	ug/L	5	5	2.1	6.8	6.7
Trichloroethylene	ug/L	5	5	4	17	100
1,2-(cis) Dichloroethylene	ug/L	70	5	1.2	2.2	3.8
1,2-(trans) Dichloroethylene	ug/L	100	5	ND <5.0	ND <5.0	ND <10
Methylene Chloride	ug/L	5*	5	ND <5.0	ND <5.0	1.9
1,1-Dichloroethylene	ug/L	7	5	0.87	1.2	4
1,1-Dichloroethane	ug/L	5*	5	ND <5.0	ND <5.0	ND <10
Chloroform	ug/L	7*	5	ND <5.0	ND <5.0	ND <10
1,1,1-Trichloroethane	ug/L	200	5	ND <5.0	ND <5.0	3.6
Benzene	ug/L	5	1	ND <5.0	ND <5.0	ND <10
Toluene	ug/L	1000	5	ND <5.0	ND <5.0	ND <10
Chlorobenzene	ug/L	100	5	ND <5.0	ND <5.0	ND <10
Ethylbenzene	ug/L	700	5	ND <5.0	ND <5.0	ND <10
Bis(2-ethylhexyl) phthalate	ug/L	5*	5	NA	NA	NA
Di-n-butyl phthalate	ug/L	50*	50	NA	NA	NA
Arsenic	ug/L	10	25	ND <15	ND <15	ND <15
Barium	ug/L	2000	1000	99.7	77.6	98.7
Lead	ug/L	15	25	ND <15	ND <15	ND <15
Selenium	ug/L	50	10	ND <38	ND <38	ND <38
Iron	ug/L	300*	300	342	151	153
Manganese	ug/L	300*	300	437	276	250
Nitrogen	ug/L	1,000	10,000***	NA	NA	NA
Total Dissolved Solids	*mg/L*		1,000***	NA	NA	NA
Antimony	ug/L	6	3	ND <15	ND <15	ND <15
Chromium, Hexavalent	ug/L	50*	50	NA	NA	NA

NOTES:
*EPA Maximum Contaminant Level (MCL) not established. Value is NYSDEC GA Standard.
** NYSDEC class GA criteria are from NYSDEC Technical and Operational Guidance Series (TOGS 1.1.1),
Ambient water quality, class GA standards/guidance values from Table 1.
*** NYSDEC Groundwater effluent limitations (Class GA), table 5 from NYSDEC TOGS 1.1.1
ND= Not detected, NA= Not Analyzed, EXT-1 = name of extraction well
ug/L = microgram per liter, mg/L = milligram per liter, GA=groundwater classification
342 = Shaded cells exceed either EPA MCL or NYSDEC GA standards

Table 2 CITECT – CONTROLS/DISPLAY			
Equipment	Equip Label	Control	Display
Extraction Well Pump 1	EW-1	Auto-Off switch	+Flow rate gpm
Extraction Well Pump 2	EW-2	Auto-Off switch	+Flow rate gpm
Extraction Well Pump 3	EW-3	Auto-Off switch	+Flow rate gpm
Equalization Tank	T-1-3-1	Tank level readout %	LIC-1-3-1, pump controls
Equalization Tank	T-1-3-1	Low-low level alarm	LIC-1-3-1 (LL)
Equalization Tank	T-1-3-1	High-High level alarm	LIC-1-3-1 (HH)
Influent Pump 1	P-1-4-1	Auto-Off switch	Pump speed Hz
Influent Pump 2	P-1-4-2	Auto-Off switch	Pump speed Hz
Influent Pump 3	P-1-4-3	Auto-Off switch	Pump speed Hz
Treatment Train 1 Flow	FT-1-6-1	Flow readout gpm	FCV-1-6-1 %-open
Treatment Train 2 Flow	FT-1-6-2	Flow readout gpm	FCV-1-6-2 %-open
Reaction Tank 1 pH	T-1-8-1	pH readout	AIC-1-8-1
Reaction Tank 2 pH	T-1-8-2	pH readout	AIC-1-8-2
ASF Tank 1	T-2-1-1	Tank level readout (in.)	LIC-2-1-1, pump controls
ASF Tank 1	T-2-1-1	High-high level alarm	LIC-2-1-1 (HH)
ASF Tank 1	T-2-1-1	Low-low level alarm	LIC-2-1-1 (LL)
ASF Tank 2	T-2-1-2	Tank level readout (in.)	LIC-2-1-2 , pump controls
ASF Tank 2	T-2-1-2	High-high level alarm	LIC-2-1-2 (HH)
ASF Tank 2	T-2-1-2	Low-low level alarm	LIC-2-1-2 (LL)
Air Stripper Feed Pump 1	P-2-3-1	Auto-Off switch	Pump speed Hz
Air Stripper Feed Pump 2	P-2-3-2	Auto-Off switch	Pump speed Hz
Air Stripper Feed Pump 3	P-2-3-3	Auto-Off switch	Pump speed Hz
AS Feed discharge pH		pH readout	AIC-2-2-1
Recycle Tank	T-3-4-1	Tank level readout (in.)	LIC-3-4-1, pump controls
Recycle Tank	T-3-4-1	High-high level alarm	LIC-3-4-1 (HH.)
Recycle Tank	T-3-4-1	Low-low level alarm	LIC-3-4-1 (LL)
RCY Pump 1	P-3-5-1	Auto-Off switch	
RCY Pump 2	P-3-5-2	Auto-Off switch	
GACF Tank 1	T-2-8-1	Tank level readout (in.)	LIC-2-8-1, pump controls
GACF Tank 1	T-2-8-1	High-high level alarm	LIC-2-8-1 (HH.)
GACF Tank 1	T-2-8-1	Low-low level alarm	LIC-2-8-1 (LL)
GACF Tank 2	T-2-8-2	Tank level readout (in.)	LIC-2-8-2 , pump controls
GACF Tank 2	T-2-8-2	High-high level alarm	LIC-2-8-2 (HH.)
GACF Tank 2	T-2-8-2	Low-low level alarm	LIC-2-8-2 (LL.)
GACF Pump 1	P-2-9-1	Auto-Off switch	Pump speed Hz
GACF Pump 2	P-2-9-2	Auto-Off switch	Pump speed Hz
GACF Pump 3	P-2-9-3	Auto-Off switch	Pump speed Hz
TW Tank 1	T-2-8-1	Tank level readout (%)	LIC-2-8-1, pump controls
TW Tank 1	T-2-11-1	High-high level alarm	LIC-2-11-1 (HH)
TW Tank 1	T-2-11-1	Low-low level alarm	LIC-2-11-1 (LL)
TW Tank 2	T-2-11-2	Tank level readout (%)	LIC-2-11-2, pump controls
TW Tank 2	T-2-11-2	High-high level alarm	LIC-2-11-2 (HH)
TW Tank 2	T-2-11-2	Low-low level alarm	LIC-2-11-2 (LL)
INJ Pump 1	P-2-12-1	Auto-Off switch	
INJ Pump 2	P-2-12-2	Auto-Off switch	
Plant discharge	P-2-12-1(2)	Flow readout (gpm)	FIT-2-15-1
Injection Well 1	IW-1	Well Level readout (ft AMSL)	LE/LT-2-15-1
Injection Well 1	IW-1	High level alarm	LE/LT-2-15-1 (HH)
Injection Well 2	IW-2	Well Level readout (ft AMSL)	LE/LT-2-15-2
Injection Well 2	IW-2	High level alarm	LE/LT-2-15-2 (HH)
Injection Well 3	IW-3	Well Level readout (ft AMSL)	LE/LT-2-15-3

Table 2 CITECT – CONTROLS/DISPLAY			
Equipment	Equip Label	Control	Display
Injection Well 3	IW-3	High level alarm	LE/LT-2-15-3 (HH)
Injection Well 4	IW-4	Well Level readout (ft AMSL)	LE/LT-2-15-4
Injection Well 4	IW-4	High level alarm	LE/LT-2-15-4 (HH)

Table 3

Remediation Alternatives Cost Benefit Analysis

	NO CHANGE IN CURRENT PUMP & TREAT SYSTEM	PUMP FROM EXT-1 ONLY	INSTALL NEW SHALLOWER EXTRACTION WELL OR GROUT BOTTOM OF EXT-1	MONITORED NATURAL ATTENUATION
Description	Continued operation of groundwater pump and treat system with no changes to flow rates or operations other than optimizing equipment and processes for treating groundwater.	Operation of EXT-1 at the current pumping rate (115-120 GPM) to capture the identified PCE plume along the western side of the Site.	Replacement of EXT-1 with shallow well (20 ft below water table) or grouting the bottom of 80 ft of EXT-1 and pumping at approximately 55 GPM to capture the identified PCE plume along the western side of the Site.	Discontinuing all operation of the groundwater pump and treat system and monitoring the natural degradation of chlorinated compounds in the groundwater.
Scope of Work for Next 10-15 Years	- Installation of 9 monitoring wells to confirm extent of groundwater plume. - Groundwater monitoring / reporting - 1 year quarterly - 9-14 years semi-annual - 1 year quarterly post-remediation - Plant monitoring and monthly O&M - Remedial System Evaluation - 5-year reviews - Final decommissioning of remediation system - Final closure report	- Installation of 9 monitoring wells to confirm extent of groundwater plume. - Groundwater monitoring / reporting - 1 year quarterly - 9-14 years semi-annual - 1 year quarterly post-remediation - System reconfiguration to accommodate lower flow rate - Plant monitoring and monthly O&M - Remedial System Evaluation - 5-year reviews - Final decommissioning of remediation system - Final closure report	- Installation of 9 monitoring wells to confirm extent of groundwater plume. - Installation of new shallow recovery well to replace EXT-1 or grout bottom of EXT-1 - Groundwater monitoring / reporting - 1 year quarterly - 9-14 years semi-annual - 1 year quarterly post-remediation - System reconfiguration to accommodate lower flow rate - Plant monitoring and monthly O&M - Remedial System Evaluation - 5-year reviews - Final decommissioning of remediation system - Final closure report	- Installation of 9 monitoring wells to confirm extent of groundwater plume. - Groundwater monitoring / reporting - 1 year quarterly - 5 years semi-annual - 4-9 years annual - Remedial System Evaluation - 5-year reviews - Final decommissioning of remediation system - Final closure report
Advantages	- Requires no operational changes - Captures contaminant plume and other potential source areas on site, if present	- Reduced groundwater flow rate - Lower O&M costs due to reduced treatment - Captures contaminant plume on west side of Site	- Minimizes system flow rate and maximizes capture efficiency - Lowest long-term O&M costs - Captures contaminant plume on west side of Site	- No active groundwater treatment - No long-term O&M costs - Uses natural processes to achieve remedial goal
Disadvantages	- System operates at higher flow rates than necessary - Highest long-term O&M costs - System operates long-term (additional 10-15 years)	- EXT-1 deeper than needed to capture plume - Capture zone may not encompass other potential on-site sources, if present - System operates at a flow rate that is higher than necessary - High long-term O&M costs	- Capture zone may not encompass other potential on-site sources, if present - Requires replacement of EXT-1 and treatment reconfiguration to optimize the system	- Appropriate only if contaminant plume limits confined to property boundary
Notes	Least desirable option based on highest long-term O&M costs and unnecessary treatment of excess groundwater	Desirable option if contaminant plume is determined to extend beyond the property boundary and EXT-1 cannot be replaced with a shallower extraction well	Most desirable option if contaminant plume is determined to extend beyond the property boundary	Most desirable option if contaminant plume limits are confined to property boundary
Total Estimated Cost	**$ 2,897,000.00**	**$ 2,798,250.00**	**$ 2,842,750.00**	**$ 611,100.00**
Total Annual Estimated Savings	**$ 453,000.00**	**$ 453,000.00**	**$ 453,000.00**	**$ 447,000.00**
Payback Period	**6.4**	**6.2**	**6.3**	**1.4**

TABLE 4

COST ANALYSIS

TREATMENT SYSTEM MODIFICATIONS					
ITEM	No Change	Pump from EXT-1 only	EXT-1 As Is	EXT-1 Grout	MNA
	340 GPM	116 GPM	55 GPM	55 GPM	0 GPM
Replace Check Valves	$ 10,400.00	$ 10,400.00	$ 10,400.00	$ 10,400.00	$ -
Repair Carbon Vessels (340 GPM)	$ 10,000.00	$ -	$ -	$ -	$ -
Replace Carbon @ 3.5 Years (340 GPM)	$ 28,750.00	$ -	$ -	$ -	$ -
Replace Carbon @ 12 Years (340 GPM)	$ 33,000.00	$ -	$ -	$ -	$ -
Repair Carbon Vessels (116 GPM)	$ -	$ 5,000.00	$ -	$ -	$ -
Replace Carbon @10 Years (116 GPM)	$ -	$ 32,000.00	$ -	$ -	$ -
Repair Carbon Vessels (55 GPM)	$ -	$ -	$ 5,000.00	$ 5,000.00	$ -
Replace Carbon @12 Years (55 GPM)	$ -	$ -	$ 33,000.00	$ 33,000.00	$ -
Mothball System	$ 72,000.00	$ 72,000.00	$ 72,000.00	$ 72,000.00	$ 50,000.00
Remove Air Stripper	$ 21,600.00	$ 21,600.00	$ 21,600.00	$ 21,600.00	$ -
Remove Sand Filter - Filters	$ -	$ -	$ -	$ -	$ -
Install Remote Operation of System	$ 75,000.00	$ 70,000.00	$ 70,000.00	$ 70,000.00	$ -
Repair INJ Pumps 1&2	$ 1,650.00	$ 1,650.00	$ 1,650.00	$ 1,650.00	$ -
Operation & Maintenance	$ -	$ -	$ -	$ -	$ -
Additional Piping and Electrical for new well #1	$ -	$ -	$ 9,500.00	$ 9,500.00	$ -
Install new infiltration gallery	$ 50,000.00	$ -	$ -	$ -	$ -
Remove Vapor Phase Carbon	$ 21,600.00	$ 21,600.00	$ 21,600.00	$ 21,600.00	$ -
Remote Operation Contractor ($150,000 @ 15 Years)	$ 1,860,000.00	$ 1,860,000.00	$ 1,860,000.00	$ 1,860,000.00	$ -
Total Capital Costs	***$ 2,184,000***	***$ 2,094,250***	***$ 2,104,750***	***$ 2,104,750***	***$ 50,000***
INVESTIGATION, MONITORING & REPORTING					
Item	No Change	Pump from EXT-1 only	EXT-1 As Is	EXT-1 Grout	MNA
Monitor Well Installation	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Groundwater Monitoring	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 355,000
5-Yr Review	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000
EXT-1 Grouting	$ -	$ -	$ -	$ 30,000	$ -
Closure Reporting	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
Investigation Costs	***$ 450,000***	***$ 450,000***	***$ 450,000***	***$ 480,000***	***$ 505,000***
INVESTIGATION, MONITORING & REPORTING					
Contingency	$ 263,000	$ 254,000	$ 255,000	$ 258,000	$ 56,000
Total Remedy Cost	***$ 2,897,000***	***$ 2,798,250***	***$ 2,809,750***	***$ 2,842,750***	***$ 611,000***
SAVINGS					
Operator Savings - Annual	$ 412,000.00	$ 412,000.00	$ 412,000.00	$ 412,000.00	$ 412,000.00
Air Stripper Operation Cost Savings	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	
Vapor Phase Carbon Operation Cost Savings	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	
Total Annual Savings	***$ 453,000***	***$ 453,000***	***$ 453,000***	***$ 453,000***	***$ 447,000***
Payback Period (years)	6.4	6.2	6.2	6.3	1.4

CHARTS

Chart 1: Groundwater Influent Concentration (PCE, TCE, and 1,1-DCE) vs. Time

May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19

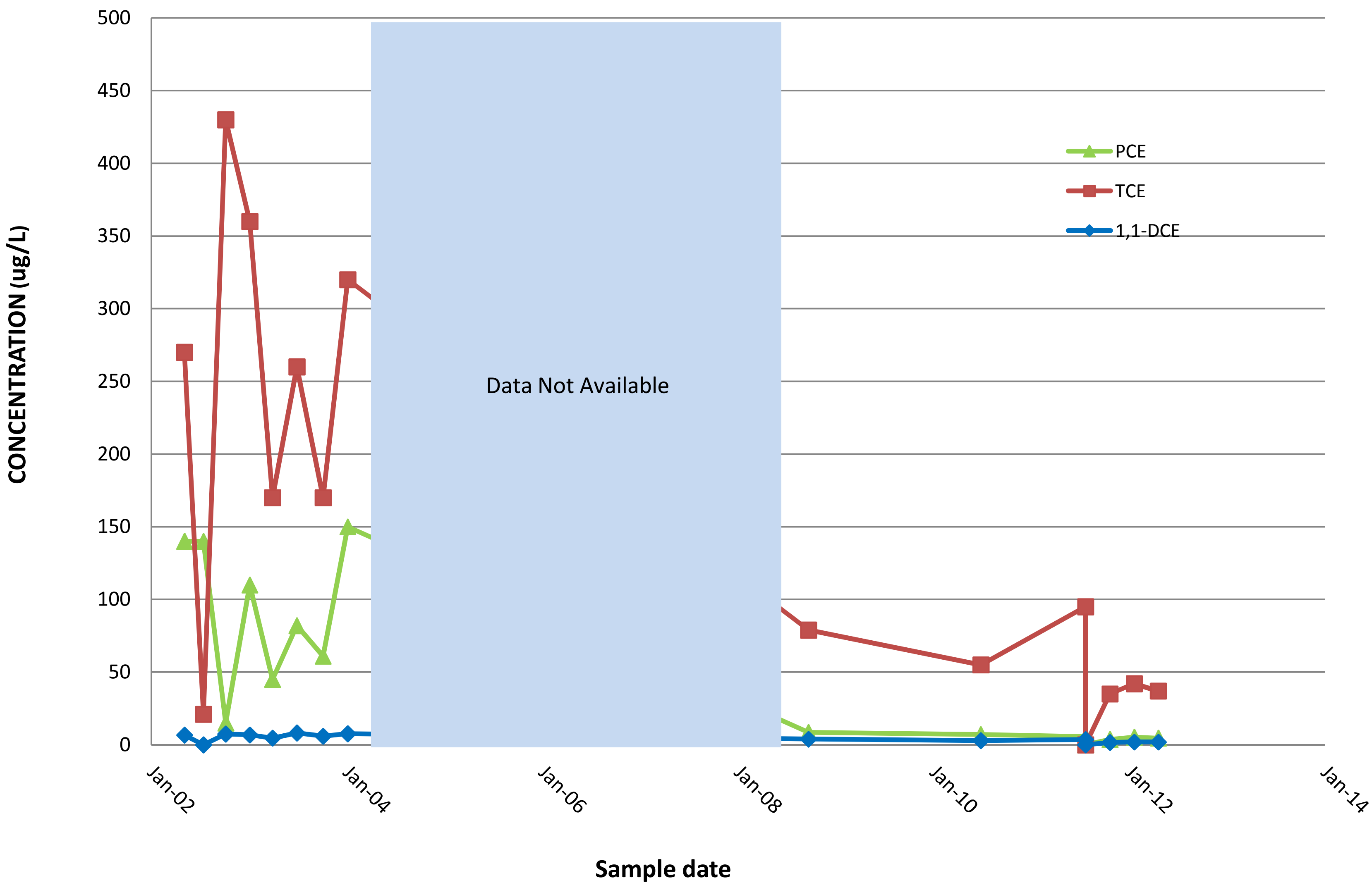
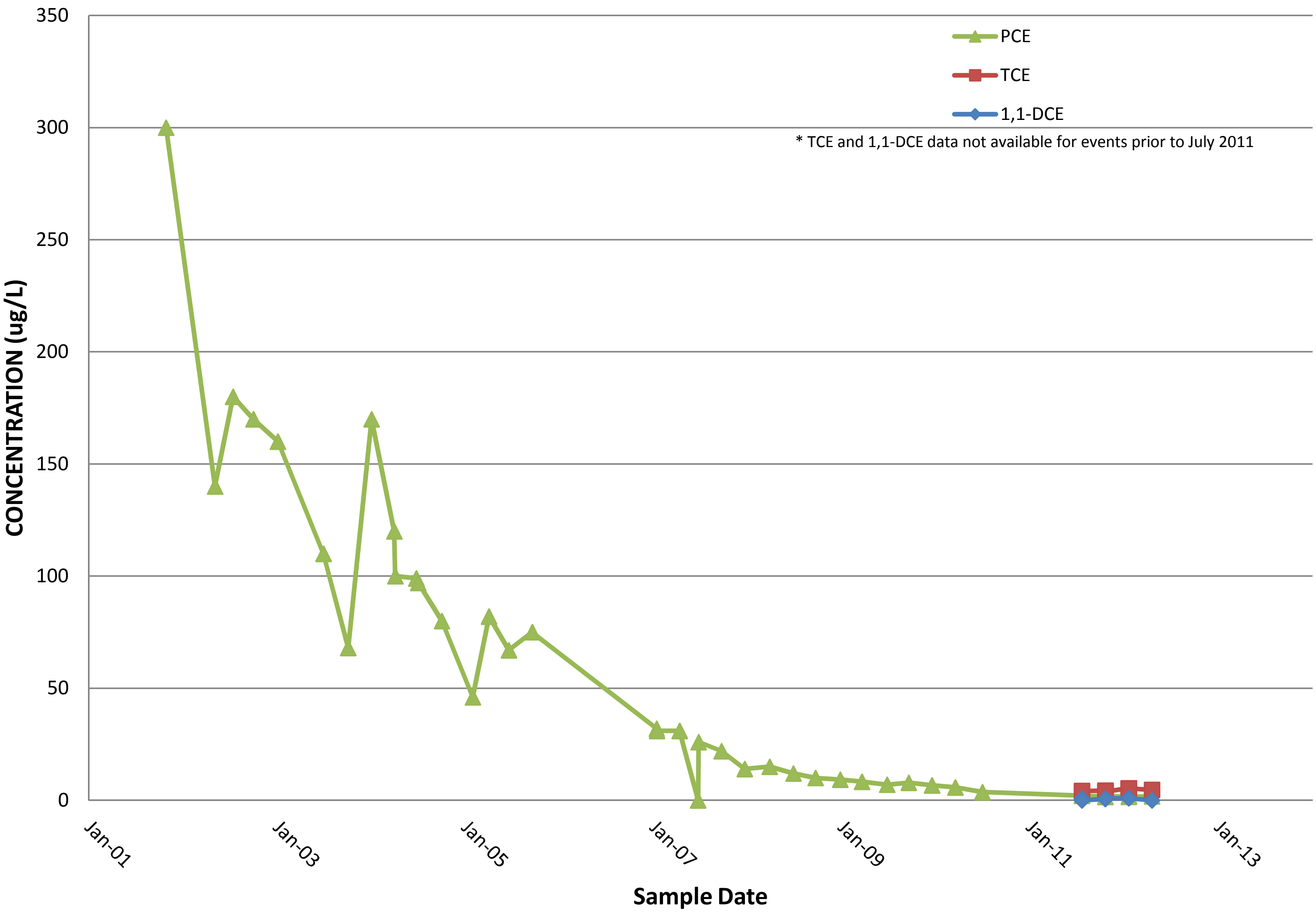


Chart 1a: EXT-1 Concentration (PCE, TCE, 1,1-DCE) vs Time

May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19



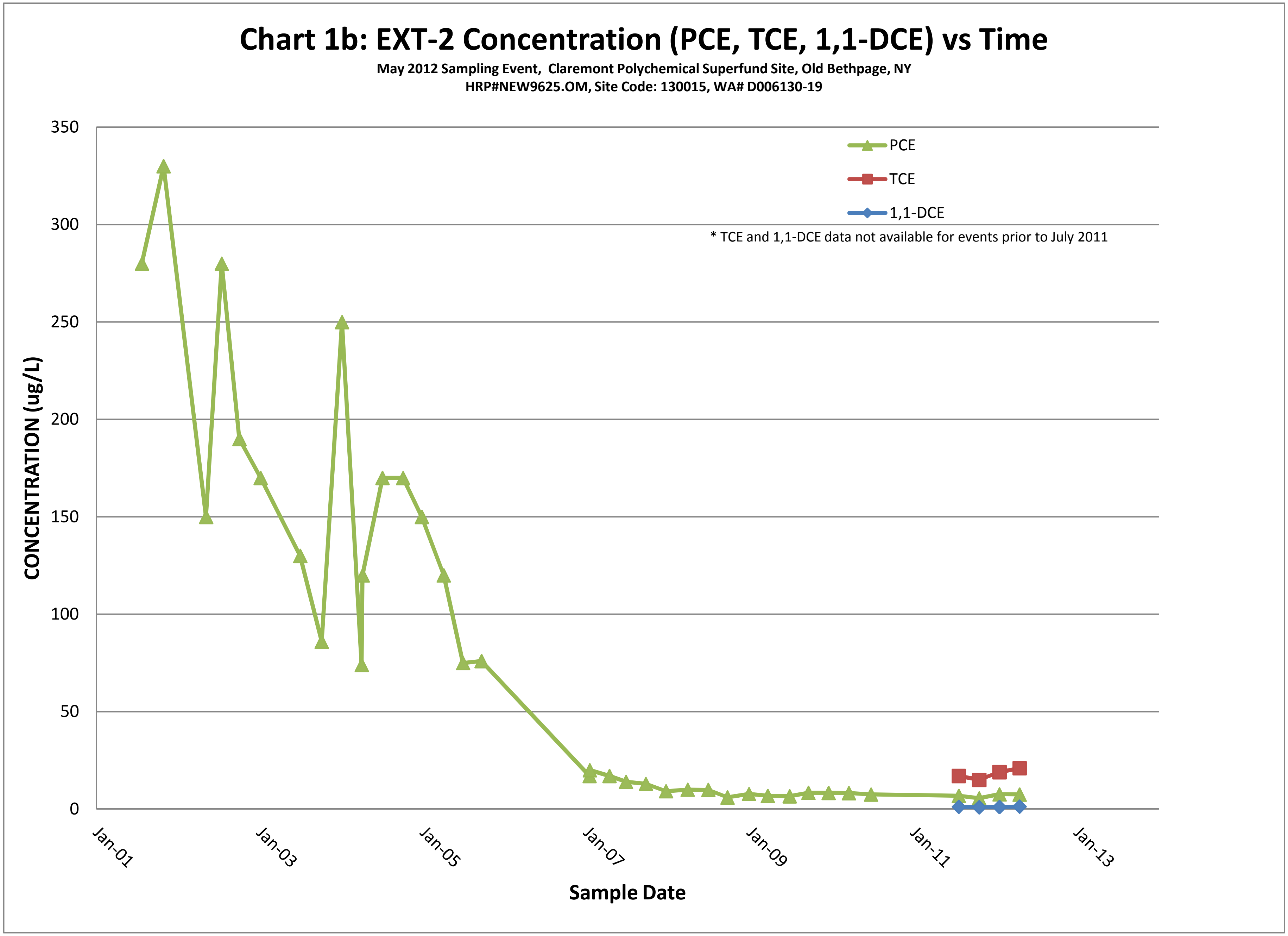


Chart 1b: EXT-2 Concentration (PCE, TCE, 1,1-DCE) vs Time
May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19
PCE
TCE
1,1-DCE
* TCE and 1,1-DCE data not available for events prior to July 2011
CONCENTRATION (ug/L)
350
300
250
200
150
100
50
0
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Sample Date

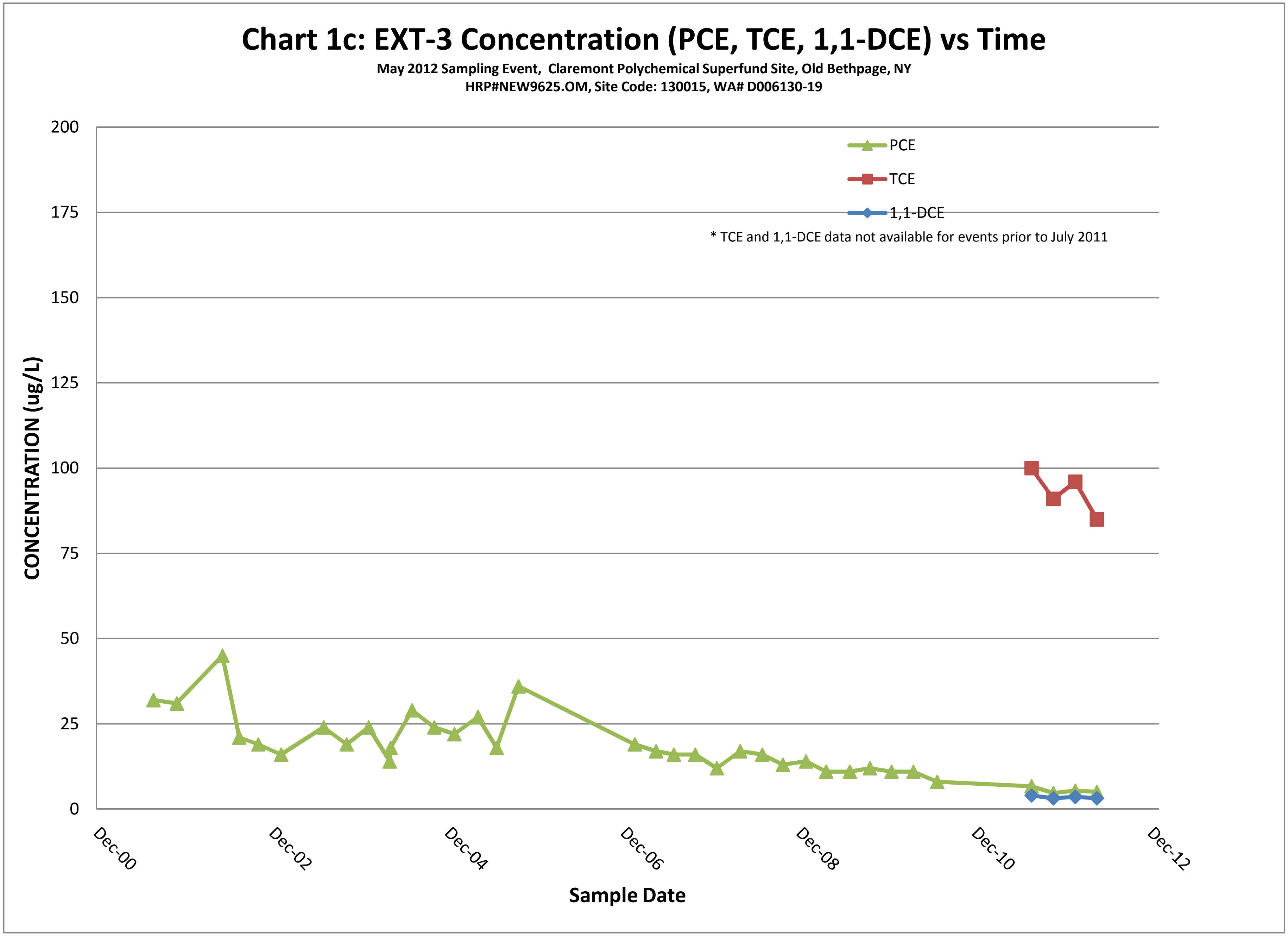
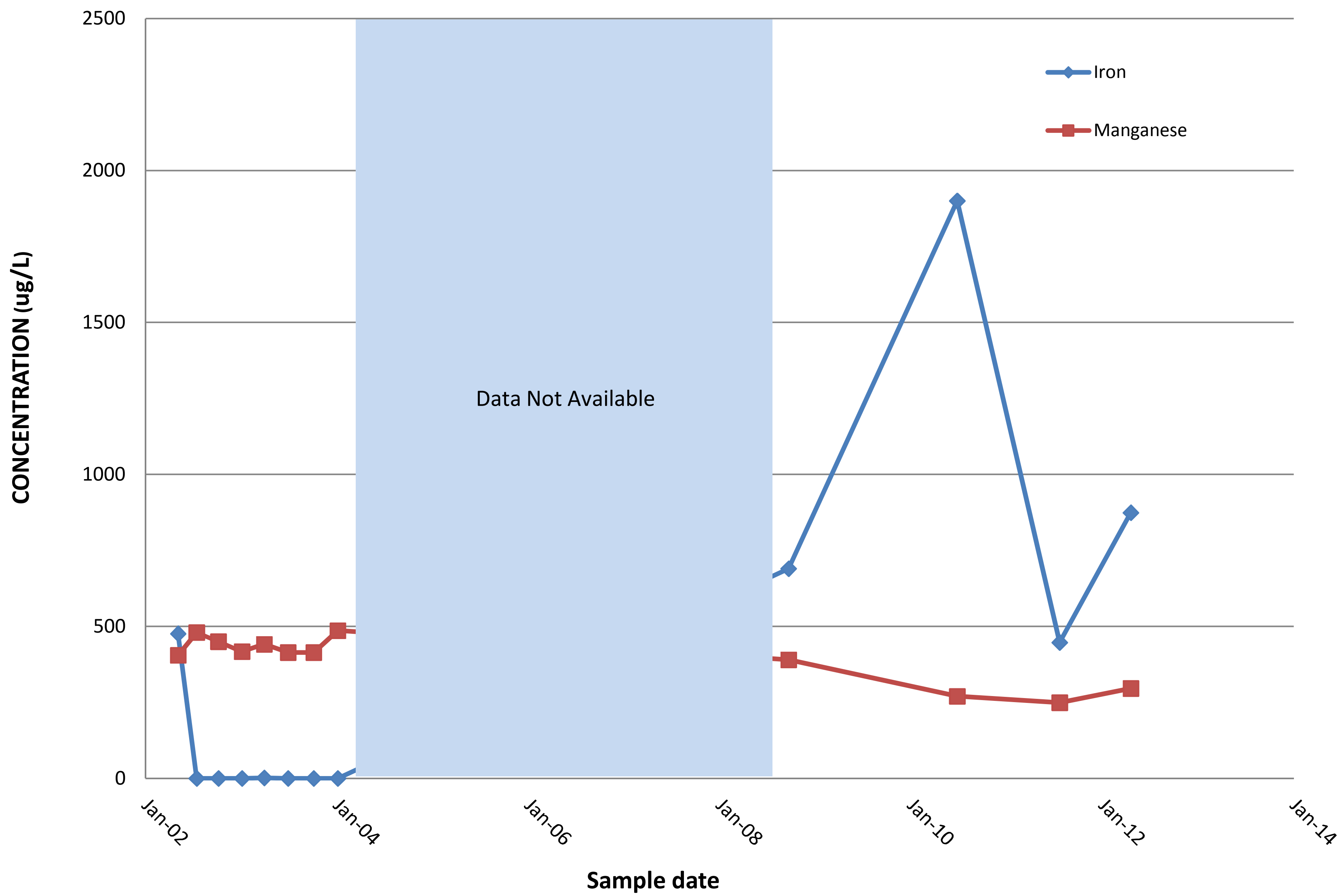


Chart 1c: EXT-3 Concentration (PCE, TCE, 1,1-DCE) vs Time
May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19
PCE
TCE
1,1-DCE
* TCE and 1,1-DCE data not available for events prior to July 2011
CONCENTRATION (ug/L)
200
175
150
125
100
75
50
25
0
Dec-00
Dec-02
Dec-04
Dec-06
Dec-08
Dec-10
Dec-12
Sample Date

Chart 2: Groundwater Influent Concentration (Iron and Manganese) vs. Time

May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19



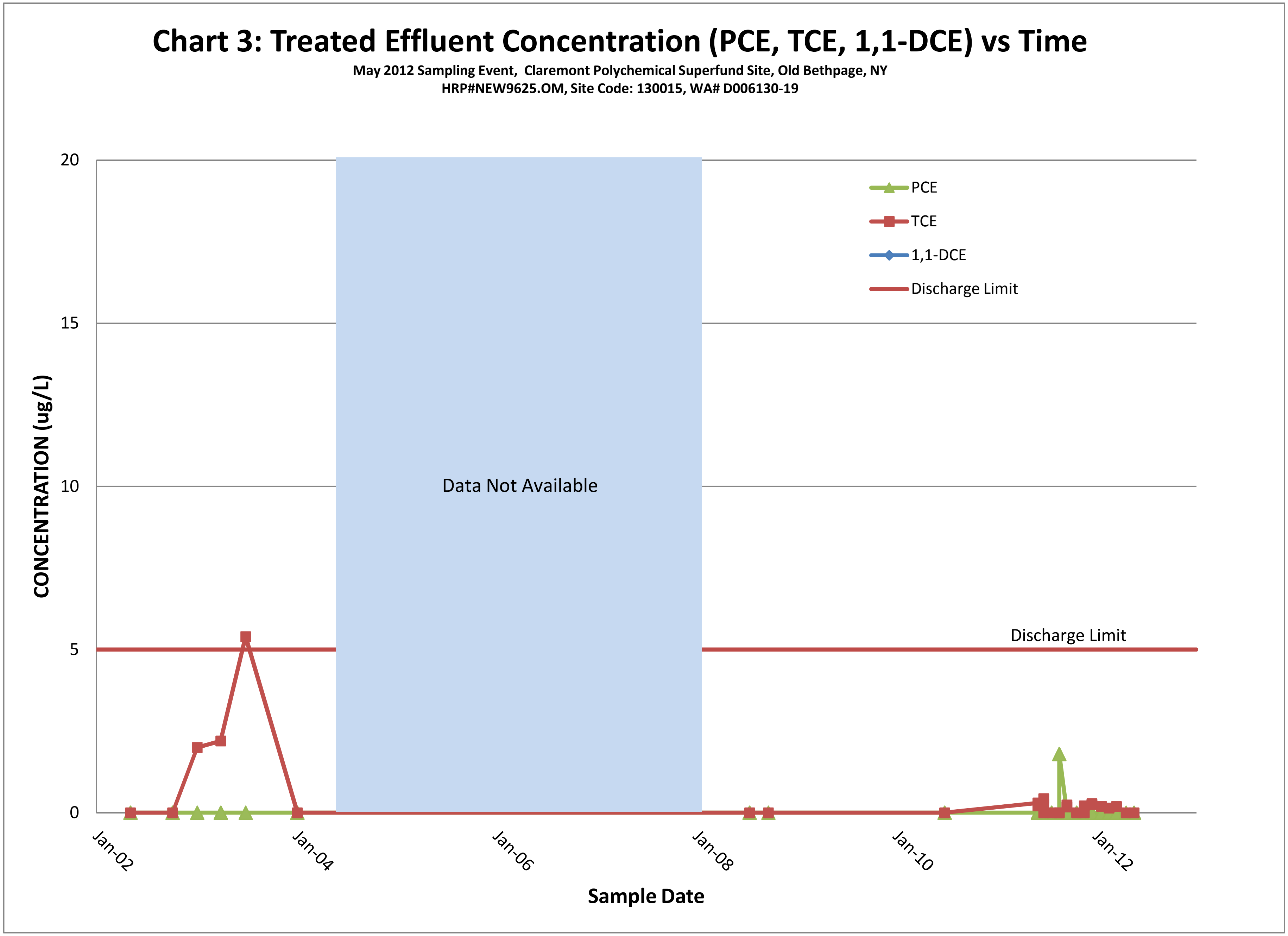


Chart 3: Treated Effluent Concentration (PCE, TCE, 1,1-DCE) vs Time
May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19
CONCENTRATION (ug/L)
20
15
10
5
0
Data Not Available
Discharge Limit
PCE
TCE
1,1-DCE
Discharge Limit
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Sample Date

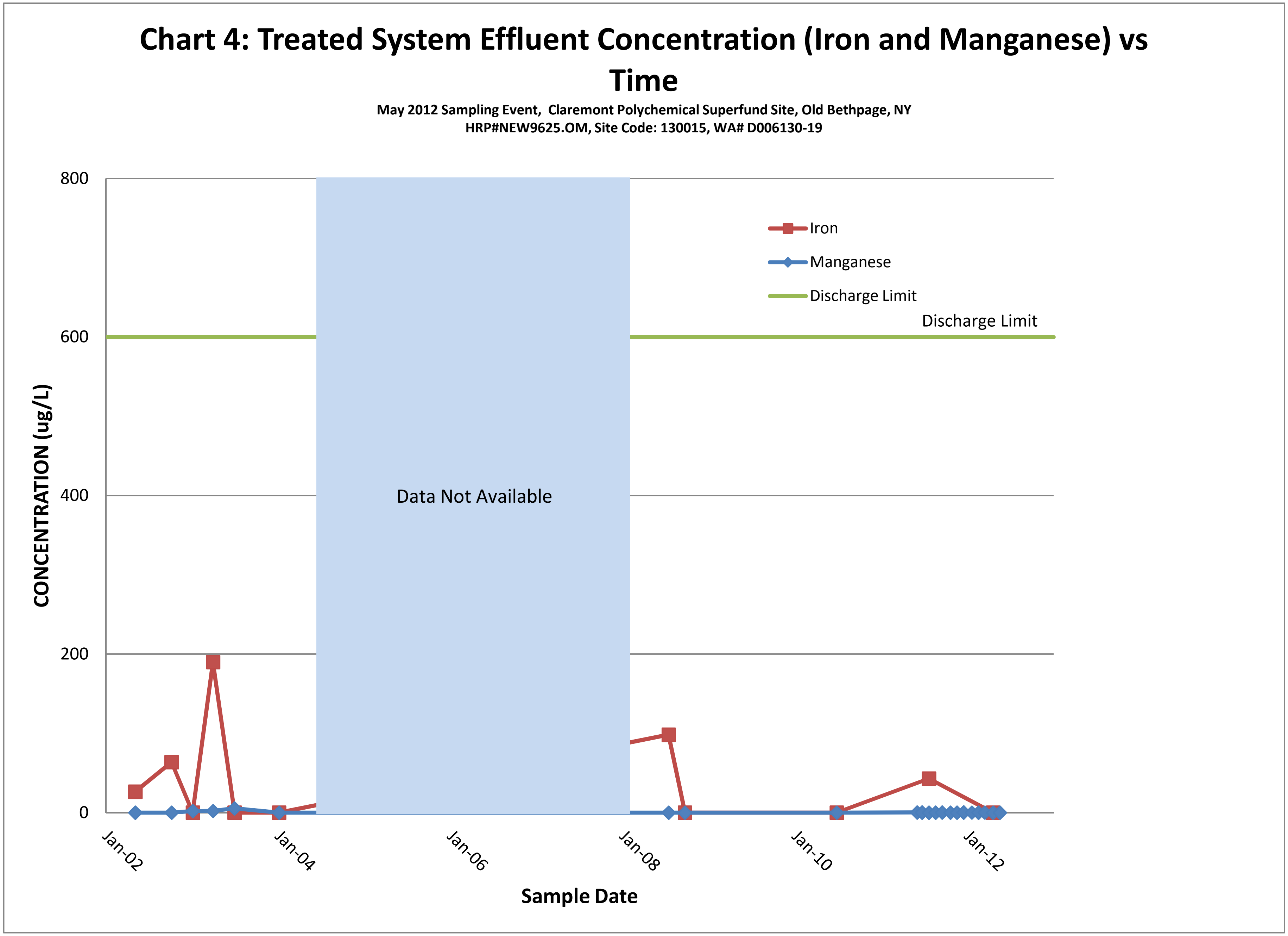


Chart 4: Treated System Effluent Concentration (Iron and Manganese) vs Time
May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19
800
600
400
200
0
CONCENTRATION (ug/L)
Iron
Manganese
Discharge Limit
Discharge Limit
Data Not Available
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Sample Date

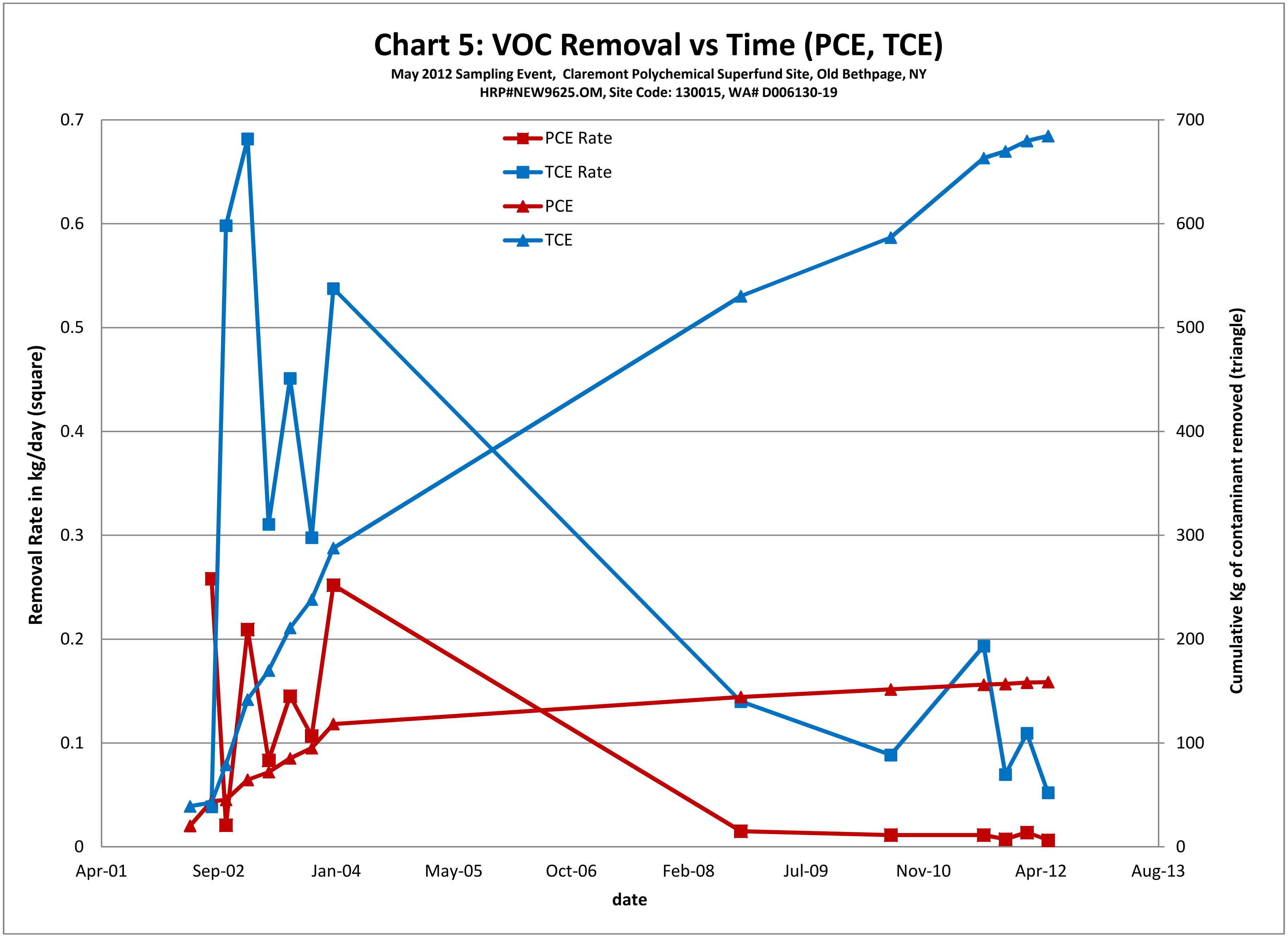


Chart 5: VOC Removal vs Time (PCE, TCE)
May 2012 Sampling Event, Claremont Polychemical Superfund Site, Old Bethpage, NY
HRP#NEW9625.OM, Site Code: 130015, WA# D006130-19
PCE Rate
TCE Rate
PCE
TCE
Removal Rate in kg/day (square)
Cumulative Kg of contaminant removed (triangle)
date
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
100
200
300
400
500
600
700
Apr-01
Sep-02
Jan-04
May-05
Oct-06
Feb-08
Jul-09
Nov-10
Apr-12
Aug-13

APPENDIX A

SYSTEM	UNITS	EQUIPMENT	ACTION	FREQUENCY						COMMENTS
					3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	
	1	WATER FILTER	INSPECT	MONTHLY						
	3	PERISTALTIC PUMPS	EXERCISE	MONTHLY						
	19	SYSTEM VALVES	EXERCISE	MONTHLY						
POTASSIUM		CHEMICAL DRUMS	INVENTORY	MONTHLY						The potassium permangante feed system is currently mothballed. Equipment is checked monthly to make sure the system is ready for service should the groundwater characteristics change and require the system to back online. Before this system can go back online, significant work will need to be done with the PID controlller in the local control panel.
PERMANGANATE	1	POLY TANK	INSPECT	MONTHLY						
FEED	1	MIXER	INSPECT/EXERCISE	MONTHLY						
			CLEAN	AS NEEDED						
	1	DRAIN VALVE	EXERCISE	MONTHLY						
	2	METERING PUMPS	INSPECT	MONTHLY						
	7	SYSTEM VALVES	EXERCISE	MONTHLY						
FLASH/FLOC TANK # 1	1	SAMPLE PORT VALVE	EXERCISE	MONTHLY						The flash and flocculation tanks and associated equipment are currently offline. Due to lack of solids in the groundwater, metals precipiation is not required at this time. The systems are checked monthly to ensure that they are fully functional in the event that they are required to be returned to service.
	1	DRAIN VALVE	EXERCISE	MONTHLY						
	1	SLUDGE PUMP INF. VALVE	EXERCISE	MONTHLY						
	2	MIXER	EXERCISE	MONTHLY						
	1	SLUDGE PUMP EFF. VALVE	EXERCISE	MONTHLY						
	2	GAUGE VALVES	EXERCISE	MONTHLY						
FLASH/FLOC TANK # 2	1	SAMPLE PORT VALVE	EXERCISE	MONTHLY						
	1	DRAIN VALVE	EXERCISE	MONTHLY						
	1	SLUDGE PUMP INF. VALVE	EXERCISE	MONTHLY						
	2	MIXER	EXERCISE	MONTHLY						
	1	SLUDGE PUMP EFF. VALVE	EXERCISE	MONTHLY						
	2	GAUGE VALVES	EXERCISE	MONTHLY						
CLARIFIER # 1	1	BAFFLES	INSPECT	WEEKLY						sludge building up
			CLEAN	WEEKLY						
	2	SLUDGE PUMPS	INSPECT	WEEKLY						
			EXERCISE	MONTHLY						
	3	SAMPLE PORT VALVES	EXERCISE	WEEKLY						
	1	DRAIN VALVE	EXERCISE	MONTHLY						
	1	WEIRS	INSPECT	WEEKLY						
CLARIFIER # 2	1	BAFFLES	INSPECT	WEEKLY						Sludge building up
			CLEAN	WEEKLY						
	2	SLUDGE PUMPS	INSPECT	WEEKLY						
			EXRECISE	MONTHLY						
	3	SAMPLE PORT VALVES	EXERCISE	WEEKLY						
	1	DRAIN VALVE	EXERCISE	MONTHLY						
	1	WEIRS	INSPECT	WEEKLY						
SAND FILTER # 1	4	DRAIN VALVES	EXERCISE	MONTHLY						
	8	RISERS	INSPECT	WEEKLY						Power Washed Sept. 18. 2007
SAND FILTER # 2	4	DRAIN VALVES	EXERCISE	MONTHLY						
	8	RISERS	INSPECT	WEEKLY						
PNEUMATIC SYSTEM	1	AIR COMPRESSOR MOTORS	CHECK OIL LEVEL	WEEKLY						System was put in an Off-Line mode to save wear on units (1-8-08). Compressor is activated as needed
	1		CHANGE OIL / FILTER	QUARTERLY						

SYSTEM	UNITS	EQUIPMENT	ACTION	FREQUENCY	3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	COMMENTS
	2	COMPRESSOR AIR FILTER	INSPECT	WEEKLY						
			CHANGE	QUARTERLY						Changed Jan 18, 2006
	2	COMPRESSOR BELTS	CHECK BELT TENSION	WEEKLY						New Belts in stalled at # one Motor (11-21-07)
			CHANGE	AS NEEDED						
	1	AIR COMP. TANK	INSPECT	WEEKLY						
			CHECK DRAIN / FILTER	DAILY						
	2	AIR COMP. TANK VALVES	EXERCISE	MONTHLY						
	8	PRESSURE RELIEF VALVES	INSPECT	WEEKLY						
	3	AFTER COOLER VALVES	EXERCISE	MONTHLY						
	1	AFTER COOLER DRAIN	INSPECT	DAILY						
	4	AIR DRYER VALVES	EXERCISE	MONTHLY						
	1	AIR DRYER DRAIN	INSPECT	WEEKLY						Dryer was repaired & installed Feb. 07, 2007
	2	COALESING FILTER	DRAIN	WEEKLY						
	2		REPLACE C'TRGE	QUARTERLY						Replaced Jan 27, 2006
	4	COALESIG FILTER VALVES	EXERCISE	MONTHLY						
	15	PLANT REGULATORS/TRAPS	DRAIN	DAILY						
AIR STRIPPER FEED	2	TANK	INSPECT	WEEKLY						
	1	pH PROBE	CHECK ACCURACY	WEEKLY						probe needs cleaning as calibration is not taking
			CALIBRATE	AS NEEDED						Checked Feb. 29,2008
	2	pH PROBE VALVES	EXERCISE	MONTHLY						
	3	PUMP	INSPECT	WEEKLY						Feb-13-06 New Glycerine-filled gauge installed
	3	PUMP MOTOR	INSPECT/ROTATE	WEEKLY						
			LUBRICATE	AS NEEDED						
	3	CHECK VALVES	LUBRICATE	MONTHLY						
			INSPECT	QUARTERLY						
	1	FLOW CONTROL VALVES/ACTUATORS	INSPECT	WEEKLY						actuators removed june 2007
	2	TANK INFLUENT VALVES	EXERCISE	MONTHLY						
	2	TANK EFFLUENT VALVES	EXERCISE	MONTHLY						
	2	TANK DRAIN	EXERCISE	MONTHLY						tank full - not tested
	2	LEVEL INDICATOR	INSPECT	WEEKLY						
	2	LEVEL IND. ISOLATION VALVE	EXERCISE	MONTHLY						
	5	PUMP INFLUENT VALVES	EXERCISE	MONTHLY						
	3	PUMP EFFLUENT VALVES	EXERCISE	MONTHLY						
	1	SAMPLE PORT VALVE	EXERCISE	MONTHLY						
HYDROCHLORIC FEED		CHEMICAL DRUM	INVENTORY	WEEKLY						The hydrochloric acid feed system is currently offline and mothballed. Equipment is checked monthly against the chance that system is required to be returned to service. On July 30. 2007 new LMI pump was installed @ p-5-3-2 .
	1	MIXER	INSPECT	MONTHLY						
			CLEAN	AS NEEDED						
	2	PUMPS	INSPECT	MONTHLY						
		PIPING / TUBING	INSPECT	MONTHLY						
			CLEAN	AS NEEDED						
AIR STRIPPER TOWER	1	FIBERGLASS TOWER	INSPECT	WEEKLY						peeling paint
	1	HEATER	INSPECT	WEEKLY						

SYSTEM	UNITS	EQUIPMENT	ACTION	FREQUENCY						COMMENTS
					3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	
	1	GAUGES / TUBING	INSPECT	WEEKLY						
			DRAIN CONDENSATE	AS NEEDED						Belts
	1	BLOWER	INSPECT BELTS	WEEKLY						New belts installed 10/01/07, Tightened 2/29/08
			GREASE BEARINGS	MONTHLY						BEARINGS GREASED - 11-05-07
	1	PRESSURE GAUGE	INSPECT	WEEKLY						
	1	SUMP	DRAIN	AS NEEDED						
		OFF GAS PIPING	INSPECT	WEEKLY						
	2	OFF GAS PIPING VALVES	EXERCISE	MONTHLY						
VAPOR GAC UNITS	4	GAUGES	INSPECT	WEEKLY						
			DRAIN CONDENSATE	AS NEEDED						Carbon Change GAC #2 (12-19-07)
	4	GAUGE VALVES	EXERCISE	MONTHLY						
		TUBING	INSPECT	WEEKLY						New Tubing #1 (12-12-07), #2 needs replacement
			REPLACE	AS NEEDED						condensation problems
AQUEOUS GAC FEED	3	PUMP	INSPECT	WEEKLY						Feb 10, 2006 Replace pressure gauge (P-2-9-2)
	3	PUMP MOTORS	INSPECT/ROTATE	WEEKLY						Pump Motors rotated 2-21-08
			LUBRICATE	AS NEEDED						
			AMP DRAW	MONTHLY						Amp Draws Taken 2-29-08
	3	CHECK VALVES	LUBRICATE	MONTHLY						Broken Gland Repaired 1 -14- 08
			INSPECT	QUARTERLY						
	2	POLY TANK	INSPECT	WEEKLY						
	2	TANK INFLUENT VALVES	EXERCISE	MONTHLY						
	2	TANK EFFLUENT VALVES	EXERCISE	MONTHLY						
	2	TANK DRAIN	EXERCISE	MONTHLY						
	1	WATER LEVEL ISOLATION	EXERCISE	MONTHLY						
	3	PUMP SUCTION VALVE	EXERCISE	MONTHLY						New shut off valves installed 10/23/07
	3	PUMP DISCHARGE VALVE	EXERCISE	MONTHLY						New shut off valves installed 11/15/07
	2	FLOW CONTROL VALVES/ACTUATORS	INSPECT	WEEKLY						Actuators (A/S) & (C./F) out of service (June 2007)
	2	AIR STRIP. BYPASS VALVE	EXERCISE	MONTHLY						This has been blocked
	1	SAMPLE PORT VALVE	EXERCISE	MONTHLY						
AQUEOUS GAC VESSELS	3	INFLUENT VALVES	EXERCISE	MONTHLY						
	2	PRESSURE RELIEF VALVES	INSPECT	MONTHLY						
	3	BACKWASH VALVES	EXERCISE	MONTHLY						
	2	EFFLUENT VALVES	EXERCISE	MONTHLY						
	2	SAMPLE PORT VALVE	EXERCISE	MONTHLY						
	4	GAUGE ISOL. VALVES	EXERCISE	MONTHLY						
TREATED WATER	2	TANK	INSPECT	WEEKLY						Tanks were powerwashed at the base 10-31-07
SYSTEM	2	DRAIN VALVE	EXERCISE	AS NEEDED						
	2	PUMPS	INSPECT	WEEKLY						
	2	PUMP MOTORS	INSPECT	WEEKLY						
			LUBRICATE	AS REQUIRED						
			AMP DRAW	QUARTERLY						Amp Draws Taking 2/29/08
	2	CHECK VALVES	LUBRICATE	MONTHLY						

SYSTEM	UNITS	EQUIPMENT	ACTION	FREQUENCY						COMMENTS
					3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	
			INSPECT	QUARTERLY						
	3	PUMP INFLUENT VALVES	EXERCISE	MONTHLY						
	4	PUMP EFFLUENT VALVES	EXERCISE	MONTHLY						
	3	RECYCLE FLOW VALVES	EXERCISE	MONTHLY						
	1	BACKWASH FEED VALVE	EXERCISE	MONTHLY						
	1	LEVEL INDICATOR	INSPECT	WEEKLY						Insulation and heater Installed 12-21-07
	1	LEVEL IND. ISOLATION VALVE	EXERCISE	MONTHLY						Insulationand heater Installed 12-21-07
		Krohne Mag meter	Inspect	weekly						Backwash line below Krohne Meter has leak 11-20-07
	4	PROP. FLOW METER	INSPECT	WEEKLY						
	8	METER ISOL. VALVES	EXERCISE	MONTHLY						
FLOOR DRAINS &	1	SUMP PIT W/ PUMP	INSPECT	WEEKLY						Carbon build up, pump clogged
PIT	12	FLOOR DRAINS	INSPECT	WEEKLY						
	2	FLOW CONTROL VALVES	EXERCISE	MONTHLY						
RECYCLE SYSTEM	2	PUMPS	INSPECT	WEEKLY						
		PUMP MOTORS	INSPECT	WEEKLY						
			LUBRICATE	AS REQUIRED						
			AMP DRAW	MONTHLY						Amp Draws Taking 2/29/08
	2	CHECK VALVES	LUBRICATE	MONTHLY						
			INSPECT	QUARTERLY						
	2	PUMP INFLUENT VALVES	EXERCISE	MONTHLY						
	3	PUMP EFFLUENT VALVES	EXERCISE	MONTHLY						
SLUDGE STORAGE	1	TANK	INSPECT	WEEKLY						
TANK	2	DRAIN VALVE	EXERCISE	MONTHLY						New valve and drainline installed Jan 20008
	4	DECANT VALVES	EXERCISE	MONTHLY						
	1	SAMPLE PORT VALVE	EXERCISE	MONTHLY						
	1	SLUDGE PRESS PUMP	EXERCISE	MONTHLY						
	1	LEVEL INDICATOR	INSPECT	WEEKLY						
	2	LEVEL INDIC. VALVE	EXERCISE	MONTHLY						
SLUDGE PRESS	1	SLUDGE PRESS	INSPECT	MONTHLY						The sludge press has never been used and is currently mothballed.
			EXERCISE	MONTHLY						
	1	INFLUENT VALVE	EXERCISE	MONTHLY						
	4	EFFLUENT VALVES	EXERCISE	MONTHLY						
HVAC &	1	MOTOR	INSPECT	ANNUALLY						Last inspected Dec 2005
AIR HANDLING UNIT	3	BELTS	INSPECT	SEMI-ANNUALLY						Last inspected Dec 2005
	1	MOTOR BEARING	LUBRICATE	SEMI-ANNUALLY						Inspected and Lubricated (12-04-07)
	1	BLOCK BEARING (SOUTH)	LUBRICATE	SEMI-ANNUALLY						Inspected and Lubricated (12-04-07)
		Filters								New filters Feb 2008
	1	BEARING (NORTH)	LUBRICATE	SEMI-ANNUALLY						Inspected and Lubricated (12-04-07)
CONTROL ROOM	1	MCC UNIT	CHECK LIGHTBULBS	WEEKLY						
	1	MCP	CHECK LIGHTBULBS	WEEKLY						
LABORATORY	N/A	BOTTLES	INVENTORY	MONTHLY						
	N/A	CHEMICALS	INVENTORY	MONTHLY						

SYSTEM	UNITS	EQUIPMENT	ACTION	FREQUENCY						COMMENTS
					3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	
	N/A	COOLERS	INVENTORY	MONTHLY						

COMMENTS:

FF - FULLY FUNCTIONAL
IOS - INTENTIONALLY OUT OF SERVICE
NS - NEEDS SERVICE (NORMAL MAINTENANCE)
RR - REPAIRS REQUIRED
NR - NOT REQUIRED
NA - NOT APPLICABLE

WEEKLY MAINTENANCE TO BE PERFORMED AT THE BEGINNING OF THE WEEK.
MONTHLY MAINTENANCE TO BE PERFORMED BY SECOND/THIRD WEEK.
ANNUAL / SEMI ANNUAL MAINTENANCE TO BE PERFORMED IN MARCH AND SEPTEMBER AS SCHEDULE PERMITS.
MAINTENACE PERFORMED AS NEEDED WILL BE INDICATED WITH A DATE AFTER THE INSPECTION

APPENDIX B

GROUNDWATER MODELING REPORT
FOR
CLAREMONT POLYCHEMICAL CORPORATION SITE

505 WINDING ROAD
OLD BETHPAGE, NASSAU COUNTY NEW YORK 11804

Site Code: 130015
WA# D006130-19

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Prepared by:

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August 14, 2012

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1.0 INTRODUCTION AND OBJECTIVES

HRP Associates, Inc. (HRP) has revised and updated a groundwater flow model previously created by Science Applications International Corporation (SAIC) for the Claremont Polychemical (CPC) site located in Old Bethpage, Nassau County, New York. The groundwater flow model was originally created using Groundwater Vistas Version 4 and updated by HRP using Groundwater Vistas Version 6.11. This work was completed pursuant to a September 9, 2010 work assignment (WA) issued by the New York State Department of Environmental Conservation (NYSDEC); contract/WA No. D006130-19. The revised groundwater flow model was used as a tool to assist with optimizing the recovery aspects of the remediation system.

2.0 GROUNDWATER FLOW MODEL

This section of the report describes the revisions and updates that were made to SAIC's groundwater flow model. A summary of SAIC's groundwater flow model is presented in their April 2011 *Updated Groundwater Modeling Report for the Claremont Polychemical Superfund Site*. Details regarding the construction of the groundwater model are not presented herein, as such details are documented in SAIC's April 2011 report.

2.1 Conceptual Model

SAIC originally established a hydrogeologic model based on their conceptual model of the site, which consisted of three zones: A, B, and C. Zone C subdivided into three layers, creating a total of five model layers. SAIC calibrated the hydrogeologic model by independently varying the hydraulic conductivities within each of the five model layers. HRP has made no change to the original qualitative understanding of the groundwater flow system or controlling hydrogeologic features, and has maintained the five zones of differing hydraulic conductivities. However, HRP has further refined the model layer thicknesses to more accurately represent screened intervals at CPC extraction wells and monitoring wells. This is believed to result in a better calibrated groundwater flow model. See below for a summary of layer thicknesses used in HRP's model.

2.2 Model Selection and Description

SAIC used the USGS computer program MODFLOW® to simulate groundwater flow at the site. It is assumed that SAIC used the MODFLOW-96 version, based on the cited reference in their April 2011 report. Model simulations completed by HRP and documented herein used an updated MODFLOW version; MODFLOW2000.

The model domain or area being modeled is generally made to be much larger than the area of interest in order to minimize boundary affects on the area of interest. In addition, the cell size in a model domain directly affects the accuracy of the model results. Cell size in commonly varied to reduce file size and runtime. To maintain accuracy, cell sizes are made small in the areas of interest where field groundwater elevations are readily available and increased systematically towards the domain edges where little or no field data is available. The SAIC model domain consisted of 708 rows and 616 columns. Each domain cell had equal horizontal dimensions measuring 25-feet by 25-feet. In order to increase accuracy in the model area of interest (the CPC site), HRP decreased the horizontal dimensions (x and y) of the model grid surrounding the three CPC extraction wells and increased the cell size outside of the CPC monitoring well network and other extraction/injection wells within the model domain. This yielded a model domain consisting of 358 rows and 378 columns. Cell dimensions ranged from a minimum of 0.833 feet (10 inches) in the areas of highest interest (i.e., extraction wells) to a maximum of 200 feet at the outer margins of the domain.

In addition, SAIC's model consisted of five layers. The layer thicknesses (from shallowest to deepest) were 100 feet, 120 feet, 130 feet, 130 feet, and approximately 300 feet. HRP refined the layer thicknesses as summarized in the table below:

SAIC Model		HRP Model	
Layer	Thickness (ft)	Layer	Thickness (ft)
1	100	1-5	20 (each)
2	120	6-11	20 (each)
3	130	12-15	20 (each)
		16-17	25 (each)
4	130	18	30
		19	41
		20	59
5	~300	21	~300

2.3 Constant Head Boundaries

Natural hydrogeological boundaries (e.g. surface water bodies, topographic features, surface water runoff divides, etc.) are not close to the site. Therefore, SAIC established the model domain using artificial hydrogeologic boundaries. No-flow boundaries were established along the edges of the model domain by orienting it parallel to the inferred direction of groundwater flow. Constant head boundaries were specified along the upgradient (northwestern) and downgradient (southeastern) edges of the model domain. SAIC used a constant head of 80.16 feet on the upgradient boundary and 48.45 feet on the southeastern boundary.
SAIC used groundwater elevation data from March 2006 when creating the groundwater flow model. HRP used groundwater elevation data from July 2011 when updating the groundwater flow model. In general, groundwater elevations declined from March 2006 to July 2011. The average drop in groundwater elevation observed in the most upgradient monitoring wells (EW-6A, EW-6C, EW-7C, EW-7D, EW-8D, EW-9D, and EW-10C) between March 2006 and July 2011 was approximately 1.5 feet. Therefore, during model simulations completed by HRP, a constant head of 78.66 was used along the upgradient model boundary. Simulated groundwater contours across the CPC site are shown in Figure 1.

2.4 Pumping and Injection Systems Within the Model Domain

A total of 34 pumping and injection wells (combined) are located within the model domain and include the three groundwater extraction wells (EX-1, EX-2, EX-3) and four groundwater injection wells (IN-1, IN-2, IN-3, IN-4) for the CPC groundwater remediation system. SAIC's groundwater flow model included groundwater elevation data, pumping rates, and injection rates for March 2006. HRP updated the model by using data from July 2011.

The model domain also includes a number of other pumping wells and systems at the Old Bethpage Landfill, Nassau County Fire Training Facility, etc. HRP used the March

2006 data input for the SAIC model for these other pumping and injection systems. This is a potential data gap for several areas within the model domain. However, as demonstrated by the favorable calibration statistics presented below, the portion of the model including the CPC site and its associated monitoring wells is well calibrated. HRP's updated version of the groundwater flow model utilizing July 2011 calibration data focuses on the portion of the model domain occupied by the CPC site.

The March 2006 and July 2011 groundwater pumping and injection rates used by SAIC and HRP, respectively, for the CPC groundwater remediation system are summarized in Table 1. Pumping and injection rates used by HRP represent average daily rates obtained from flow meter readings from each individual well. Subsequent to the creation of SAIC's groundwater flow model, groundwater infiltration galleries were constructed near injection wells IN-1 and IN-3 due to reduced flow at each well. Water flow to each injection well / infiltration gallery pair is estimated at 60% to the injection well and 40% to the infiltration gallery. The infiltration galleries were modeled as increased recharge cells assigned to areas approximately equal to the gallery dimensions. The rate of recharge at the infiltration galleries (in feet per day) was estimated as 40% of the average daily discharge to the respective injection well divided by 1,666 ft^2 for gallery #1 and 1,215.5 ft^2 for gallery #3, which represent the respective areas of the assigned model grid cells.

2.5 Hydraulic Conductivity Values

The horizontal hydraulic conductivity (K_x) values used as initial model parameter estimates by SAIC were based on pump test results completed by SAIC in 2003. Based on generally uniform geologic conditions within individual model layers, single K_x values were applied to the entire layer and did not vary spatially. As part of SAIC's efforts to calibrate the groundwater flow model, K_x values for each layer were adjusted in order to achieve the best model calibration. Table 2 summarizes K values used by SAIC, other referenced K values presented by SAIC, and K values ultimately used by HRP. A conventional ratio for horizontal hydraulic conductivity (K_x) to vertical hydraulic conductivity (K_z) of 10 was used. A complete discussion of methods employed by HRP for obtaining K values is provided below in the Model Calibration Section.

2.6 Model Calibration

Proper calibration of the groundwater flow model is necessary to ensure that the model is accurately simulating observed field conditions (i.e. water levels at observation points). This is an important step for creating a model that can be reliably used for predictive assessments of groundwater flow and contaminant transport. HRP re-calibrated the groundwater flow model to account for refinement of the model grid and use of more recent data for groundwater extraction, injection, and infiltration rates associated with the CPC groundwater treatment system. HRP used the parameter estimation software PEST, developed by John Doherty of Watermark Computing, to adjust model parameters and calibrate the model.

PEST has the ability to automatically adjust model parameters, run model simulations, and minimize discrepancies between the pertinent model-generated simulation results and the corresponding observed field measurements. PEST uses a nonlinear estimation technique known as the Gauss-Marquardt-Levenberg method in order to optimize model calibration. As applied to the groundwater flow model for the CPC site, K values for each layer were altered by PEST to optimize the model calibration, as defined by the lowest sum of residual squares (observed heads minus simulated heads). The K values obtained by running PEST are listed in Table 2. A comparison of steady state calibration statistics generated by SAIC and HRP from their respective calibrated groundwater flow models is presented in Table 3.

All the head residuals are between -1.72 feet and 3.92 feet. The sum of squared residuals (28.7) was computed by squaring all residuals and adding them together. This statistic is meaningless by itself but is useful to plot on sensitivity curves and when judging several different simulations. The residual mean error (0.01) was near zero and was computed by dividing the sum of residuals by the number of residuals. Because both positive and negative residuals were used in the calculation, this value should be close to zero for a good calibration. Any deviations from zero suggest a bias on the simulated head values. The absolute residual mean (0.56) was calculated using the absolute value of the error (only positive values) and is a measure of the average error in the model. The residual standard deviation (0.84) is a measure of the overall spread of residuals. Both values are low and indicate the residuals are near an ideal value of zero. The residual standard deviation can also be compared to the overall range in observed heads (9.67 ft.) and shows how the errors relate to the overall gradient across the model. Values less than 10% (HRP model = 8.69%) indicates good calibration (Environmental Simulations, Inc., 2011).

A commonly used visual assessment of model calibration is a plot of simulated vs. observed water levels as shown in Figure 2. Ideally, in a perfectly calibrated groundwater flow model, all points would lie on a 45-degree line. As shown in Figure 2, the correlation coefficient (R^2) of the observed vs. model-predicted heads is 0.853, indicating a good fit of the data to the trend line. The data is slightly skewed by an anomalous head reading at monitoring well BP-3A, which corresponds to the highest residual observed within the model. Excluding the head values observed and simulated at BP-3A as an outlier, results in a R^2 value of 0.928, which indicates an excellent fit of the data to the trend line.

3.0 PARTICLE TRACKING ANALYSIS

Forward particle tracking analysis was completed to assess the possible flow paths of contaminants (represented as particles) released to the underlying aquifer and the ability of the existing CPC groundwater extraction well network to capture the contaminants/particles. Particle tracking includes only the effects of advective groundwater flow and does not include migration impacts from dispersion, sorption, and/or contaminant degradation. On-site and off-site investigations previously completed by others have identified upgradient contaminant sources that are most likely migrating beneath the CPC site. Some of the identified contamination is likely being captured by the CPC groundwater treatment system. For the purpose of optimizing treatment of groundwater contamination emanating from the CPC site only, particle tracking analysis only addressed known and suspected on-site contaminant release areas.

3.1 Particle Tracking from Known and Suspected Release Areas

The following locations were assigned particles:

- The CPC building footprint – Particles were assigned to the edges of the building footprint and represent a conservative assessment of potential contaminant release(s) from interior portions of the building, such as sumps, drains, drywells, etc.

- Remedial soil excavation area along the east side of the CPC building – Particles were assigned to the limits of the remedial soil excavation as presented by Rust Environment & Infrastructure, 1994.
- Debris piles as shown on historical site plans – A circular array of particles were assigned to the approximate limits of former debris piles shown on historical site plans.
- Former aboveground storage tanks (ASTs) and underground storage tanks (USTs) located along the south side of the CPC building – A line of particles was assigned to the approximate southern limits of the former ASTs and USTs.
- Former concrete stormwater treatment basins located along the western side of the CPC building – A line of particles was assigned to the former stormwater treatment basins location.

All particles were released to relatively shallow model elevations at and beneath the water table, corresponding to approximately 70, 50, and 30 feet above mean sea level (msl) (60, 80, 100 feet below grade, respectively).

Under current operating conditions at the CPC groundwater treatment system, all released particles in the model were captured by the extraction wells (Figure 3). Model simulations show the groundwater capture zone extending laterally beyond the potential contaminant release areas and vertically to greater than -88 feet below msl (approximately 143 feet of saturated thickness) beneath nearly the entire property (Figure 8, Remedial System Optimization Report). Additional simulations suggest that if the groundwater pumping rate and related reinjection is reduced by 5%, not all particles are captured, which indicates potential contaminant migration past the groundwater capture zone (Figure 4).

For comparison purposes, a model simulation was run with the CPC groundwater treatment system turned off (modeled by entering zero as the pumping rates for the three extraction wells and four injection wells and reducing the recharge rate at each infiltration gallery location to background). Under this scenario (Figure 5), particle traces migrating from the CPC site closely resemble the outline of the western portion of the TCE plume shown by SAIC for 2006 groundwater concentrations (attached Figure 3-2 from Updated Groundwater Modeling Report for the Claremont Polychemical Superfund Site, prepared by SAIC, February 2011) and correspond to contaminants migrating from or beneath the CPC site. The widening of the plume to the east, as shown in SAIC's 2006 data, most likely corresponds to contaminant contributions from an off-site and upgradient source, which is not being captured by the CPC groundwater treatment system under active pumping conditions. Also note that particle traces migrating from the CPC site are ultimately captured by the Town of Oyster Bay recovery wells #4 and #5.

3.2 Particle Tracking from Diffuser Well

Previous site investigations identified a diffuser well located along the western side of the CPC building that could have been used for disposal of wastes deep into the aquifer. Although available data suggest significant disposal via this well did not occur, model simulations evaluated the diffusion well as a potential release area.
The well construction log for diffuser well No. N-8968D identifies five screened intervals and a final bottom depth of 244 feet below grade (about 113 feet below msl). In order to simulate a potential contaminant release, particles were added to each model layer

intersected by the diffuser well. The deepest particle was added at a depth corresponding to the bottom of the diffuser well. Model simulation results indicate all particles, spanning the depths of all screened intervals within the diffuser well, are captured by the groundwater extraction wells under current pumping conditions. Additional simulations demonstrated that when groundwater pumping rates and related reinjection rates were reduced by 30%, all particles from the diffuser well remained captured by the groundwater extraction wells.

The exact location of a second on-site diffuser well (N-8227D) is unknown, but is suspected to be located west of the CPC building. The well construction log identifies one screened interval between 80 and 130 feet below grade (approximately 50 to 0 feet above msl). Various model simulations demonstrated that particles released to layers corresponding to the full depth of the diffuser well west of the CPC building were captured by the CPC groundwater extraction wells.

4.0 GROUNDWATER FLUX EVALUATION

The flux of groundwater through the capture zone predicted by the flow model was compared to the combined pumping rates of EXT-1, EXT-2, and EXT-3 in order to further understand the dynamics of the groundwater flow system and limitations of the model. The predicted flux was determined from the model velocity output file for each model cell along a cross section of the capture zone multiplied by the cross-sectional area of the cell and an estimated soil porosity (30%). The resulting fluxes were summed and compared to the cumulative pumping rate of the extraction wells. The following table compares the predicted flux through the capture zone to the total pumping rate of the system.

Cumulative Pumping Rate of Three Extraction Wells	Cumulative Groundwater Flux Through Extraction Well Capture Zone	Percent Difference
65,258 ft^3/day	67,740 ft^3/day	3.7 %

The analysis revealed that the predicted flux through the capture zone corresponded well to the total pumping, as was expected. Close inspection of the results also provided the following insights.

- The predicted width of the capture was affected by the hydraulic conductivity value assigned to the individual model layers.
- Averaging hydraulic conductivity values and gradients in the vertical layers significantly affected the capture zone width.

As a result, the model's ability to predict the capture zone width is limited by the spatial accuracy of the hydraulic conductivity values used to calibrate the model compared to field conditions. The degree of characterization needed to accurately assess capture zone extent varies greatly depending upon the spatial variability of hydraulic conductivity and complexity of the hydrostratigraphy.

5.0 SUMMARY AND CONCLUSIONS

Following an extensive parameter estimation analysis with PEST, hydraulic conductivities were calculated for the five vertical zones previously established by SAIC and a pre-existing groundwater flow model was improved and calibrated. July 2011 data for the CPC groundwater treatment system and observed water elevations in monitoring wells were used to update the model and simulate revised groundwater extraction and injection/infiltration conditions. The model-simulated heads closely match the July 2011 data. The model was then used to predict the groundwater capture zone created by the CPC extraction wells. All particles introduced at known or suspected on-site release areas were captured under groundwater extraction rates. Particle migration paths under non-pumping conditions closely resemble the western edge of the 2006 TCE plume presented by SAIC. The expansion (widening) of the plume to the east suggests off-site, upgradient contaminant contribution.

6.0 REFERENCES

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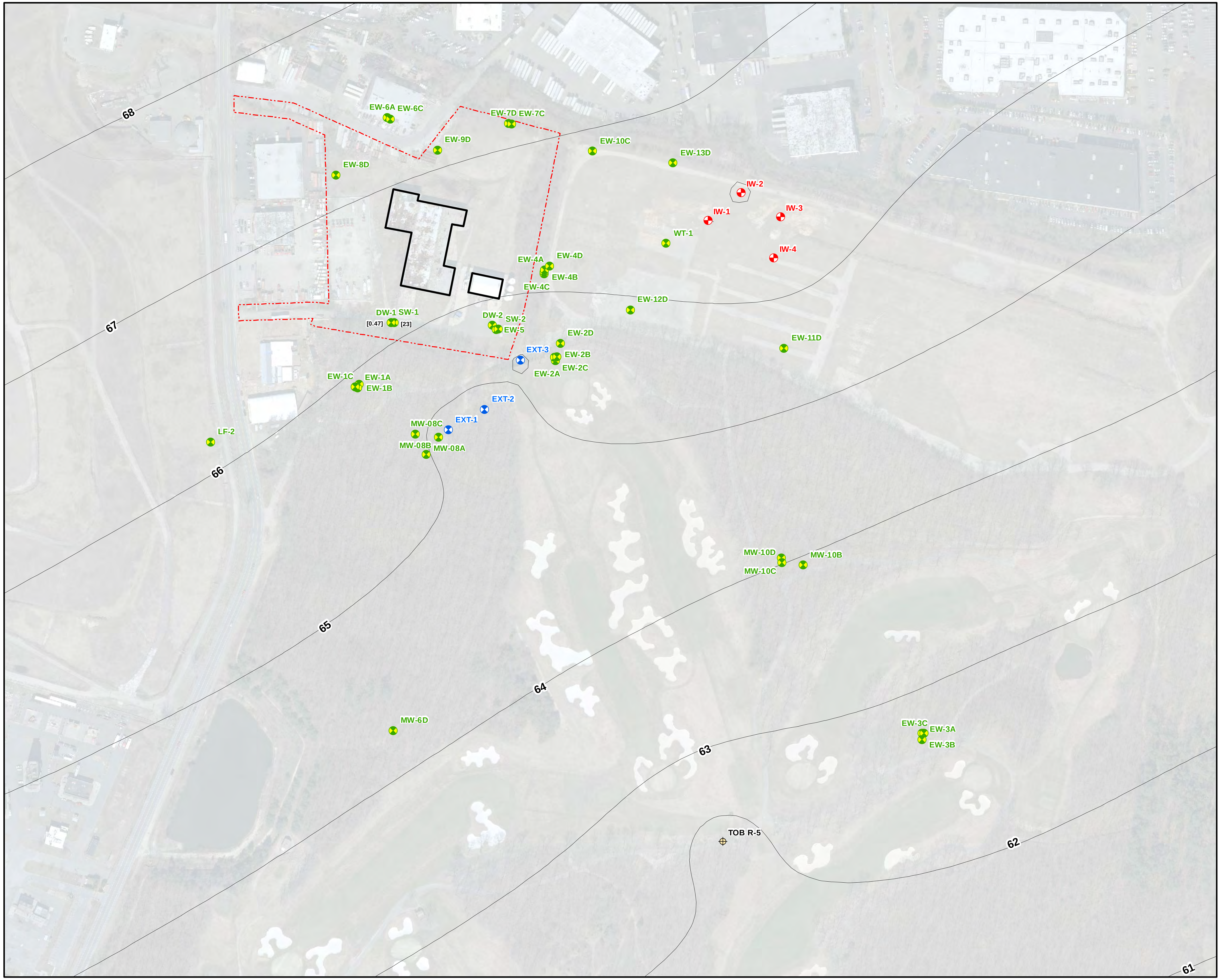
Rust Environment & Infrastructure, 1994. *100% Final Design Submittal, Phase I Remedial Design Plans, Claremont Polychemical Corp., Old Bethpage, New York*.

SAIC, 2011. *Updated Groundwater Modeling Report for the Claremont Polychemical Superfund Site, Final, Old Bethpage, New York*. April 2011.

Watermark Numerical Computing, 2005. *PEST, Independent Parameter Estimation, User Manual: 5th Edition*. 5th Edition published in 2005 (with slight additions in 2010).

FIGURES



200 100 0 200 400
Feet

1 inch = 300 feet

Legend

- Oyster Bay Extraction Well
- Extraction Well
- Injection Well
- Monitoring Well
- Claremont Property
- Grounwater Elevation Contours (Feet Above Mean Sea Level)

N

Figure 1
Groundwater Elevation Contours
Under July 2011 Pumping Conditions
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 300'

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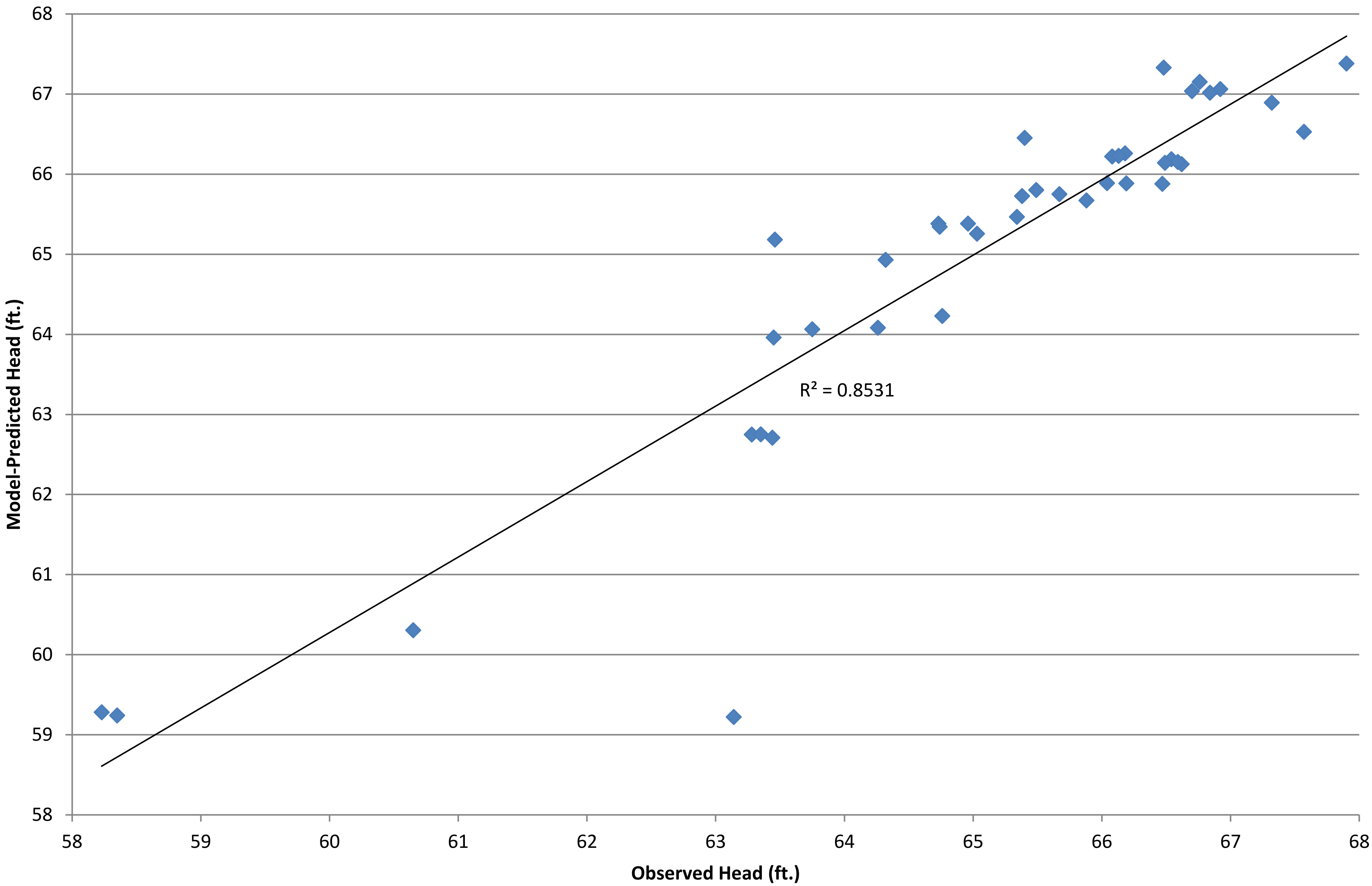
www.hrpassociates.com

Figure 2
Observed vs. Model-Predicted Head (ft.) - July 2011



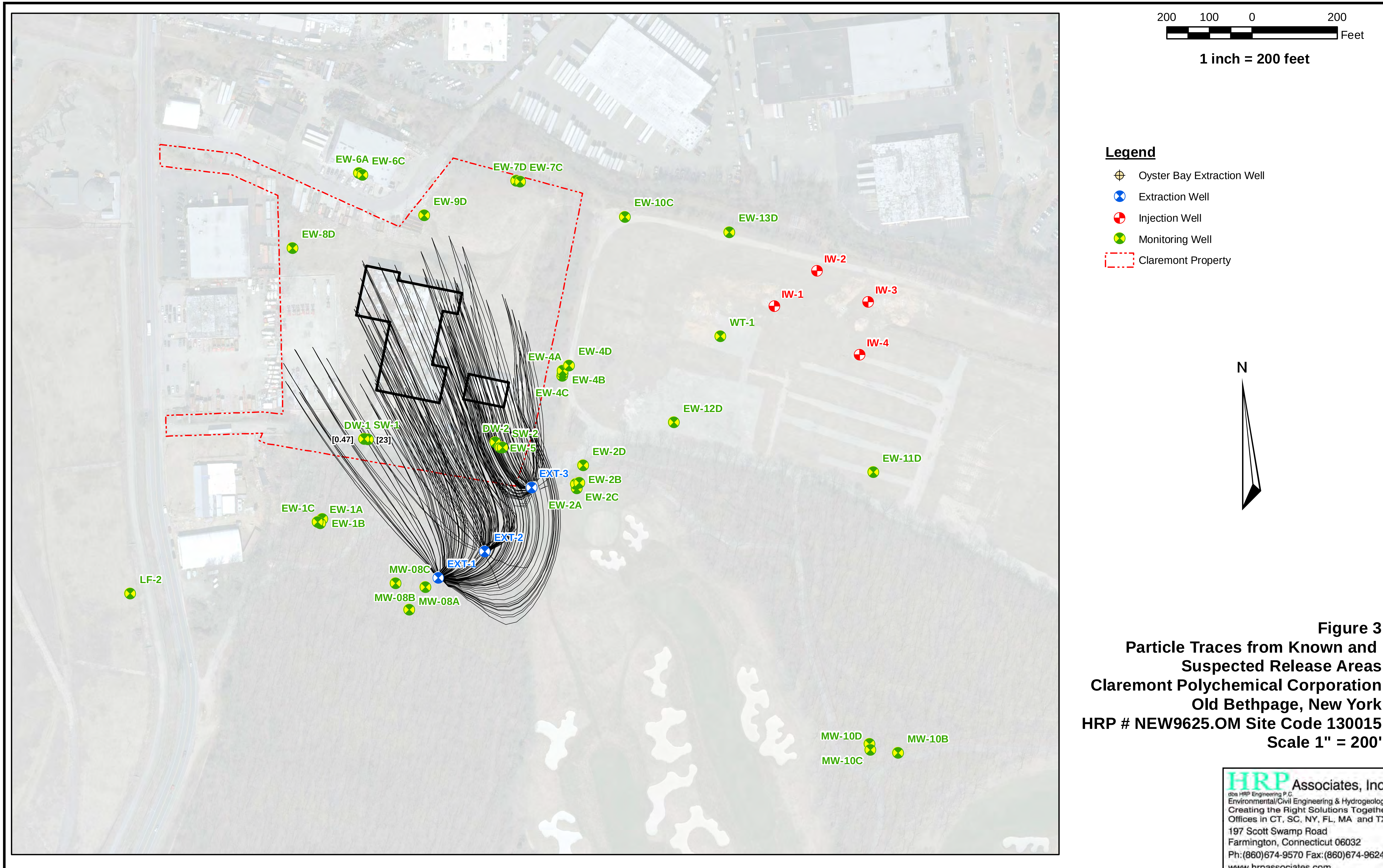


Figure 3
Particle Traces from Known and Suspected Release Areas
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 200'

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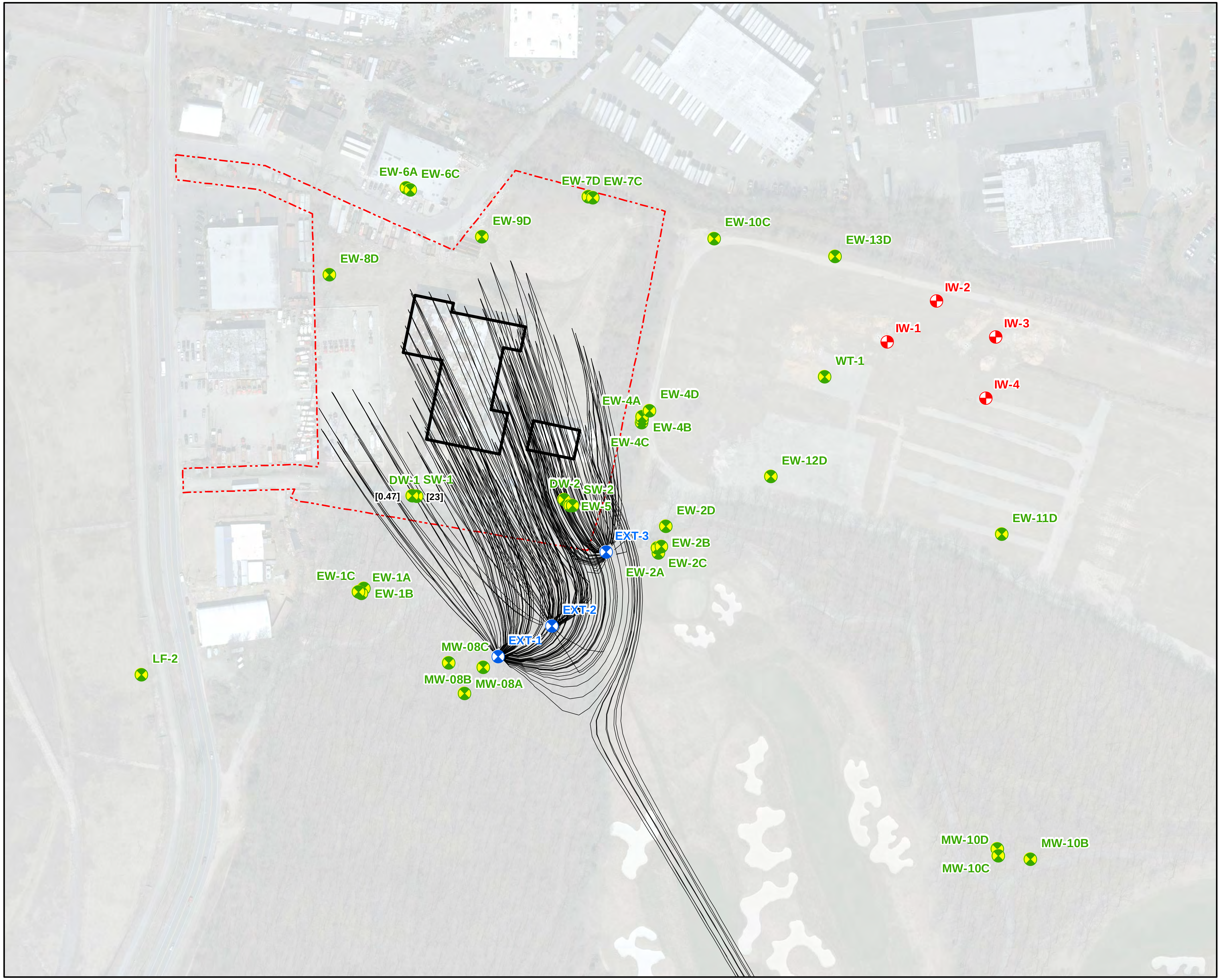

200 100 0 200
Feet

1 inch = 200 feet

Legend

- Oyster Bay Extraction Well
- Extraction Well
- Injection Well
- Monitoring Well
- Claremont Property

N

Figure 4
Particle Traces from Known and Suspected Release Areas
5% Reduced Pumping Rate
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 200'

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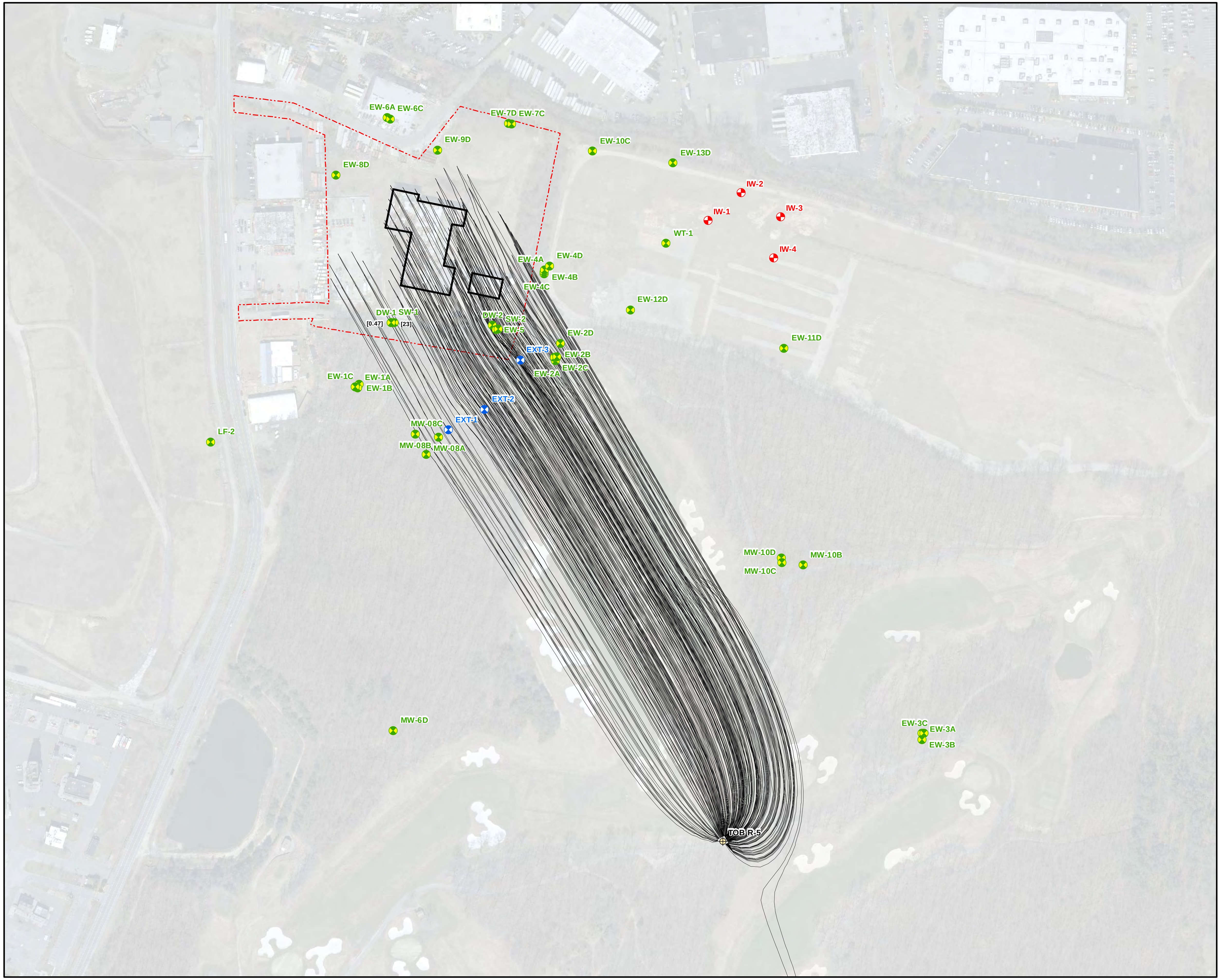

200 100 0 200 400
Feet

1 inch = 300 feet

Legend

- Oyster Bay Extraction Well
- Extraction Well
- Injection Well
- Monitoring Well
- Claremont Property

N

Figure 5
Particle Traces from Known and Suspected Release Areas
No Pumping from CPC Extraction Wells
Claremont Polychemical Corporation
Old Bethpage, New York
HRP # NEW9625.OM Site Code 130015
Scale 1" = 300'

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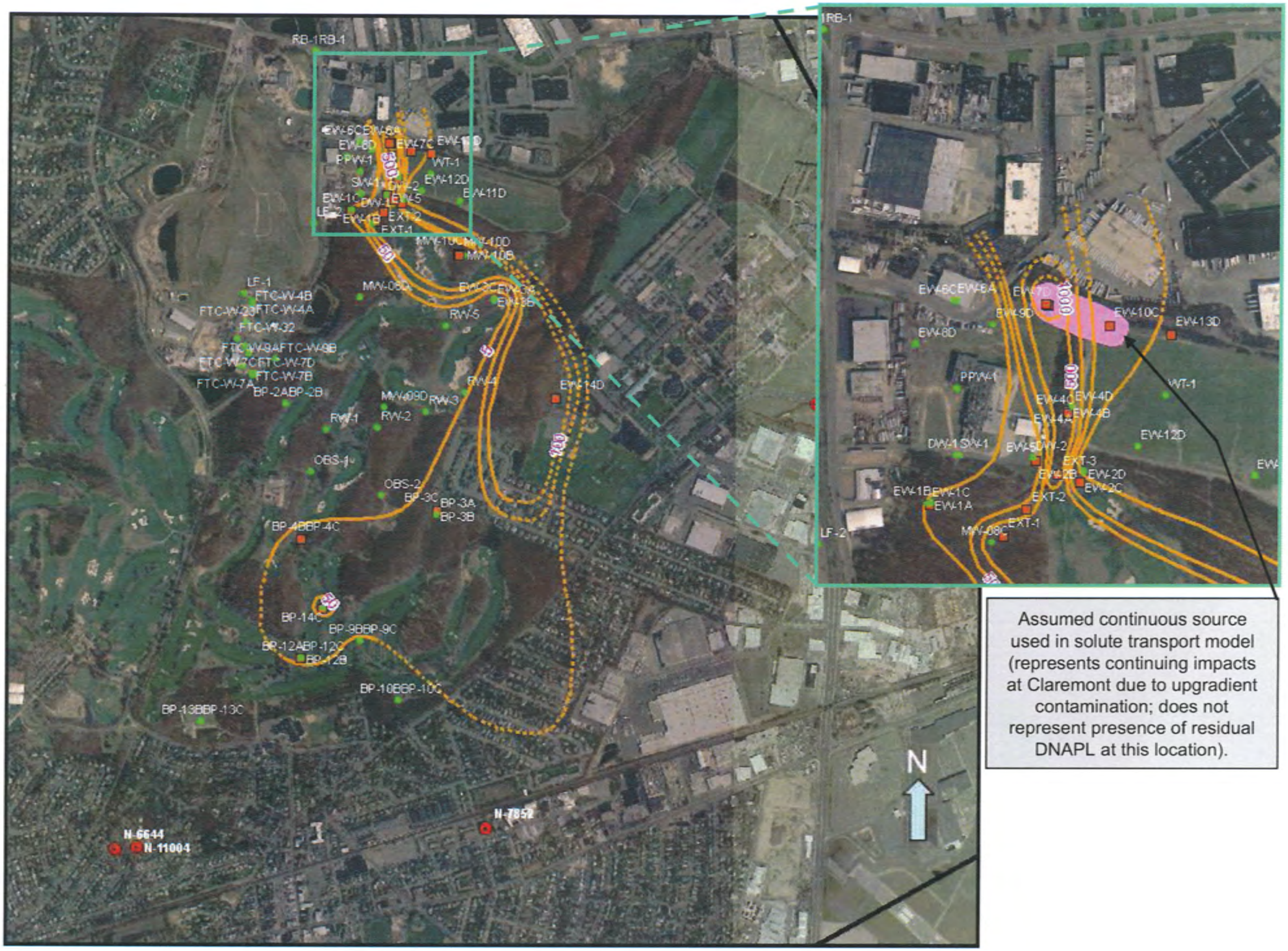

Figure 3-2. TCE Plume Map
Contours 5, 50, 100, 500, and 1000 mg/L

TABLES

TABLE 1

Extraction and Injection Well Pumping Rates

Claremont Polychemical Corporation Superfund Site

Old Bethpage, Nassau County, New York

	SAIC (March 2006)	HRP (July 2011)		
Well	Pumping Rate (ft^3/day)	Pumping Rate (ft^3/day)	Infiltration Gallery Recharge Rate (ft^3/day)	Infiltration Gallery Recharge Rate (ft/day)
EX-1	-32,354	-22,342	-	-
EX-2	-32,354	-23,853	-	-
EX-3	-32,354	-19,063	-	-
IN-1	24,217	9,858.6	6,572.4	3.945
IN-2	24,217	14,338	-	-
IN-3	24,217	11,367.6	7,578.4	6.235
IN-4	24,217	14,270	-	-

Note: A negative pumping rate indicates groundwater extraction

TABLE 2

Modeled Hydraulic Conductivity Values

Claremont Polychemical Corporation Superfund Site

Old Bethpage, Nassau County, New York

	SAIC Values				Public Wells	Nassau County Department of Public Works	1987 Geraghty and Miller Pump Test	HRP Calibrated Values	
	Initial		After Calibration						
Layer	$K_x = K_y$	K_z	$K_x = K_y$	K_z	$K_x = K_y$	$K_x = K_y$	$K_x = K_y$	$K_x = K_y$	K_z
1	31.5	3.15	282	28.2		150	---	215.3	21.53
2	52.3	5.23	125	12.5		150	251	101.4	10.14
3	36.9	3.69	135	13.5	2.76-29.83	150	253	365.8	36.58
4	36.9	3.69	690	69				317.2	31.72
5	36.9	3.69	98	9.8				43.3	4.33

All units are in ft/day

TABLE 3

Steady State Calibration Statistics
Claremont Polychemical Corporation Superfund Site
Old Bethpage, Nassau County, New York

	SAIC Model	HRP Model
Number of Wells	83	41
Residual Mean	-0.05	0.01
Residual Standard Deviation	0.68	0.84
Sum of Squares of Residuals	38.66	28.7
Absolute Residual Mean	0.53	0.56
Minimum Residual	-2.01	-1.72
Maximum Residual	1.69	3.92
Residual Standard Deviation / Range in Observed Heads	4.58%	8.69%

APPENDIX C

ENERGY AUDIT REPORT

Claremont Polychemical Superfund Site

505 Winding Road
Old Bethpage, NY 11804

Prepared For:

New York State Department of Environmental Conservation

Work Assignment # D006130-19
Site # 130015

April 2012
Revised August 2012

Prepared by:

HRP Associates, Inc.

DBA HRP Engineering P.C.
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ENERGY AUDIT REPORT
Claremont Polychemical Superfund Site
505 Winding Road
OLD BETHPAGE, NY 11804

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Claremont Polychemical Superfund Site
505 Winding Road
OLD BETHPAGE, NY 11804

EXECUTIVE SUMMARY

In accordance with the Department of Environmental Remediation's DER-31 Green Remediation, the New York State Department of Environmental Conservation (NYSDEC) is dedicated to developing and promoting innovative clean-up strategies that restore contaminated site to productive use, promote environmental stewardship, and reduce associated costs while minimizing ancillary environmental impacts from these clean-ups. Due to this interest, HRP Associates, Inc. DBA HRP Engineering P.C. (HRP Engineering) completed an energy audit of the NYSDEC's Claremont Polychemical Superfund Site, located at 505 Winding Road, Old Bethpage, New York, groundwater remediation facility to identify and evaluate Energy Conservation Measures (ECMs) and renewable energy options. The facility, which is a groundwater treatment plant, was constructed in 2000.

The groundwater remediation facility utilizes electricity for lighting, motors, HVAC (cooling, fans), process and office equipment, and natural gas for heating. The building typically consumes 490,000 kW-hr/yr ($74,000/yr) of electricity and 641 CCF/yr ($572/yr) of natural gas. The facility utilizes Long Island Power Authority for both supply and delivery of electricity. Natural gas is supplied and delivered by National Grid. Natural gas costs fluctuate with market prices, ranging from $0.80 CCF to $0.94 CCF in 2011, and averaging $0.89 CCF over the reviewed period.

In February 2012, HRP reviewed the building's operational characteristics and employee's general actions and tendencies. We also reviewed the HVAC and lighting processes, and the overall building envelope to identity and evaluate potential ECMs and renewable energy opportunities. A summary of potential energy and costs saving measures identified during the audit are summarized on Table 1 and included in Appendix D. HRP's review determined:

- The building's motors offer the most significant energy savings since the majority of the existing motors were installed in 2000 when the building began operation. The initial efficiencies of the motors range from 80-85%. It can be assumed that the efficiency has declined over the 10+ years of operation due to wear. New premium efficiency motors have efficiencies as high as 95%. It was reported by facility personnel that none of the motors have been rewound. At a cost of approximately $15,800 dollars, the motors at the facility could be replaced with high efficiency motors that would lead to an annual savings of about $2,200 with a payback of 7.2 years. Long Island Power Authority offers rebates of: $800 - $2000 for motors of 5 – 25 HP, which could further reduce the payback period.
- The existing lighting is typically 34W T-8 lamps with magnetic ballasts. These lamps and fixtures can be replaced with more efficient T-8 lamps with electronic ballast to save electricity. The cost to replace the fixtures at the facility would be about $400 dollars and have an annual savings of about $18.72 with a payback period of 21 years.

- Renewable Energy options were reviewed including solar photovoltaic, wind turbines, and geo-thermal systems. Utilization of wind turbines was determined to be the best option with potential energy savings up to 11,106 kWh/year, or $1,665.
- The heat tape on outdoor piping at the facility currently runs continuously from November to April. A thermostat can be installed so the system only runs when outdoor temperatures are below freezing. The cost to install the thermostat would be approximately $800 and have an annual savings of $1,724, resulting in a payback period of 0.5 years.

In addition to the activities noted above, the NYSDEC should evaluate the feasibility of implementing any of the ECM's identified during the audit and detailed in Appendix C. Furthermore, we recommend that you consider:

- Bidding electricity and natural gas purchase prices on an annual basis to ensure that the facility obtains the best available costs. For example, Claremont contracts with LIPA to supply and distribute electricity to the facility. LIPA electricity customers can choose to purchase electricity supply from LIPA or an Energy Services Company (ESCO). If an ESCO is selected then the Electricity Supply charge on the facility's statement will change to the costs of the selected supplier while the Electricity Delivery Charge will remain. In addition, the Merchant Function charges and taxes associated with electricity delivery will be eliminated. The facility also has the option to purchase green energy.

1.0 OVERVIEW OF ACTIVITIES

1.1 Statement of Audit Goals and Objectives

In accordance with the NYSDEC's DER-31/ Green Remediation policy, HRP Engineering completed an energy audit and renewable energy feasibility study to increase energy efficiency, optimize operations, and evaluate renewable energy options. In particular, HRP reviewed the facility's operations, equipment and energy use to identify and evaluate potential Energy Conservation Measures (ECMs) (i.e. lighting upgrades, motor replacement, demand softening, etc.) The audit considered energy conservation opportunities including, but not limited to:

- Building Envelope
- HVAC Systems
- Electrical Systems
- On-site Processes

In addition, the implementation of renewable energy including solar photovoltaic systems, wind turbines and geo-thermal systems were reviewed.

1.2 Audit Tasks

To achieve the goal, HRP completed the following tasks:

Task One – Energy Use and Utility Program Information Collection

HRP utilized software to review energy bills for up to a 1 year period to identify:

- Energy use patterns
- Anomalies in energy use
- Load Factor by month

Task Two - Energy Audit

HRP conducted a site inspection to identify significant energy consuming equipment including but not limited to:

- Lighting system and controls
- Motors
- Ventilation systems
- Process equipment
- Building Envelope
- Cooling / Cooling systems and controls

- Other major energy using systems, as applicable

In addition, building, equipment, and operational information were collected including:

- Equipment rating, age, and operational history
- Typical hours of operation
- Equipment design parameters, if available
- Current operating condition for each system
- O&M procedures and records
- Remaining useful life of each system
- Feasible replacement systems

Task Three – Renewable Energy Evaluation

A review of the feasibility of utilizing PV solar, wind turbines and geo-thermal to generate on-site power was conducted including:

- Identification of options
- Review of potential energy generation
- Cost of installation
- Available incentives

Task Four - Energy Data Evaluation

The collected information was analyzed to identify and evaluate ECMs utilizing software and Energy Estimators to determine potential savings under various operating or equipment modification scenarios. Each of the identified ECM's was reviewed to identify:

- Potential cost and energy savings
- Total project cost
- Life expectancy of each proposed ECM
- Total project lifetime cost savings
- Annual CO_2 Equivalent savings in pounds
- Available grants and rebates to reduce implementation costs

2.0 DESCRIPTION OF EXISTING CONDITIONS

2.1 Facility Location and Description

The Claremont facility is located at 505 Winding Road in Old Bethpage, Nassau County, New York at the site of the abandoned Claremont Polychemical Company production facility. The facility was originally built by the United States Environmental Protection Agency (USEPA) and was granted to the New York State Department of Environmental Conservation (NYSDEC) to operate in 2011. HRP Engineering was retained to operate and maintain the facility beginning June 1, 2011. Land use in the area is light industrial and commercial.

The Claremont ground water treatment system is designed to treat metal and organic contaminants and provide final pH adjustment. The facility consists of a 6,000 ft^2 building and associated driveways and parking lots located on a 9.5 acre parcel. On-site operations include groundwater extraction, various water treatments as well as injection of the treated water back into the ground.

The Claremont extraction system consists of three extraction wells approximately 150 feet apart south of the site oriented in a southwest-northeast line. The three extraction wells are screened from approximately 60 feet MSL (just below the water table) to -30 feet MSL and are outfitted with 10 horsepower pumps each capable of providing 200 gpm. The average flow rate of the system over the course of a month is approximately 325 gpm. This average flow rate translates to approximately 470,000 gallons per day.

Water from the extraction system enters a 60,000 gallon equalization tank situated adjacent to the treatment building. Water from the equalization tank flows through two parallel metals-removal trains that are each rated for 250 gpm. Each treatment train includes a reaction tank, a flocculation tank, a clarifier, and a filter and is followed by air-stripper feed tanks. The treated water is then stored in two 60,000-gallon vessels before reinjection to the subsurface.

2.2 Building Occupation Profile

The facility runs 24 hours a day, 7 days per week. Staff is generally present Monday through Friday, from 5am to 3pm. A total of 2 employees are employed at the site.

2.3 Building Systems

The energy consuming equipment at the facility includes HVAC, ventilation, motors and lighting.

2.3.1 HVAC Equipment

The building consists of 2 distinct HVAC zones as outlined below. Interviewed employees were not aware of any issues associated with the HVAC system and each of the units appeared to be in generally good condition with routine maintenance reportedly completed as recommended by the manufacturer. The units' were installed in 2000 when the facility was opened.

Office Portion

The 250 ft^2± office portion of the building consists of 1 furnace unit that is controlled by a non-programmable thermostat.

The Office's cooling needs are met using a Mitsubishi Mr. Slim PUH42EK unit which provides 42,500 BTU/hr of cooling.

Treatment Plant Portion

The treatment plant portion of the building is provided with heating and ventilation via the Power Flame burner fueled by natural gas with a minimum rating of 600 MBH and a maximum of 1250 MBH.

This portion of the plant has consistent groundwater flow through of about 350 gallons per minute. The groundwater temperature remains constant throughout the year which keeps the building temperature above freezing during the winter. There are no heat exchangers or processes to add or remove heat, therefore the flow through temperature would remain constant.

Reducing the total volume of water in the building by replacing Carbon Treatment Cells with a Tray Aerator unit or other treatment option would not affect the temperature in the building due to the constant flow of the extraction wells as well as the minimal reduction in volume of the water in the building. Currently the facility doesn't heat this portion of the building unless work is being completed during the winter.

This section of the plant also utilized four exhaust fans to remove humidity. There is no cooling in this section of the facility.

2.3.2 Hot Water

Hot water is utilized for sanitary purposes (i.e. hand washing). The hot water is supplied via a 19.9 gallon State Industry hot water heater. It is projected that 20 gallons of hot water are used per day, 5 days a week for 52 weeks. This equates to 5,200 gallons of hot water used annually. Annual electricity use to heat water is approximately 2,168,400 Btu, or 635.5kW.

2.3.3 Lighting

A summary of the facility's lighting is provided below by area:

Indoor Lighting – the office area utilized the standard 48", T12 4 – 34W lamp fixture with magnetic ballasts, while the main plant used 20- 250W High Pressure Sodium lamps and four 48", T12 2 – 34W lamp fixture. Indoor lighting is controlled by switches.

Exit Signs – there are 5 exits signs that utilize two 15W lamps each.

Outdoor lighting - consists of 12- 250W High Pressure Sodium lamps mounted on the building. Outdoor lighting is reportedly controlled with a light sensor that currently does not function properly.

Approximately 29,264kWh are used annually for lighting or $4,390/year.

2.3.4 Ventilation

In addition to the ventilation associated with the noted HVAC units, there are 4 exhaust fans located in the facility. The exhaust fans are used as needed to remove moisture from the water treatment portion of the facility.

2.3.5 Motors

The facility maintains a variety of motors associated with different units within the water treatment process.

A summary of the motors is provided below.

Unit ID	Horsepower	Efficiency (%)*	Operation
P-1-1-1	10	79	Extraction Pump
P-1-1-2	10	79	Extraction Pump
P-1-1-3	10	79	Extraction Pump
P-1-4-1	5	90.2	Influent Pump
P-1-4-2	5	90.2	Influent Pump
P-1-4-3	5	90.2	Influent Pump
P-1-11-1	1.5	84	Sludge Recycle Pump**
P-1-11-2	1.5	84	Sludge Recycle Pump**
P-1-12-1	1.5	84	Sludge Transfer Pump**
P-1-12-2	1.5	84	Sludge Transfer Pump**
P-2-3-1	10	89.5	ASF Pump
P-2-3-2	10	91.7	ASF Pump
P-2-3-3	10	91.7	ASF Pump
P-2-9-1	10	91.7	GACF Pump
P-2-9-2	10	91.7	GACF Pump
P-2-9-3	10	91.7	GACF Pump
P-2-12-1	10	91.7	Injection Pump
P-2-12-2	10	91.7	Injection Pump
Exhaust Fan 1	1	90	Exhaust Fan
Exhaust Fan 2	1	90	Exhaust Fan
Exhaust Fan 3	1	90	Exhaust Fan
Exhaust Fan 4	1	90	Exhaust Fan

* Efficiency as rated by the manufacturer
** Air Pumps

The motors are operated on a lead/lag schedule as noted below.

- 3 of 3 Extraction pumps operate 24 hours per day.
- 2 of 3 influent pumps operate 24 hours per day.
- Sludge recycling pumps not used except to ensure functionality.
- Sludge transfer pumps not used except to ensure functionality.
- 2 of 3 ASF pumps operate 24 hours per day.
- 2 of 3 GACF pumps operate 24 hours per day.
- 1 of 2 injection pumps operate 24 hours per day.
- Exhaust fans used as necessary

The facility is expected to utilize approximately 429,126 kWh/year or $64,368/year from motors. Motors are the largest user of electricity at the facility.

2.4 Building Envelope

The facility is constructed of a steel structure with a concrete slab on grade. There is no crawl space or basement in the building. It is expected that half inch fiberglass sheets are used for insulation. The facility has five outside doors, four of them located in the treatment plant and the other located at the office. There are no windows at facility due to the nature of the facilities operations. Airspace gaps are present around areas where the piping goes through the building walls.

2.5 Other

The facility also utilizes the following energy consuming equipment:

- Two Champion Model PL-70 air compressors that deliver 102 cfm air at 125 psig, each driven by a Baldor 25 HP motor; by design, only one of the compressors operates at a time. The compressors are used to operate air pumps which remove the solids that settle in the clarifying tank;
- Chromalox Heat tape- (20W/ft), which operates continuously without a thermostat from November to April; and
- Computers (2).

3.0 ENERGY USE

3.1 Energy Suppliers

Claremont uses electricity for lighting, hot water, motors and piping heat tape. Various pieces of equipment such as air compressors and computers also contribute to electricity usage at the facility. Natural gas is utilized by the HVAC burner for heating and 1 hot water heater. Currently, natural gas and electricity are supplied to the facility by the following suppliers:

Natural Gas

Natural gas at the facility is supplied by National Grid. Natural gas costs have ranged from $0.80 CCF to $0.94 CCF in 2011, and averaged $0.89 CCF over the reviewed period.

Electricity

Distribution and Supply is provided by Long Island Power Authority (LIPA) under Tariff Class 281-Secondary, Commercial, Large, General Use with a blended electricity cost of $0.15 kW-hr.

LIPA's tariff includes following fees:

Service Charge- $1.40/Day

Demand Charge (Per KW)- June 1- Sept. 30 : $9.33
Oct. 1- May 31: $8.25

Energy Charge (Per kWh)- June 1- Sept. 30 : $0.0530
Oct. 1- May 31: $0.0381

Efficiency and Renewables Charge - $0.00485/kWh

Power Supply Charges- LIPA's Tariff For Electric Service includes a Fuel and Purchased Power Cost Adjustment ("FPPCA")(shown on your bill as Power Supply Charges) mechanism providing for LIPA to charge its customers for the costs of purchased power and fuel used to produce electricity.

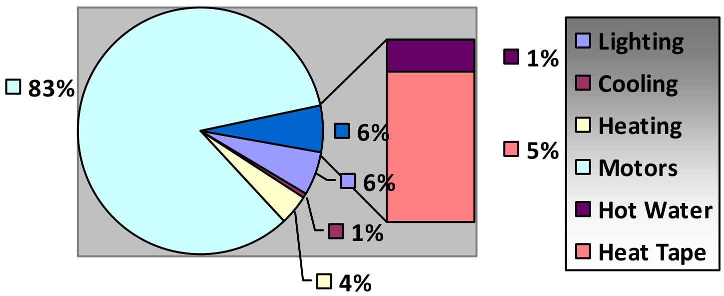
HRP understands that LIPA currently does not install "smart meters' for its customers. HRP recommends that a smart meter be installed at the facility which would allow continuous monitoring of electricity (i.e. tracking of on-peak and off-peak electricity usage), which would provide more information about the facilities electricity usage.

3.2 Energy Use

A summary of electricity and natural gas use for the past year is discussed below and presented in Appendix B, Figures 1 through 4. In particular, a review of the facility's energy bills determined that the facility's annual electricity and natural gas use and costs are:

	Annual Usage		Annual Cost
Electricity	490,000 kW-Hr	1,671.95mmBTU	$74,000
Natural Gas	641 CCF	64.84mmBTU	$ 572

Based on a review of the energy usage and type of equipment, HRP estimated that the facility's energy allocation is as follows:



Energy Use	Natural Gas (CCF / yr)	Electricity (kW-hr/Yr)	Total Energy (mmBTU / yr)	Percent Energy Use
Lighting		29264.08	99.77	5.75
Cooling		3369.6	11.49	0.66
Heating	641		.641	3.76
Motors		429,126.32	1463.1	84.07
Hot Water		635.5	0.017	1.06
Heat Tape		23,040	78.55	4.70
Total	641	490,000	1670	100

The facility's electricity use and demand averaged 1,343 kW-hr/day and 84 kW, respectively during the 1-yr reviewed period. It is expected that due to the consistent operation at the facility, including consistent water flow rates and hours of operation, one year of data was sufficient for review.

As noted on Figure 1, the electricity use ranged from a minimum of 1247 kW-hr/day in August to a maximum of 1,417 kW-hr/day in December 2011.

Demand

A review indicated that the demand was consistent throughout the reviewed period with a maximum of 87.5 kW in September 2011 to a minimum of 80kW in November 2011. Figure 3 demonstrates that the demand at the facility oscillates over the course of the year, but remains consistently between 80 kW and 90 kW due to the consistency of facility operations.

Demand – Power Factor

A review of the facility's power factor (i.e. the phase difference between voltage and current), as noted on the electricity bills, indicated that the facility has an average power factor of 0.66 and above 0.70 during the period of November and December 2011. Currently, LIPA does not charge the facility any penalties based on the power factor. A low power factor can be expensive and inefficient and some utility companies may charge additional fees when the power factor is less than 0.90.

Load Factor

The facility's load factor (see Figure 4) ranges from approximately 62% to 72%, with the higher load factor observed during the heating season, likely due to increased need for electricity and heating. Due to the consistent demand no abnormalities or outliers were identified that required further review. Therefore the facilities load factor appears appropriate.

Natural Gas Usage

Natural gas use, which is recorded weekly, is used for heating and hot water. Usage peaks in the winter and there is generally no usage during the summer. The data indicated that the natural gas use had a maximum of 134 CCF-week in February 2010 and a minimum of 0 CCF-week for multiple weeks during the summer based on available data. The reported natural gas use for a building of its size is low; however, considering the building use the usage is appropriate.

Tariff Class

Currently the facility utilizes LIPA's Tariff Class 281 for Secondary, Commercial, Large, and General Use. HRP completed a review of the tariff rates to determine if any other options would be favorable financially. A review of a time-differentiated rate proved that due to the nature of the facility's twenty four hour a day schedule, the time of use tariff class would not provide any savings.

4.0 ECM IDENTIFICATION AND INCENTIVE INDENTIFICATION

4.1 ECM Identification and Evaluation

Provided within Appendix C are each of the ECMs identified by HRP during the audit, as well as our calculations to determine potential energy and costs savings, costs to implement the ECM and simple payback. A summary of the ECMs and lifetime calculations are provided on Table 1.

The collected information was analyzed to identify and evaluate potential ECMs to reduce energy use and operating costs including:

- Equipment and lighting upgrades (pump impellers,lighting ballasts, lamps, exit signs etc.);
- Equipment control (Heat Tape, programmable thermostats, etc.);and
- Equipment replacement (Energy Star rated equipment, Premium Efficiency motors, etc.).
- Operation Modification (Elimination of Metal preparation, air stripping modification).
- Alternative energy generation measures such as geothermal, solar and wind.

Once the ECMs were identified, HRP utilized our prior experience, software, vendor quotes, and RS Means *Building Construction Data* or an equivalent authoritative source to estimate implementation costs, potential energy and costs savings.

5.0 RENEWABLE ENERGY

As part of the energy audit and in accordance with the NYSDEC's DER-31 Green Remediation policy, HRP completed a review of utilizing various renewable energy options to power the facility. The use of Geo-thermal energy, wind turbines, and solar photovoltaic's were all reviewed and are further discussed below.

5.1 Geo-Thermal Energy

HRP performed a study to evaluate the feasibility of utilizing geothermal energy to heat/cool the facility. Considering the building has a continuous flow of groundwater, the facility is a candidate for geo-thermal energy. The feasibility was completed using estimations of the current system efficiency and experience with performance of ground source heat pump (GSHP) installations in the area.

Basic Geo-Thermal Concept

Geo-thermal technology utilizes stable ground temperatures (typically in the low 50s of in New York) to transfers heat between the ground and a building to maintain the building space conditions. In particular, the stable ground temperatures provide a source for heat in the winter and a means to reject excess heat in the summer by circulating a fluid between the building and the groundwater.

System Operation

Groundwater from the extraction wells would be pumped through a heat pump. In the summer, the heat pump transfers heat to the passing groundwater, thereby providing cooling to the space. In winter, the heat pump absorbs heat from the groundwater and transfers that heat through the building.

Existing HVAC System

The facility utilizes a natural gas burner for heat and a single Mitsubishi Mr. Slim air conditioning unit for cooling. The system has separate thermostats for the office and the main part of the treatment plant. The heating system is rarely used and is efficient and functioning very well. There is no cooling in the treatment portion of the facility.

Geo-Thermal Feasibility Study

The study reviewed the feasibility of utilizing the existing water extraction system for a water to water system. It was assumed installation of a geo-thermal system would include the replacement of the existing HVAC system with Water Source heat pumps. The feasibility was completed using estimations of the current system efficiency and experience with performance of ground source heat pump (GSHP) installations in the area.

Geothermal Analysis and Discussion

The following analysis was developed based on the utility information, existing site conditions and the following assumptions:

- Natural Gas cost is $0.92 per hundred cubic feet
- Existing gas-fired Equipment is 70% efficient on average
- Existing A/C equipment runs at EER of 9
- Geothermal Cooling Efficiency EER 16
- Geothermal Heating Efficiency COP 3.6
- Heat pump size: Two 5 ton units

Summary

The review determined that the geo-thermal system installation is anticipated to be $20,000 (heat pump plus installation) with a projected savings of $590/year. The project has a simple payback of 34 years. It is expected that due to a high efficiency of the existing equipment and the limited use of the facility's heating and cooling systems, geo-thermal at this time does not offer adequate savings. However, if the facility intends to upgrade/replace any HVAC equipment or construct and add onto an existing building, the use of geo-thermal should be re-evaluated.

5.2 Wind Turbines

HRP evaluated the feasibility of utilizing wind energy to supplement the groundwater treatment facility's electricity needs. The feasibility was completed using information provided by NYSERDA approved wind turbine manufacturers and local wind data.

Wind Energy Concept and Considerations

A wind energy system transforms the kinetic energy of the wind into electrical energy that can be harnessed for practical use. There are two basic designs of wind electric turbines: vertical-axis, and horizontal-axis (propeller-style) machines. Horizontal-axis wind turbines are most common today, ranging in size from 1 kW to 100s of kWs.

Choosing a proper site for a wind turbine is critical to a successful project. While the most important factors may vary from site to site, in any given instance a single factor can undermine success of an otherwise superlative project. A viable wind energy site generally includes the following key factors:

- Attractive Wind Resource;
- Landowner and Community Support;
- Feasible Permitting;
- Compatible Land Use;
- Nearby Access to an Appropriate Electrical Interconnect Point;
- Appropriate Site Conditions for Access during Construction and Operations;
- Aviation Compatibility; and
- Favorable Electricity Market.

Wind Resources

According to the wind map in Appendix D, Old Bethpage is located within an area mapped as Wind Power Class of 4. Further, according to SolarEstimate weather data, the area's average annual wind speed is 12.0 mph.

Typically, any site with a wind class of 3 and an average wind speed of 10mph or above is considerable viable.

Utility Coordination

If the installation is independent of all utility power, no utility coordination is required. However if the wind turbine is tied into the normal power supply of the building, the installation must abide by all applicable electrical codes and must stop supplying the grid during power outages. The other essential coordination is synchronization with the utility grid by matching voltage, frequency, and power quality. The local electrical company will buy back the power at a prearranged rate through a concept called net metering, which allows the electric meters of customers with generating facilities to reverse meter consumption when the generators are producing more energy than the customer demands. With net metering, energy generation offsets consumption over the entire billing period.

Zoning

Town approvals are typically required for any wind turbine installation. In addition, the following environmental impacts will need to be assessed to address:

- Visual impact
- Noise
- Potential physical obstacles (growing trees, buildings)

Wind Turbine Selection

The following Wind Turbines were selected (based on available NYSERDA incentives) for analysis using the RETScreen *International Wind Energy Product Model Software* provided *by the Canadian Ministry of* Natural Resources.

Option 1: 1 – Skystream 3.7 1.8kWWind Turbine (See Appendix E for Technical Specifications).

Option 2: 1 - Whisper 500 3kW Wind Turbine (See Appendix E for Technical Specifications).

Option 3: 1 - 10kW Bergey BWC XL 1 (See Appendix E for Technical Specifications).

Cost Analysis

A cost analysis, summarized in Appendix F, noted that Option 3, with an installed cost of $20,350 and an output of 11,106kWh/year, has the quickest payback period of 12.2 years. This would account for about 2.5% of the facility's electricity use. Larger or multiple turbines could be considered to increase the output of the system.

Cost calculations were completed assuming the $0.15/kWh average. Also, a maintenance cost of $250 every year was factored in to the financial analysis. No specific information was found on the cost of maintaining these wind turbines since the manufacturers claim to sell low maintenance products and it was assumed minor part and oil changes would be the extent of yearly maintenance. Finally, the financial analysis is based largely on the price of start-up versus yearly energy savings.

LIPA provides incentives for wind turbines up to $3.50 per kWh generated, or 60% of the total installed cost. With this incentive, it would be possible to reduce the payback period to less than 5 years.

Summary

Based on weather data and wind maps, the site is located within an area mapped at power Class of 4. An average wind speed of at least 10 mph and a Wind Power Class 3 or better qualifies a site as a good wind resource. Since the facility meets these requirements, the wind is expected to be sufficient enough to power a wind turbine. In particular, based on the analysis, Option 3 has the quickest payback period of 12.2 years with a total power output of 11,106 kWh per year. If available incentives ($3.50/kWh) are applied, the project cost and payback are reduced.

5.3 Solar Photovoltaic Energy

A feasibility and solar potential review of each facility was completed and included a review of:

- *Equipment Installation Feasibility*- Type of roof, available space, ease of access and general roof condition
- *Orientation* – Tilt of roof and orientation to south
- *Shading Analysis* -- Utilizing a Solar Pathfinder the potential shading from on-site features that will impact potential solar input and the percentage of solar energy that is available at each site each month of the year.
- *Electrical Tie In Features* – Ease and associated costs of tying into each facility's existing electrical service
- Structure – Ability to attach equipment to the roof and the visual condition of the roof

Based on site visits and a review of collected information, it was determined that:

- The flat roof is oriented in southerly direction with little to no shading;
- The roof is in good condition with few obstructions; and

- Electrical tie-in would present few complications.

Based on the review, it was determined that the facility is a good candidate for the installation of the PV system due to the ability of space on the roof, access to the roof, orientation, limited shading, relative ease of electrical tie-in and good condition of the roof.

PV System Types

Based on a review of the types of designs for PV power systems, it is recommended that a roof mounted, Grid Inter-tied system would be the best option for the facility. The PV array may be mounted above and parallel to the roof surface with a standoff of several inches for cooling purposes. These systems integrate solar electricity using the grid as a secondary power source.

PV System Selection

Based on the results of the review and an understanding of the client's needs, HRP recommends the following:

System Type: Grid-connected Photovoltaic Power System
Interconnection Type: Net-metering
Type of Cells: Polycrystalline solar cells
Mounting: Flat Roof Mounting System
System Size: 39.2 kW DC (Standard Test Conditions)
Panel Wattage: 220 Watt Modules
Number of Panels: 178
Expected annual output: 47,716 kWh

Summary

Based on a projected 39.2 kW system, it is expected that the system will generate 47,716 kWh/year. The electricity generated would save the facility approximately $7,157 per year. With an installation cost of approximately $235,000, the payback period would be 32.8 years. LIPA provides incentives for $1.30 per watt generated, which could potentially reduce the payback period to 23.8 years.

6.0 Financial Incentives

A wide variety of financial incentives are available through utility providers, state and federal government, to reduce costs of implementing ECMs and renewable energy. The incentives are typically available to the entity that pays the system benefit charge and/or pays the taxes at the facility. The incentives include, but are not limited to:

6.1 Rebates - LIPA offers the following rebate programs for lighting and motor upgrades.

Lighting Retrofit and Prescriptive - provides rebates for energy efficiency lighting projects, both new construction and retrofit, to support equipment and controls that can save energy. The program offers per-unit incentives as well as performance-based incentives including but not limited to:

- T8/T5 Fixtures: $75
- T8/T5 Lamps/Ballasts: $40
- Ceramic Metal Halide Fixtures: $15 - $75
- Variable Frequency Drives: (5 – 25 HP): $800 - $2000

Custom Incentives – offers incentives to encourage the implementation of energy conservation measures in new or existing buildings that do not fit the requirements of prescriptive incentive program. Eligible energy conservation measures will be incentivized based on energy savings at a maximum of $200,000 per building annually. All custom projects require program pre-approval prior to the purchase and installation of equipment.

NYSERDA also offers a state rebate program for existing facilities which includes lighting, motors, motor VFDs and interval meters among other technologies. Facilities are eligible for $0.16 per kWh for electric efficiency, $200 per kW for demand response and other rebates. The measures needed to qualify vary with the programs.

6.2 Renewable Energy Incentives

With LIPA's rebate, along with New York State's Solar Tax Credit and Federal Tax incentives, entities can significantly reduce the cost of purchasing a PV system. LIPA will provide $1.30 per watt generated up to 50 kW with a maximum of $65,000. With this rebate, it would cut the payback period for the system from roughly 33 years to about 25 years. Additionally, tax credits could potentially reduce the payback time further.

For wind turbine systems, LIPA will provide $3.50 per kilowatt hour (kWh) up to 16,000 kWh produced annually or 60% of the total installed costs, whichever is less. With this incentive, it is possible that the facility could lower the payback period from 12.2 years to 4.9 years

7.0 CONCLUSIONS AND ECM DISCUSSION

7.1 Conclusions

Claremont's Old Bethpage, New York building, utilizes electricity for lighting, motors, HVAC (cooling, fans), and office equipment and natural gas for heating. The building typically consumes 479,000 kW-hr/yr ($74,000/yr) of electricity and 641 CCF/yr ($572/yr) of natural gas. The facility utilizes Long Island Power Authority for both supply and delivery. The site is classified under Tariff Rate 281, which is for Secondary, Commercial, Large, General Use electricity users. Natural gas costs fluctuate with market prices, ranging from $0.80 CCF to $0.94 CCF in 2011, and averaging $0.89 CCF over the reviewed period.

An analysis of the building's energy usage determined that the building is relatively efficient, with most of the energy being used for the motors. According to discussions with the staff, the heating system for the plant is rarely used unless work is being completed during the colder months.

HRP identified and evaluated many ECMs including but not limited to:

- Motor equipment upgrades(pumps, exhaust fans);
- Lighting Upgrades (exit lights, fluorescent, solar);
- Thermostat for Piping Heat Tape Control;
- Removal of the metal removal process and air stripper- replacement with tray aerators.
- Solar PV and Wind turbines to supplement electricity usage.

7.2 ECM Discussion

After completing a review of site equipment and operations, HRP identified various ECMs that the facility should consider implementing. A discussion of each of the ECM areas can be found below.

Motors

At the facility, motors account for the majority of energy used. Motors at the facility run twenty four hours a day; therefore they would likely provide the most savings. Current motors at the facility, when installed, typically had efficiencies ranging from 80-90 percent. Over time, these motors degrade and efficiency will decrease. New premium efficiency motors can have efficiency ratings as high as 95 percent. These high efficiency motors could provide significant savings based on the high electricity usage observed at the water treatment plant.

Replacing the current motors with new, higher efficiency motors is an option the facility can review as an energy and cost saving measure. However with a high initial cost and a generally long payback period, this option for the pumps at the facility does not appear to be warranted at this time. As the existing pumps fail, at that time they can be replaced with higher efficiency pumps. The current motors, if maintained properly, will most likely have a useful life of five to ten years.

Removal of Air Stripping and Metal Removal Train
Based on the current process at the facility, HRP evaluated removing the air stripping unit and metal removal train and associated motors. The study evaluated using a tray aerator to replace the existing unit. The proposed system PID can be found in Appendix G. The cost savings would be noticed due to the removal of several motors associated with the process.

Lighting
The facility generally uses 250 watt High Pressure Sodium lamps in the treatment portion of the plant and 34 watt T-8 lamps in the office. Although lighting does not account for a large portion of the electricity consumed at the facility, replacing these lamps and ballasts with more efficient lamps would provide cost effective ways to save energy with generally short pay back periods. Also, NYSERDA has rebate programs for existing facilities that would provide rebates for energy efficiency lighting projects. The program offers per-unit incentives as well as performance based incentives.

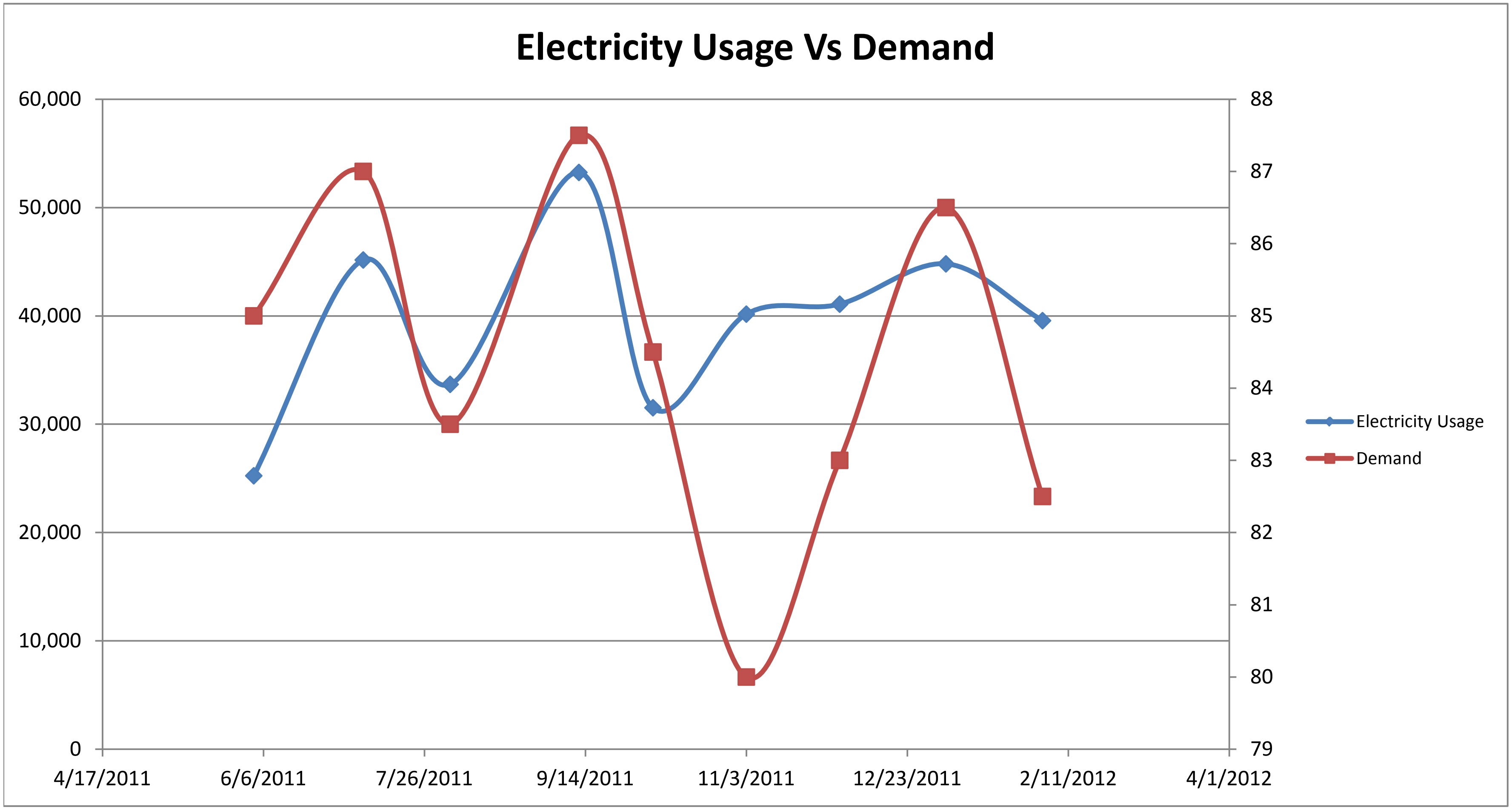
Heat Tape
Currently, the piping heat tape at the facility runs continuously from November to April. Based on the product specifications, an estimated 23,040 kWh is used during that time. A thermostat has been installed on the system so that it only runs when outdoor temperatures are below freezing. According to climate data for the area, approximately 98 days are below freezing. By installing a thermostat, the heat tape would only be using electricity about 50% as much as it does currently. This would lead to energy savings of 11,520 kWh and $1,728 annually.

Renewable Energy
Since the facility's main energy use is electricity, various renewable energy systems were evaluated. For heating and cooling needs, a study of geo-thermal systems was completed. For electricity, both wind turbine and solar panel systems were evaluated for potential installation. While the geo-thermal and solar systems had low savings and high payback times, the wind turbine system could potentially be a valuable system to offset the electricity used by the plant.

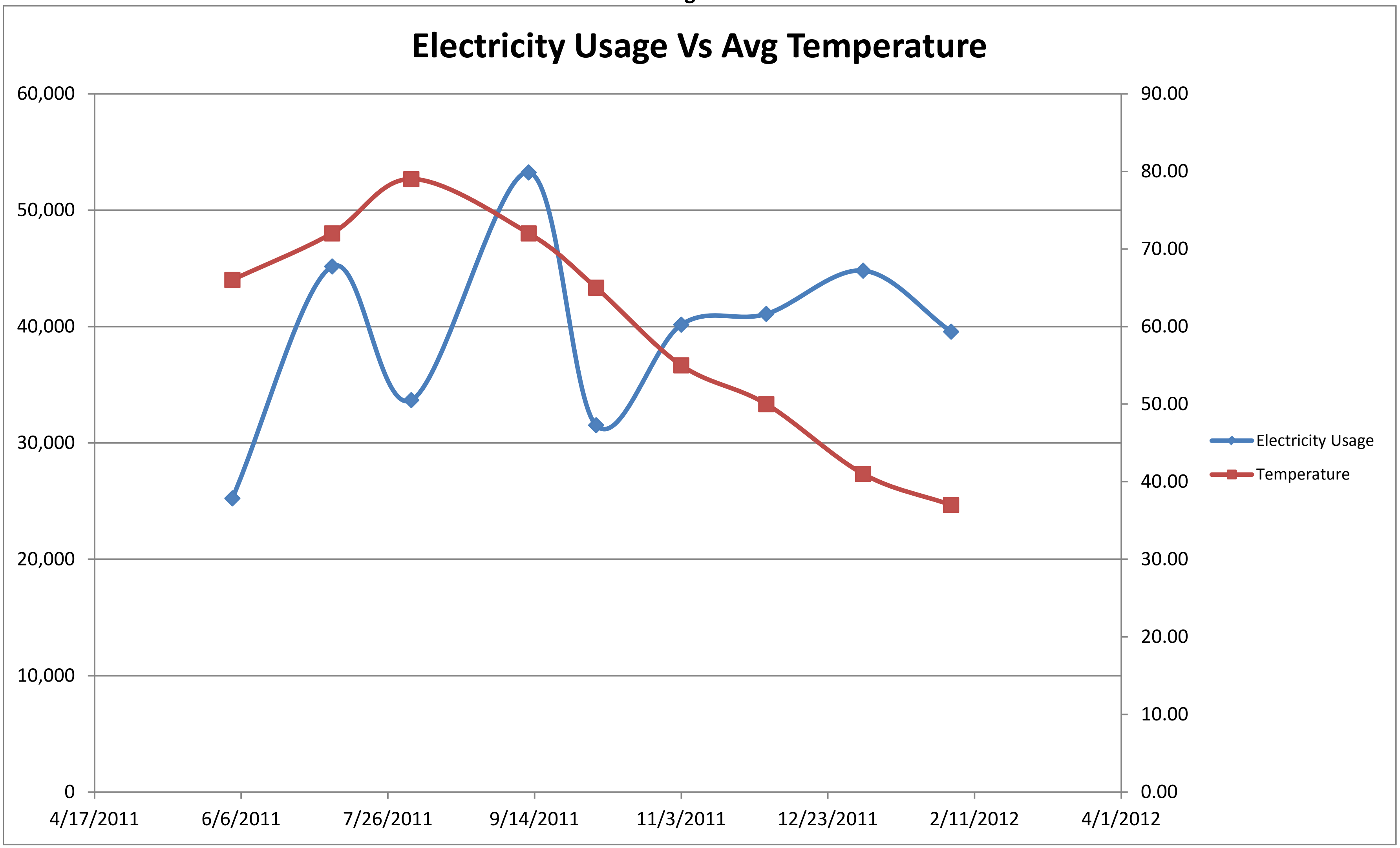
Bid of Electric Power

The Claremont facility has a contract with LIPA to supply and distribute electricity to the facility. LIPA electricity customers can choose to purchase electricity supply from LIPA or an Energy Services Company (ESCO). If an ESCO is selected then the Electricity Supply charge on Claremont's LIPA Statement will change to the costs of the selected supplier while the Electricity Delivery Charge will remain. The available ESCOs for LIPA customers includes: Con Edison Solutions, Hess Corporation, People's Power & Gas and Plymouth Rock Energy, LLC. The Claremont facility would provide the ESCOs with an energy usage profile and they would provide their supply charge. The facility could then choose the best price available. By using this method, the facility could potentially save about five percent annually on electricity supply costs.

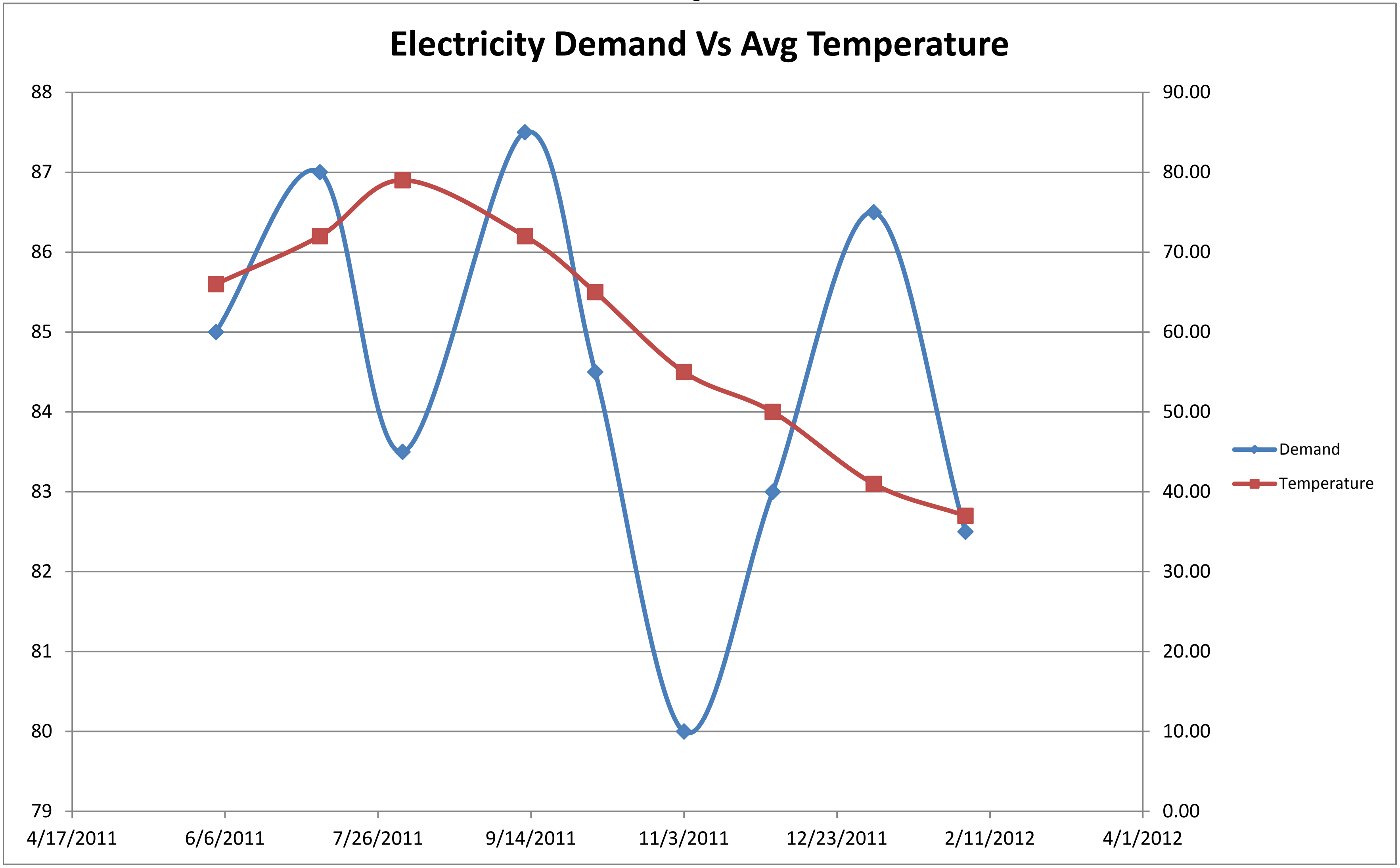
ENERGY AUDIT REPORT
New York Department of Environmental Conservation
Claremont Polychemical Superfund Site
505 Winding Road
Figure 1



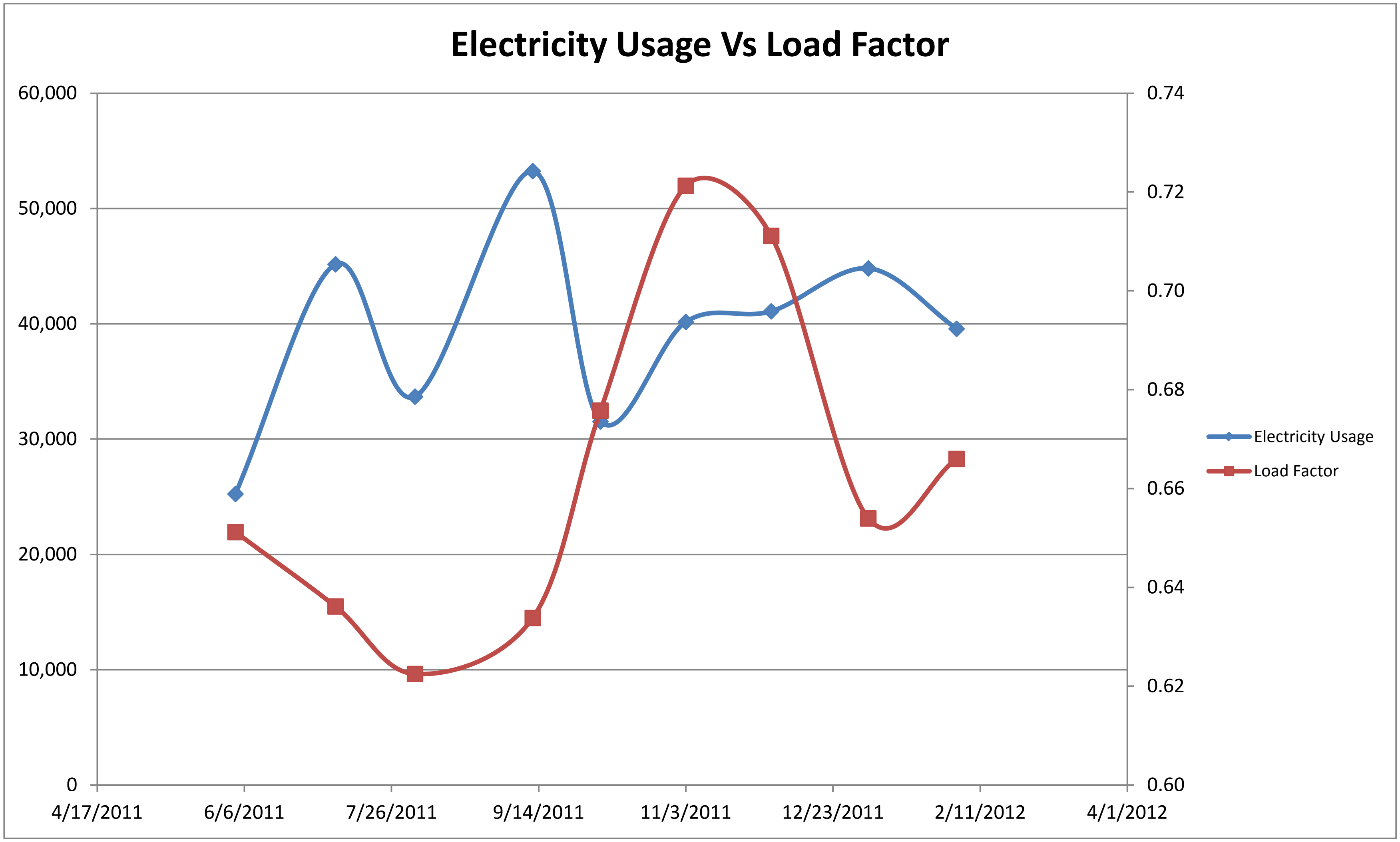
ENERGY AUDIT REPORT
New York Department of Environmental Conservation
Claremont Polychemical Superfund Site
505 Winding Road
Figure 2



ENERGY AUDIT REPORT
New York Department of Environmental Conservation
Claremont Polychemical Superfund Site
505 Winding Road
Figure 3



ENERGY AUDIT REPORT
New York Department of Environmental Conservation
Claremont Polychemical Superfund Site
505 Winding Road
Figure 4



ENERGY AUDIT REPORT

New York Department of Environmental Conservation

Claremont Polychemical Superfund Site

505 Winding Road

Table 1: Summary of ECMS and Renewable Energy

ECM Number	ECM Description	Energy Measure Type	Project Cost ($)	Annual Cost Savings ($)	Energy Savings (kWh)	Natural Gas Savings (CCF)	Green House Gas Savings (tons/kWh)	Simple Payback (years)
1	Lighting Replacement	Lighting	$400	$19	124.80	N/A	0.16	21.40
2	Exit Lights	Lighting	$650	$183	1,223.04	N/A	1.58	3.50
3	Solar Light Pipes	Lighting	$16,000	$1,643	1,095,000.00	N/A	1,417.15	9.70
4	Metal Train and Air Stripping Unit	Electricity	$150,000	$6,300	42,000.00	N/A	54.36	24.00
5	Geo-Thermal	Heating	$20,000.00	$590	N/A	631.00	3.79	34.00
6	Wind Turbines	Electricity	$20,350	$1,666	11,106.00	N/A	14.37	12.20
7	PV Solar	Electricity	$235,000	$7,157	47,716.00	N/A	61.75	32.80
8	Motor Upgrade	Electricity	Varies	Varies	Varies	Varies	Varies	Varies
9	Heat Tape Thermostat	Electricity	$800	$1,724	11,520.00	N/A	14.91	0.50

Assumptions: Green house gas emissions factors come from Energy Information Administrations Average Energy Emissions Factors by State and Region

APPENDIX A

SUMMARY OF HVAC UNIT

HVAC Burner Information

Make:	Power Flame
Model:	JR30A-12
Rate:	Minimum: 600 MBH
	Maximum: 1250 MBH

Standard Equipment:

1. Spark ignited gas pilot.
2. Air flow safety switch.
3. Flame rod flame detector.

Standard Control:

O-O - On-off operation with low fire start and one position air.

Burner Motor:

Marathon:	m/n 40F56C34D1196B
	p/n 05412
	1/3 HP, 3450 rpm

HVAC Air Make up Unit:

Make:	Baldor
	25 HP, 1780 RPM

APPENDIX B

ELECTRICITY AND NATURAL GAS USE

ENERGY AUDIT REPORT
New York Department of Environmental Conservation
Claremont Polychemical Superfund Site
505 Winding Road
Electricity Usage

Bill Date	Days In Bill	Meter Reading	Reading Type	KWH Used	Recorded KW-Demand	Billed KW	Bill Amount	KWH Used Per Day		Load Factor	Avg Temp
6/3/2011	19	78089	ACTUAL	25,240	85	85	$3,773.26	1,328	55.35	0.65	66.00
7/7/2011	34	79218	ACTUAL	45,160	87	87	$7,444.86	1,328	55.34	0.64	72.00
8/3/2011	27	80060	ACTUAL	33,680	83.5	83.5	$5,571.14	1,247	51.98	0.62	79.00
9/12/2011	40	81391	ACTUAL	53,240	87.5	87.5	$8,781.11	1,331	55.46	0.63	72.00
10/5/2011	23	82179	ACTUAL	31,520	84.5	84.5	$5,061.00	1,370	57.10	0.68	65.00
11/3/2011	29	83183	ACTUAL	40,160	80	80	$5,973.90	1,385	57.70	0.72	55.00
12/2/2011	29	84210	ACTUAL	41,080	83	83	$6,120.03	1,417	59.02	0.71	50.00
1/4/2012	33	85330	ACTUAL	44,800	86.5	86.5	$6,741.37	1,358	56.57	0.65	41.00
2/3/2012	30	86319	ACTUAL	39,560	82.5	82.5	$5,913.48	1,319	54.94	0.67	37.00

ENERGY AUDIT REPORT New York Department of Environmental Conservation Claremont Polychemical Superfund Site 505 Winding Road Natural Gas Usage			
Date	Time	Gas Meter	CCF Used
5-Feb-10		50707	
19-Feb-10	1200	50841	134
22-Feb-10	935	50841	0
2-Mar-10	941	50912	71
8-Mar-10	1119	50960	48
15-Mar-10	1015	51016	56
23-Mar-10	858	51089	73
1-Apr-10	1040	51162	73
5-Apr-10	1245	51179	17
12-Apr-10	955	51189	10
19-Apr-10	955	51240	51
16-Apr-10	935	51281	41
28-Apr-10	730	51305	24
3-May-10	1015	51331	26
11-May-10	940	51372	41
17-May-10	920	51418	46
24-May-10	1025	51442	24
26-May-10		51452	10
1-Jun-10	940	51454	2
7-Jun-10	935	51454	0
14-Jun-10	1100	51472	18
21-Jun-10	1430	51479	7
28-Jun-10	925	51479	0
6-Jul-10	917	51479	0
14-Jul-10	845	51479	0
19-Jul-10	1020	51479	0
26-Jul-10	900	51479	0
2-Aug-10	910	51479	0
9-Aug-10	915	51479	0
16-Aug-10	900	51479	0
Data Lost			
5/16/2011	940	52497	0
5/23/2011	910	52505	8
5/31/2011	1230	52503	-2
6/6/2011	935	52503	0
6/13/2011	1210	52503	0
6/20/2011	925	52503	0
6.27.11	1000	52503	0

ENERGY AUDIT REPORT New York Department of Environmental Conservation Claremont Polychemical Superfund Site 505 Winding Road Natural Gas Usage			
7/5/2011	840	52503	0
7/11/2011	1000	52503	0
07/18/11	1045	52503	0
07/25/11	1155	52503	0
08/01/11	900	52503	0
08/08/11	905	52503	0
08/15/11	930	52503	0
08/22/11	1245	52503	0
08/29/11	1330	52503	0
09/06/11	945	52503	0
09/12/11	930	52503	0
09/19/11	945	52503	0
09/26/11	855	52503	0
10/03/11	920	52503	0
10/10/11	1105	52503	0
10/17/11	1000	52503	0
10/24/11	1440	52503	0
10/31/11	920	52503	0
11/07/11	1050	52503	0
11/14/11	855	52503	0
11/21/11	935	52503	0
11/28/11	910	52503	0
12/05/11	945	52503	0
12/12/11	955	52503	0
12/19/11	935	52503	0
12/27/11	905	52503	0
01/03/12	950	52519	16
01/09/12	905	52533	14
01/16/12	1200	52533	0
01/23/12	915	52533	0
01/30/12	1255	52539	6
02/06/12	915	52560	21
02/13/12	935	52600	40
02/20/12	910	52600	0
02/27/12	1110	52616	16
03/05/12	940	52632	16

APPENDIX C

ECM'S AND ASSOCIATED DOCUMENTATION

ECM SUMMARY SHEET

ECM NUMBER	1
ECM CODE	Lighting
ECM DESCRIPTION	Replace existing T-8 and T-12 lamps and magnetic ballasts with energy efficient T-8 lamps and electronic ballasts.
PROJECT COST	$400
SIMPLE PAYBACK	21.4 years
ELECTRICAL ENERGY SAVINGS	124.8kWh
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$18.72

EXISTING CONDITIONS:

Many of the existing lighting fixtures utilize T-12 lamps with magnetic ballasts.

ECM SPECIFICATIONS:

Replace T-12 lamps and magnetic ballasts with 28W energy efficient T-8 lamps and electronic ballasts.

Assume lights are on 10 hours a day, 5 days per week, and 52 weeks per year

Assume electricity cost $0.15/kWh

8 *(0.034-0.028kW) x 10hours x 5 days x 52 weeks = 124.8kWh saved per year

124.8kWh x $0.15/kWh = $18.72 saved per year

Payback = Project cost/ annual savings

$400/18.72 = 21.4 years

ECM SUMMARY SHEET

ECM NUMBER	2
ECM CODE	Lighting
ECM DESCRIPTION	Replace existing exit lamps with more efficient LED exit fixtures.
PROJECT COST	$650
SIMPLE PAYBACK	3.5 years
ELECTRICAL ENERGY SAVINGS	1,223.04 kWh/yr
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$183.46

EXISTING CONDITIONS:

The majority of the facilities exit signs utilize two 15W lamps each, for a total of 30W per exit sign.

ECM SPECIFICATIONS:

Replace the exit signs with more efficient, LED exit signs, which use about 2W per fixture and also have a longer operating life and require less service.

Assume:

24 hr/day x 7 days/wk x 52 =8,736 hr/yr that fixture will operate

Cost to install

5 units = $130/unit or $650 for material and installation

Savings

((5 fixtures x (30W-2W) x 8736 hr/yr =1,223.04kW-h/Yr x $0.15= $183.46

ECM SUMMARY SHEET

ECM NUMBER	3
ECM CODE	Lighting
ECM DESCRIPTION	Install Apollo® solar light pipe in treatment portion (5,500 ft^2) of building.
PROJECT COST	$16,000 for material and installation ($1000 per unit)
SIMPLE PAYBACK	9.7 yrs.
ELECTRICAL ENERGY SAVINGS	10.95 MW/yr
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$1,643

EXISTING CONDITIONS:

The building's treatment portion is provided lighting by 250W High Pressure Sodium Lamps.

ECM SPECIFICATIONS:

Install Apollo Light Pipe Model LP22.5 X 24.3 in 5,500 ft^2 of the treatment plant. The Light Pipe is a clear polycarbonate dome mounted on an aluminum flashing on the roof collects and directs sunlight down into the area below through a reflective transfer tube. This tube connects to a domed translucent or prismatic diffuser that distributes natural light evenly throughout the area without heat gain or loss (assuming less than 3% of area is cover with light tubes). Each light (Apollo Solar Light Model LP22.5) is rated for 350ft^2 and is projected to provide an average 6 hr/day of adequate lighting for activities. It is expected that on a sunny, cloudy and overcast day the light tube will provide 25 to 35, 15 and 5-7 foot-candles, respectively. For comparison purposes, the recommended lighting in foot-candles is 15 fc.

Assume:

6 hr/day x 7 days/wk x 52 = 2,190 hr/yr that light fixture will not be required to operate

Cost to install

5,500ft2/350 ft2 = 16 units or $16,000 for material and installation

Savings

((20 fixtures x .250 kW) x 2190 hr/yr =10,950kW-h/Yr x $0.15= $1,643

ECM SUMMARY SHEET

ECM NUMBER	4
ECM CODE	Air Stripping Unit
ECM DESCRIPTION	Replace Air Stripping Unit with Tray Aerator and Remove Metal Treatment Train
PROJECT COST	Est. $150,000
SIMPLE PAYBACK	24 years
ELECTRICAL ENERGY SAVINGS	42,000 kWh
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$6,300

EXISTING CONDITIONS:

Currently the facility utilizes an air stripping tower as well as a metal precipitate line which is no longer applicable to the treatment process.

ECM SPECIFICATIONS:

Install STAT 720 Low profile tray aeration unit. The installation of this unit would include the removal of the current metal precipitate line which includes a reaction tank, clarifier, sludge removal, sand filters, and the air stripping tower. Several motors utilized in this process would also be removed. The low profile aeration unit would utilize an existing pump and blower unit.

The removal of the pumps associated with the air stripping unit, mostly 10 HP each, would generate a savings of approximately 42,000kWh/ year.

Assume the cost per kW is $0.15

Annual Savings: 42,000kW x $0.15 = $6,300 savings

The cost of the STAT 720 Tray Aeration Unit is estimated to be $150,000

Payback period:

Cost of Project/Annual Savings = $150,000 / $6,300 = 24 year payback

ECM SUMMARY SHEET

ECM NUMBER	5
ECM CODE	Heating
ECM DESCRIPTION	Geo-Thermal Heat Unit
PROJECT COST	$20,000
SIMPLE PAYBACK	34
ELECTRICAL ENERGY SAVINGS	NA
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	631 ccf Natural Gas
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$590

EXISTING CONDITIONS:

The facility currently uses about 631 CCF of natural gas per year for heating using a 600 MBTU burner.

ECM SPECIFICATIONS:

Install a GeoSystems 10 Ton heat pump to replace the existing unit

Assume the cost per hundred cubic feet of natural gas is $0.92

Annual Savings: 631 x $0.92 = $590 Annual savings

The cost of the Geosystems heat pump unit is estimated to be $20,000

Payback period:

Cost of Project/Annual Savings = $20,000 / $590 = 34 year payback

ECM SUMMARY SHEET

ECM NUMBER	6
ECM CODE	Energy Generation
ECM DESCRIPTION	Wind Turbines
PROJECT COST	$20,350
SIMPLE PAYBACK	12.2 years
ELECTRICAL ENERGY SAVINGS	11106 kWh
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$1665.90

EXISTING CONDITIONS:

Currently, the facility uses about 490,000 kWh of electricity per year for various processes. It is estimated that the facility pays almost $74,000 a year for its electricity bill.

ECM SPECIFICATIONS:

Install a BWC Excel 10kW Wind Turbine to generate electricity for the facility.

Estimated yearly output of BWC Excel 10KW Wind Turbine: 11106 KWH

Assume cost per kWh = $0.15

Percentage of power provided: 2%

Approx. yearly savings: $1665.90

Estimated installed cost: $20350.00

Payback period in years: 12.2

Assuming a 20 year lifespan of the turbine, the savings in the remaining 11.4 years: $20890.39

ECM SUMMARY SHEET

ECM NUMBER	7
ECM CODE	Energy Generation
ECM DESCRIPTION	Solar Panels
PROJECT COST	$235,000
SIMPLE PAYBACK	32.8 years
ELECTRICAL ENERGY SAVINGS	47,716 kW (See attached PVWatts estimate)
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	$7,157.40

EXISTING CONDITIONS:

Currently, the facility uses about 490,000 kWh of electricity per year for various processes. It is estimated that the facility pays almost $74,000 a year for its electricity bill.

ECM SPECIFICATIONS:

Install solar panels at the facility to generate electricity.

System Type: Grid-connected Photovoltaic Power System
Interconnection Type: Net-metering
Type of Cells: Polycrystalline solar cells
Mounting: Flat Roof Mounting System
System Size: 39.2 kW DC (Standard Test Conditions)
Panel Wattage: 220 Watt Modules
Number of Panels: 178

Cost per panel is about $520
Cost for system inverter is about $25,000

Electricity savings/generation based on PVWatts estimation (attached)

Generation estimated at 47,716 kW per year
Assume cost per kW = $0.15

47,716 kW per year x $0.15 = $7,157.40

Payback:
Project cost/ annual savings
$235,000/ $7,157.40 = 32.8 years

ECM SUMMARY SHEET

ECM NUMBER	8
ECM CODE	Motor Upgrades
ECM DESCRIPTION	Premium Motor Upgrades
PROJECT COST	
SIMPLE PAYBACK	
ELECTRICAL ENERGY SAVINGS	
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	
WATER SAVINGS	NA
ANNUAL ENERGY SAVINGS	

EXISTING CONDITIONS:

Currently, the facility utilizes 16 motors throughout the treatment process. Of the estimated 479,000 kWh of electricity used annually, about 429,000 kWh are used for motors. A summary of the motors can be found below. Many of the motors were installed over ten years ago and due to general wear and tear, the efficiency of many of them have likely declined.

Unit ID	Horsepower	Efficiency (%)	Operation
P-1-1-1	10	79	Extraction Pump
P-1-1-2	10	79	Extraction Pump
P-1-1-3	10	79	Extraction Pump
P-1-4-1	5	90.2	Influent Pump
P-1-4-2	5	90.2	Influent Pump
P-1-4-2	5	90.2	Influent Pump
P-1-11-1	1.5	84	Sludge Recycle Pump
P-1-11-2	1.5	84	Sludge Recycle Pump
P-1-12-1	1.5	84	Sludge Transfer Pump
P-1-12-2	1.5	84	Sludge Transfer Pump
P-2-3-1	10	89.5	ASF Pump
P-2-3-2	10	91.7	ASF Pump
P-2-3-3	10	91.7	ASF Pump
P-2-9-1	10	91.7	GACF Pump
P-2-9-2	10	91.7	GACF Pump
P-2-9-3	10	91.7	GACF Pump
P-2-12-1	10	91.7	Injection Pump
P-2-12-2	10	91.7	Injection Pump
Exhaust Fan 1	1	90	Exhaust Fan
Exhaust Fan 2	1	90	Exhaust Fan
Exhaust Fan 3	1	90	Exhaust Fan
Exhaust Fan 4	1	90	Exhaust Fan

ECM SPECIFICATIONS:

Premium efficiency motors are now available with efficiency ratings over 95%, which could potentially save a lot of energy and money over the current motors which when new, had a maximum efficiency of only 91.7%. Since these motors generally run 24 hours a day, increasing the efficiency of motors by 5-10% would realize large savings.

Assume electricity cost of $0.15/kWh

Motor Replacement Cost:

Unit ID	Current Efficiency (%)	Premium Motor Efficiency (%)	Cost of Replacement ($)	Cost to Rewind ($)	Energy Savings/yr (kWh)-New	Energy Savings/yr (kWh)-Rewound	Pay back (years) - New	Pay back (years)-Rewound
P-1-1-1	79	95	1230	758	2446	1133	3.4	4.5
P-1-1-2	79	95	1230	758	2446	1133	3.4	4.5
P-1-1-3	79	95	1230	758	2446	1133	3.4	4.5
P-1-4-1	90.2	95	743	690	1291	575	3.8	8.0
P-1-4-2	90.2	95	743	690	1291	575	3.8	8.0
P-1-4-3	90.2	95	743	690	1291	575	3.8	8.0
P-1-11-1	84	95	536	437	0*	0	0	0*
P-1-11-2	84	95	536	437	0*	0	0	0*
P-1-12-1	84	95	536	437	0*	0	0	0*
P-1-12-2	84	95	536	437	0*	0	0	0*
P-2-3-1	89.5	95	1236	758	2092	1549	4	3.2
P-2-3-2	91.7	95	1236	758	1225	942	6.7	5.4
P-2-3-3	91.7	95	1236	758	1225	942	6.7	5.4
P-2-9-1	91.7	95	1236	758	1225	942	6.7	5.4
P-2-9-2	91.7	95	1236	758	1225	942	6.7	5.4
P-2-9-3	91.7	95	1236	758	1225	942	6.7	5.4
P-2-12-1	91.7	95	1236	758	1225	942	6.7	5.4
P-2-12-2	91.7	95	1236	758	1225	942	6.7	5.4
Ex. Fan 1	90	95	501	437	72	30	46.5	98.7
Ex. Fan 2	90	95	501	437	72	30	46.5	98.7
Ex. Fan 3	90	95	501	437	72	30	46.5	98.7
Ex. Fan 4	90	95	501	437	72	30	46.5	98.7

* Note: These motors are only operated periodically to make sure they are functioning, therefore any electricity savings would negligible and therefore these motors were not evaluated for rewinding or replacement.

ECM SUMMARY SHEET

ECM NUMBER	9
ECM CODE	Heat Tape Thermostat
ECM DESCRIPTION	Heat Tape Thermostat
PROJECT COST	$ 800
SIMPLE PAYBACK	0.5 years
ELECTRICAL ENERGY SAVINGS	11,520
DEMAND SAVINGS	NA
OTHER FUEL SAVINGS	NA
WATER SAVINGS	0
ANNUAL ENERGY SAVINGS	$1,728

EXISTING CONDITIONS:

The facility currently uses Chromolox heat tape on outdoor piping to prevent the pipes from freezing during the winter. The system is utilized continuously from November through April.

ECM SPECIFICATIONS:

Install a thermostat on the heat tape system so it is only utilized during days with a minimum temperature below freezing. Due to the temperature of the groundwater and the constant flow, it is unnecessary to continuously run the heat tape.

Assumptions:

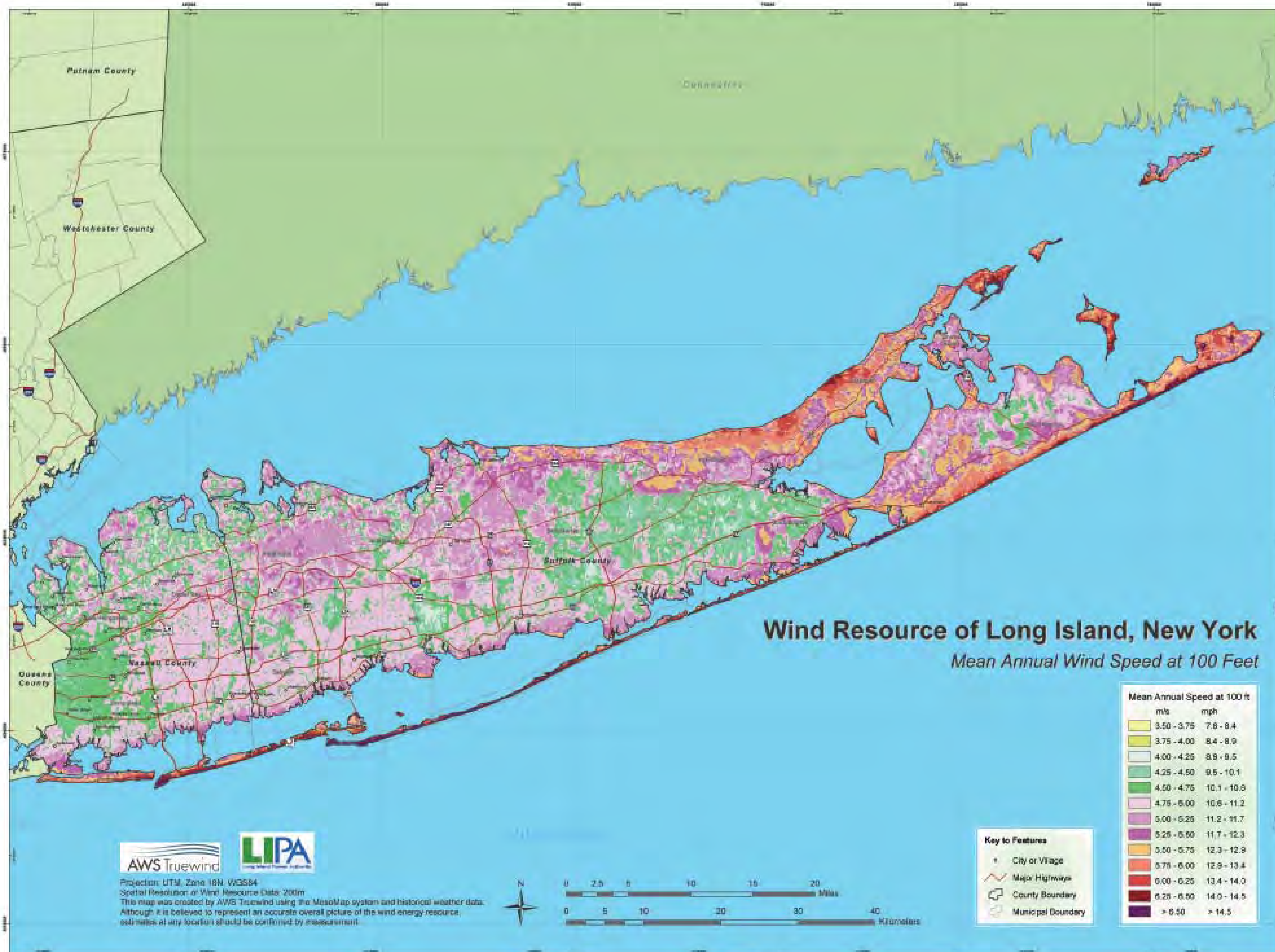
Cost of Thermostat + Installation: $700.00
Cost of Electricity: $0.15/kWh
Number of days below freezing: 98*

* According to National Weather Service Data for Islip, NY, typically 98 days are below freezing.

APPENDIX D

WIND MAP

Putnam County
Westchester County
Queens County
Nassau County
Suffolk County
Wind Resource of Long Island, New York
Mean Annual Wind Speed at 35 Feet
Mean Annual Speed at 35 ft
m/s mph
< 3.50 < 7.8
3.50 - 3.75 7.8 - 8.4
3.75 - 4.00 8.4 - 8.9
4.00 - 4.25 8.9 - 9.5
4.25 - 4.50 9.5 - 10.1
4.50 - 4.75 10.1 - 10.6
4.75 - 5.00 10.6 - 11.2
5.00 - 5.25 11.2 - 11.7
5.25 - 5.50 11.7 - 12.3
5.50 - 5.75 12.3 - 12.9
5.75 - 6.00 12.9 - 13.4
6.00 - 6.25 13.4 - 14.0
Key to Features
City or Village
Major Highways
County Boundary
Municipal Boundary
AWS Truewind
LIPA
Projection: UTM, Zone 18N, WGS84
Spatial Resolution of Wind Resource Data: 200m
This map was created by AWS Truewind using the MesoMap system and historical weather data.
Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement.
N
0 2.5 5 10 15 20 Miles
0 5 10 20 30 40 Kilometers



Putnam County
Westchester County
Connecticut
Queens County
Nassau County
Suffolk County
Wind Resource of Long Island, New York
Mean Annual Wind Speed at 100 Feet
Mean Annual Speed at 100 ft
m/s mph
3.50 - 3.75 7.8 - 8.4
3.75 - 4.00 8.4 - 8.9
4.00 - 4.25 8.9 - 9.5
4.25 - 4.50 9.5 - 10.1
4.50 - 4.75 10.1 - 10.6
4.75 - 5.00 10.6 - 11.2
5.00 - 5.25 11.2 - 11.7
5.25 - 5.50 11.7 - 12.3
5.50 - 5.75 12.3 - 12.9
5.75 - 6.00 12.9 - 13.4
6.00 - 6.25 13.4 - 14.0
6.25 - 6.50 14.0 - 14.5
> 6.50 > 14.5
Key to Features
City or Village
Major Highways
County Boundary
Municipal Boundary
AWS Truewind
LIPA
Projection: UTM, Zone 18N, WGS84
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estimates at any location should be confirmed by measurement.
N
0 2.5 5 10 15 20 Miles
0 5 10 20 30 40 Kilometers

APPENDIX E

TURBINE TECHNICAL SPECIFICATIONS

Skystream 3.7 Grid Tie 1.8kW Wind Power System

- At least 10 MPH average wind speed (best results at 12 MPH or more)
- Your property is greater than .5 acre and is unobstructed
- The local zoning allows a structure that is at least 42′ tall
- Your local utility has an existing interconnection agreement

At A Glance:
Certification: UL (US & Canada)
Rated Capacity: 1.8 kW continuous output, 2.6 kW peak
Rotor: 12 feet (3.72 m); 50-325 RPM
Interconnection: Utility connected or battery charging
Alternator: Gearless, permanent magnet brushless
Voltage Output: 240 VAC (Optional 208 VAC)
Estimated Energy Production: 400 KWh per month at 12 MPH (5.4 m/s)
Weight: 170 pounds (77 kg)
Tower: Towers from 34-70 feet (10.4-21.3 m) are available; height is dependent by site
Warranty: Five year limited

Whisper 500 Wind Turbine

Rotor Diameter 15 feet (4.5 m)
Weight 155 lb (70 kg)
Shipping Dimensions Box 1 (body): 36 x 25 x 32 in
(914 x 635 x 812 mm)
295 lb (133.8 kg)
Box 2 (blades): 88 x 12 x 6 in
(2235 x 305 x 152 mm)
38 lb (17.2 kg)
Box 3 (controller): 22 x 15 x 10 in
(559 x 381 x 254 mm) 75 lb (35 kg)
Mount 5 in schedule 40 (12.7 cm) pipe
Start-Up Wind Speed 7.5 mph (3.4 m/s)
Voltage 24, 36, 48 VDC (high voltage avail.)
Rated Power 3000 watts at 24 mph (10.5 m/s)
Peak Power 3200 watts at 27 mph (12 m/s)
Turbine Controller Whisper Charge Controller
(included)
Body Welded steel; powder coated
protection (not marine grade)
Blades 2-Carbon reinforced fiberglass
Overspeed Protection Side-furling
Kilowatt Hours/Month 538 kWh/mo at 12 mph (5.4 m/s)
Survival Wind Speed 120 mph (55 m/s)
Warranty 5 year limited warranty

BWC Excel 10KW Wind Turbine

Start-up Wind Speed: 3.4 m/s (7.5 mph)
Cut-in Wind Speed: 3.1 m/s (7 mph)
Rated Wind Speed: 13.8 m/s (31 mph)
Rated Power: 10 kW (grid & pumping), 7.5 kW for battery-charging
Cut-Out Wind Speed: None
Furling Wind Speed: 15.6 m/s (35 mph)
Max. Design Wind Speed: 54 m/s (120 mph)
Type: 3 Blade Upwind
Rotor Diameter: 7 m (23 ft.)
Blade Pitch Control: POWERFLEX®
Overspeed Protection: AUTOFURL
Gearbox: None, Direct Drive
Temperature Range: -40 to +60 Deg. C (-40 to +140 Deg. F)
Generator: Permanent Magnet Alternator
Output Form: 3 Phase AC, Variable Frequency (Regulated 48 - 240 VDC after VCS-10 or 240 VAC, 1Ø, 60 Hz with GridTek® inverter).

Whisper 100/200

Reliable Remote Power

Whisper 100 provides dependable energy for remote homes, telecommunication sites and rural applications in moderate to extreme environments. Reliable operation by thousands of customers makes Whisper 100 the top selling small wind turbine in its class. Assuming a 12 mph (5.4 m/s) average wind, a Whisper 100 will produce 100 kWh per month. Best for moderate to high wind – 9 mph (4 m/s) and above.

The versatile Whisper 200 powers applications from remote homes to water pumping. The Whisper 200's 9-foot (2.7 m) blade has almost twice the swept area of the Whisper 100, yielding twice the energy. A high voltage model is available for transmission over long distances. Best for low to moderate wind – 7 mph (3 m/s) and above.

Technical Specifications

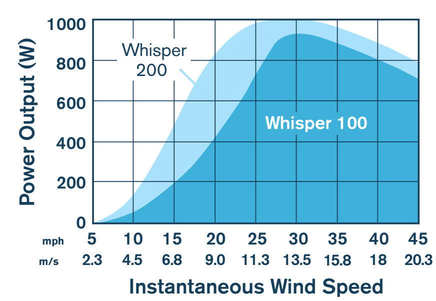
WHISPER 100

Rotor Diameter	7 ft (2.1 m)
Weight	47 lb (21 kg) box: 74 lb (22.56 kg)
Shipping Dimensions	51 x 20 x 13 in (1295 x 508 x 330 mm)
Mount	2.5 in schedule 40 (6.35 cm) pipe
Start-Up Wind Speed	7.5 mph (3.4 m/s)
Voltage	12, 24, 36, 48 VDC
Rated Power	900 watts at 28 mph (12.5 m/s)
Turbine Controller	Whisper controller
Body	Cast aluminum/marine option
Blades	3-Carbon reinforced fiberglass
Overspeed Protection	Patented side-furling
Kilowatt Hours Per Month	100 kWh/mo at 12 mph (5.4 m/s)
Survival Wind Speed	120 mph (55 m/s)
Warranty	5 year limited warranty

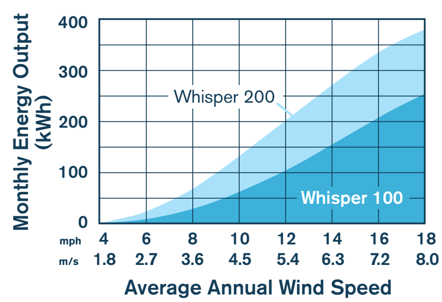
WHISPER 200

Rotor Diameter	9 feet (2.7 m)
Weight	65 lb (30 kg) box: 87 lb (39.46 kg)
Shipping Dimensions	51 x 20 x 13 in (1295 x 508 x 330 mm)
Mount	2.5 in schedule 40 (6.35 cm) pipe
Start-Up Wind Speed	7 mph (3.1 m/s)
Voltage	24, 36, 48 VDC (HV available)
Rated Power	1000 watts at 26 mph (11.6 m/s)
Turbine Controller	Whisper controller
Body	Cast aluminum/marine option
Blades	3-Carbon reinforced fiberglass
Overspeed Protection	Patented side-furling
Kilowatt Hours Per Month	200 kWh/mo at 12 mph (5.4 m/s)
Survival Wind Speed	120 mph (55 m/s)
Warranty	5 year limited warranty

POWER



MONTHLY ENERGY



FIVE YEAR WARRANTY

Southwest Windpower
1801 W. Route 66
Flagstaff, AZ 86001 USA
928.779.9463
www.windenergy.com

Makers of Skystream 3.7® / AIR / Whisper

Printed on recycled paper using vegetable inks.

3-CMLT-1346-01 REV F 9-08

Whisper 500

Serious Power from a Medium Sized Small Wind Turbine

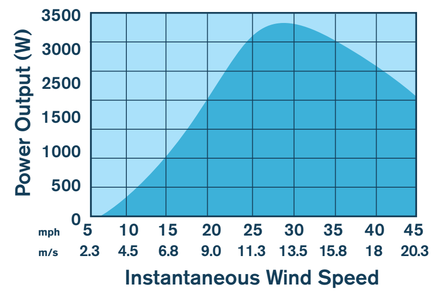
The Whisper 500 can produce enough energy to power an entire home. Assuming a 12 mph (5.4 m/s) wind, a Whisper 500 will produce as much as 500 kWh per month. That is enough energy to power the average California home.

- 5 year warranty
- Durable composite blades
- Powder coated steel body
- Includes Whisper Controller with diversion load and display
- Angle-governor protects blades and allows maximum output in any wind

Technical Specifications

Rotor Diameter	15 feet (4.5 m)
Weight	155 lb (70 kg)
Shipping Dimensions	Box 1 (body): 36 x 25 x 32 in (914 x 635 x 812 mm) 295 lb (133.8 kg) Box 2 (blades): 88 x 12 x 6 in (2235 x 305 x 152 mm) 38 lb (17.2 kg) Box 3 (controller): 22 x 15 x 10 in (559 x 381 x 254 mm) 75 lb (35 kg)
Mount	5 in schedule 40 (12.7 cm) pipe
Start-Up Wind Speed	7.5 mph (3.4 m/s)
Voltage	24, 36, 48 VDC (high voltage avail.)
Rated Power	3000 watts at 24 mph (10.5 m/s)
Peak Power	3200 watts at 27 mph (12 m/s)
Turbine Controller	Whisper Charge Controller (included)
Body	Welded steel; powder coated protection (not marine grade)
Blades	2-Carbon reinforced fiberglass
Overspeed Protection	Side-furling
Kilowatt Hours/Month	538 kWh/mo at 12 mph (5.4 m/s)
Survival Wind Speed	120 mph (55 m/s)
Warranty	5 year limited warranty

POWER



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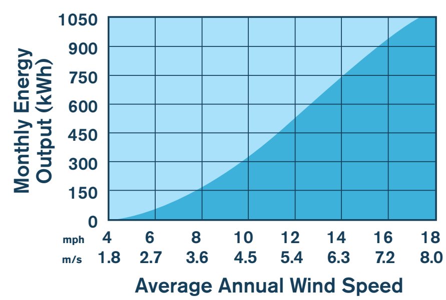

FIVE YEAR WARRANTY

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APPENDIX F

TURBINE COST ANALYSIS

Based upon an average wind speed of **12 mph**, if you use **490000 KWH** of electricity per year and currently pay **$0.15** per KWH, thefollowing estimated wind turbine types, installed costs and payback periods may apply to your situation.

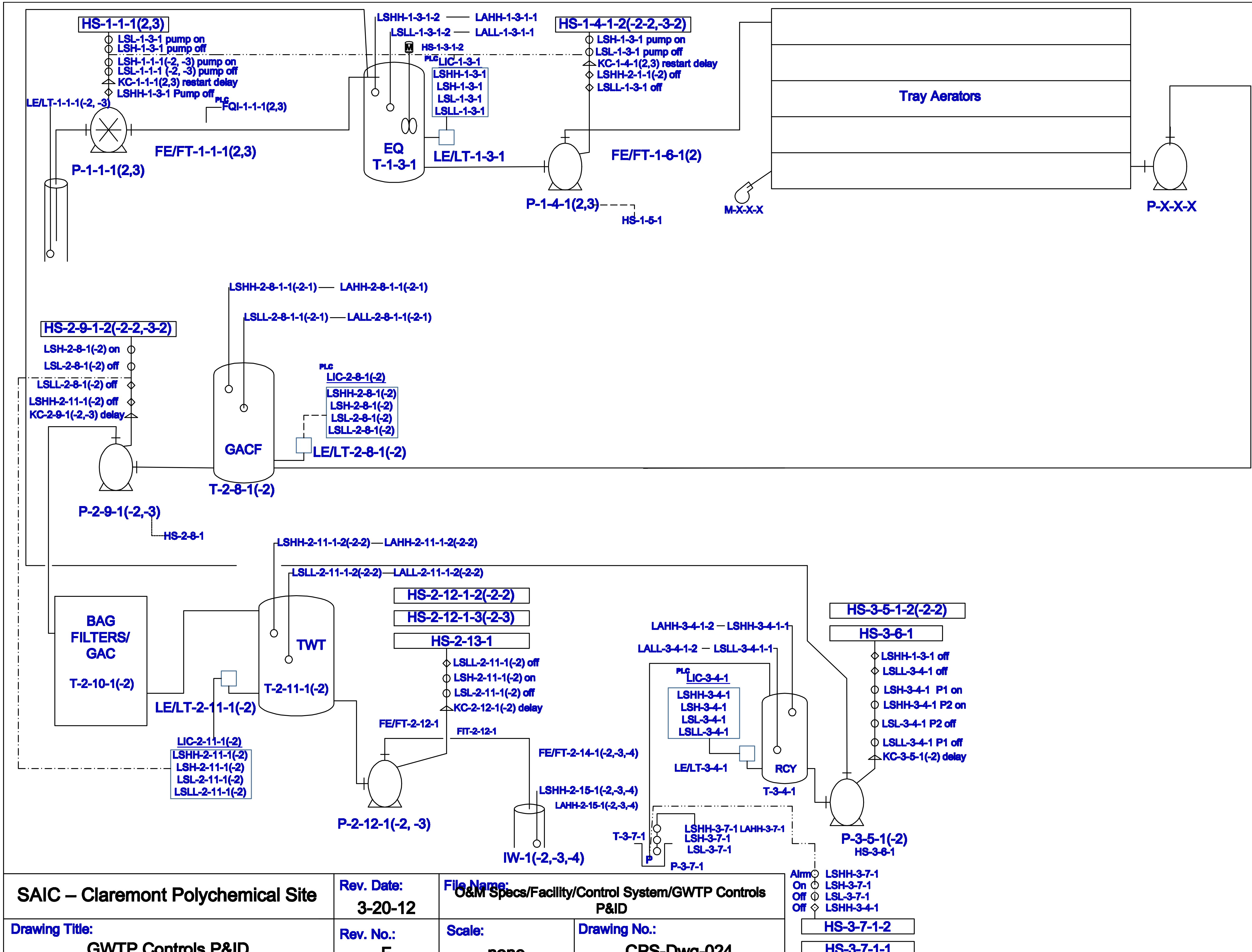
Skystream 3.7 Wind Turbine
Estimated yearly output of **Skystream 3.7 Wind Turbine: 3304 KWH**
Percentage of power provided: **0%**
Approx. yearly savings: **$495.60**
Estimated installed cost: **$13750.00**
Payback period in years: **27.5**
Cost after LIPA Rebate: 60% of installed cost: **$5,500**
Payback including rebate: **11 years**

Whisper 500 Wind Turbine
Estimated yearly output of **Whisper 500 Wind Turbine: 5163 KWH**
Percentage of power provided: **1%**
Approx. yearly savings: **$774.45**
Estimated installed cost: **$15950.00**
Payback period in years: **20.5**
Cost after LIPA Rebate: 60% of installed cost: **$6,380**
Payback including rebate: **8.2 years**

BWC Excel 10KW Wind Turbine
Estimated yearly output of **BWC Excel 10KW Wind Turbine: 11106 KWH**
Percentage of power provided: **2%**
Approx. yearly savings: **$1665.90**
Estimated installed cost: **$20350.00**
Payback period in years: **12.2**
Cost after LIPA Rebate: 60% of installed cost: **$8,140**
Payback including rebate: **4.9 years**

APPENDIX G

PROPOSED SYSTEM PID



SAIC – Claremont Polychemical Site	Rev. Date: 3-20-12	File Name: O&M Specs/Facility/Control System/GWTP Controls P&ID	
Drawing Title: GWTP Controls P&ID	Rev. No.: F	Scale: none	Drawing No.: CPS-Dwg-024

APPENDIX D

Table 12-1
Summary of Plant Maintenance Issues

Date Added	Problem or Condition	Action	Cost	Option	Option Cost	Priority level
June 2011	ASF Sys Pump #3 Motor motor bearings are making noise	Replace 10.0 hp motor when it fails	$800	none	n/a	1
June 2011	VFD ASF-P2	Replace/service	$?	Leave out of service	0	2
2008	INF Sys check valves (3) not operating correctly, must be manually opened and closed	Rebuild existing check valves in place (3)	Included in Budget	a-replace CV with like kind cast iron swing check b-replace CV with pvc ball check (3)	$X $400	2
2008	L-CA Sys. Check valves not operating correctly, must be manually opened and closed	Rebuild existing check valves in place (3)	$675 ea	a-replace *CV* with like kind cast iron swing check b-replace *CV* with pvc ball check	$X $400 +	2
2008	INJ Pump shut off valves cannot isolate individual pumps	Replace valves (4) w/ 6" PVC valves	Included in Budget	Leave valves in place	$0	2
2008	ASF Sys check valves not operating correctly, must be manually opened and closed	Rebuild check valves (3)	Included in Budget	a-replace CV with like kind cast iron swing check b-replace CV with pvc ball check	$X $400+	2
Aug. 2009	EQ Tank Discharge Valve Cannot isolate tank	Replace valve w/8" PVC valve	Included in Budget	Leave valve in place (empty tank when it needs to be isolated)	$0	3
2008	RCY Sys. Check valves not operating correctly, must be manually opened and closed	Rebuild check valves (2)	$675 ea	a-replace *CV* with like kind cast iron swing check b-replace *CV* with pvc ball check	$X $400+	3
July 2011	VFD INF-P1 Ramping	Replace/service	$?	Leave in Place – Control flow by throttling valves	0	2
2008	INJ Pump check valves (2) not operating correctly, must be manually opened and closed	Rebuild existing check valves in place (2)	Included in Budget	a-replace CV with like kind cast iron swing check b-replace CV with pvc swing check	$1300	2
Dec. 2011	LCA -V2 (Pin Hole leak)	Drips -not a hazard cost $1000 to weld and need to shut down plant	$1000	Under enhanced inspection action taken as needed	0	3
Aug. 2010	IW-2 Transducer	Replace transducer (may require tech support)	$1200	Manually monitor well	0	3
2008	Discharge Manifold leak	Make repairs	$500	Leave as is	0	3

Date Added	Problem or Condition	Action	Cost	Option	Option Cost	Priority level
Aug. 2008	Air Compressor system is worn and leaking and in need of an overhaul	Have system serviced	$12,000	a-replace both units with one sized for current duty b-run system on as-needed basis	$ 0	4
2009	Filter Press – control cabinet hydraulic leaks	Have system serviced	$?	Leave as is		4
2009	Sludge Transfer Pump is undersized for filter press feed	Leave pump as is	$0	Replace pump with M-8	$2500	4
2009	Sludge transfer piping	Leave plumbing as is	$0	Re-pipe press feed	$200	4
	INF Pump Seals (historically, pump 2 is due to fail)	Replace as needed (1)	$0	Proactively replace seals	$300	3
Jan. 2012	INF Pump-2 Motor (1) Motor bearings are starting to make noise	Replace 5.0 hp motor when fails	$600	Rebuild motor?		3
	INJ Pump seals (historically, pump 1 is due to fail)	Replace as needed (1)	$0	Proactively replace seals	$300	3
	Priority level – 1- Urgent and must be done 2- Not urgent but needs to be done 3 – Not urgent but should be done 4 – Would like done					