

**INTEGRATED ANNUAL GROUNDWATER
PERFORMANCE REPORT
For 2014**

**STUDY AREAS 5, 6, AND 7
JERSEY CITY, NEW JERSEY**

Prepared for

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TABLE OF CONTENTS

LIST OF TABLES, FIGURES AND DRAWINGS	iii
1 INTRODUCTION	1-1
1.1 GENERAL	1-1
1.2 PURPOSE AND OBJECTIVES	1-1
1.3 STATUS OF INTEGRATED MONITORING REQUIREMENTS FOR 2014	1-1
1.4 DOCUMENT ORGANIZATION	1-2
2 GENERAL CONDITIONS	2-1
2.1 ANNUAL PRECIPITATION	2-1
2.2 TIDAL MONITORING	2-1
2.3 MONITORING WELL INVENTORY	2-1
3 GROUNDWATER EXTRACTION	3-1
3.1 GWET SYSTEM OPERATION	3-1
3.1.1 <i>Pumping Rates</i>	3-1
3.1.2 <i>Force Main Acid Flushing</i>	3-1
3.1.3 <i>Well Redevelopment</i>	3-1
3.2 SA-6 NORTH CONTINGENT GROUNDWATER PUMPING SYSTEM	3-2
3.3 SA-6 SOUTH CONTINGENT GROUNDWATER PUMPING SYSTEM	3-2
3.4 SA-5 NJCU CONTINGENT GROUNDWATER PUMPING SYSTEM	3-2
3.5 SA-6 SOUTH DEWATERING PUMPING OPERATIONS	3-2
4 HYDRAULIC MONITORING	4-1
4.1 REGIONAL GROUNDWATER FLOW	4-1
4.1.1 <i>Shallow Zone</i>	4-1
4.1.2 <i>Intermediate Zone</i>	4-2
4.1.3 <i>Deep Zone</i>	4-2
4.1.4 <i>Bedrock Zone</i>	4-2
4.2 GWET SYSTEM CAPTURE ZONE	4-3
4.3 NEW JERSEY CITY UNIVERSITY	4-3
4.4 SA-7 PERIMETER POOLS	4-3
4.5 SA-6 NORTH CONTAINMENT CELL	4-4
4.6 SA-6 SOUTH CONTAINMENT CELL	4-5
4.7 SA-5 SITE 117	4-5
4.8 MISCELLANEOUS EVENTS	4-5
4.8.1 <i>Depressurization Pumping for Soil Excavation on SA-6 South</i>	4-5
5 GROUNDWATER QUALITY MONITORING	5-1
5.1 DEEP OVERBURDEN REGIONAL PLUME MONITORING	5-1
5.2 GWET EXTRACTION WELLS	5-1
5.3 SA-6 SOUTH	5-2
5.4 SA-6 NORTH	5-2
5.5 NEW JERSEY CITY UNIVERSITY	5-2
5.6 PLUME DIVERSION AREA MONITORING	5-2
5.7 SA-5 SITE 117	5-3

TABLE OF CONTENTS (Continued)

5.8	SA-5 SITES 079/153	5-3
5.9	IN-SITU SAMPLING BENEATH RIVERBED SEDIMENTS	5.6
6	S-3 INJECTION AND MASS REMOVAL PROGRAM	6-5
6.1	CASX INJECTION EVENTS IN 2014	6-5
6.2	MASS REMOVAL SUMMARY.....	6-5
6.3	GROUNDWATER QUALITY MONITORING	6-6
6.3.1	<i>Monitoring Well Sampling</i>	6-6
6.3.2	<i>Injection Well Sampling</i>	6-7
6.4	PLANNED ACTIVITIES FOR 2014	6-7
7	CONCLUSIONS AND RECOMMENDATIONS.....	7-1
7.1	COMPLIANCE WITH MONITORING REQUIREMENTS	7-1
7.2	STATUS OF GROUNDWATER CEA CERTIFICATIONS.....	7-1
7.3	RECOMMENDATIONS FOR MONITORING WELL NETWORK.....	7-1
7.4	RECOMMENDATIONS FOR WATER LEVEL MONITORING FREQUENCY.....	7-1
7.5	RECOMMENDATIONS FOR GROUNDWATER QUALITY MONITORING FREQUENCY	7-1
7.6	OTHER RECOMMENDATIONS	7-1
	LIMITATIONS.....	1
	TABLES	1
	FIGURES.....	1

APPENDICES

APPENDIX A	RESULTS OF PRE-INJECTION MONITORING OF MONITORING WELLS IN 2014
APPENDIX B	RESULTS OF PRE-INJECTION MONITORING OF INJECTION WELLS IN 2014
APPENDIX C	SA-7 PERIMETER POOL HYDROGRAPHS

LIST OF TABLES, FIGURES AND DRAWINGS

Tables

- 1-1 Summary of Groundwater Level Monitoring Requirements
- 1-2 Summary of Groundwater Quality Monitoring Requirements
- 2-1 2014 Monthly Precipitation Data
- 2-2 Groundwater Monitoring Well Inventory
- 3-1 GWET Pumping Outages in 2014
- 3-2 Average Flow Rates in SA-6 South Depressurization Wells
- 4-1 Groundwater Elevation Data from Quarterly Rounds in 2014
- 4-2 Summary of Groundwater Elevations Near NJCU
- 5-1 Summary of Groundwater Quality Data from GWET Wells
- 6-1 Summary of S-3 Sand Injection Events – First 3 Years of Operation
- 6-2 Calculation of Percent Sulfide in CaSx Samples
- 6-3 Summary of Stoichiometrically Equivalent Cr(VI) Mass Reduced

Figures

- 2-1 2014 Monthly Precipitation
- 4-1 Groundwater Elevation Contours – Shallow Zone, December 2014
- 4-2 Groundwater Elevation Contours – Intermediate Zone, December 2014
- 4-3 Groundwater Elevation Contours – Deep Zone, December 2014
- 4-4 Groundwater Elevation Contours – Bedrock Zone, December 2014
- 4-5 Groundwater Elevations in Cross-Section, December, 2014
- 4-6 SA-5 NJCU Groundwater Elevation Contours – March 2014
- 4-7 SA-5 NJCU Groundwater Elevation Contours – June 2014
- 4-8 SA-5 NJCU Groundwater Elevation Contours – September 2014
- 4-9 SA-5 NJCU Groundwater Elevation Contours – December 2014
- 5-1 Hexavalent Chromium Trends in GWET Extraction Wells
- 5-2 Trichloroethylene Trends in GWET Extraction Wells
- 5-3 Long Term Monitoring Well Results – NJCU
- 5-4 Hexavalent Chromium Concentrations in Groundwater Beneath River Riverbed Sediments
- 6-1 Location of Injection Wells Used in 2014
- 6-2 Stoichiometrically Equivalent Cr(VI) Mass Reduced in S-3 Sand by Injection
- 6-3 Cumulative Mass Cr(VI) Removed from Groundwater by Pumping

1 INTRODUCTION

1.1 General

The Long Term Monitoring Plan (LTMP) for the Study Area 7 (SA-7) deep overburden and bedrock groundwater remedy was originally developed in 2008 to monitor groundwater conditions relative to the Groundwater Extraction and Treatment (GWET) system. Annual progress reports have been prepared in accordance with this plan since the startup of the GWET system in December 2008 and thus this document represents the sixth such annual performance report. In 2011, the LTMP was expanded to integrate groundwater monitoring requirements for Study Areas 5, 6 and 7 (Project Area). Sampling and analysis within this integrated plan was performed consistent with the requirements set forth in the *Integrated Groundwater Sampling and Analysis Plan for Study Areas 5, 6 and 7* dated March 12, 2014.

1.2 Purpose and Objectives

The purpose of this document is to provide an integrated annual reporting format that characterizes regional groundwater conditions and documents compliance with area-specific remedial objectives. The specific objectives of this approach are to:

- Improve consistency and efficiency in field procedures including sample collection and scheduling.
- Provide a central database for monitoring well specifications and status.
- Provide regional groundwater flow interpretations that consider the impact of features such as subsurface barrier walls, drains, caps, and drawdown from pumping.
- Provide localized groundwater flow maps consistent with the regional contour maps.
- Facilitate preparation of CEA biennial certifications.

1.3 Status of Integrated Monitoring Requirements for 2014

The two primary elements of groundwater monitoring within the Project Area are water level measurements and water quality sampling and analysis. Groundwater level monitoring is conducted quarterly in all available monitoring wells and piezometers. These

data are used to fulfill various reporting requirements as shown on **Table 1-1**. Groundwater quality sampling is conducted in a subset of wells at various times in accordance with the requirements of the various monitoring plans. The status of groundwater sample collection in 2014 is shown on **Table 1-2**.

1.4 Document Organization

In accordance with the approved outline for the Integrated Ground Water Performance Report (IGWPR), this report is organized in terms of its three primary elements; groundwater extraction (Section 3), groundwater elevations and flow direction (Section 4), and groundwater quality (Section 5). These sections are prefaced by a discussion of overall site conditions and events during the reporting period (Section 2). The status of the S-3 Sand Injection/Mass Removal program is summarized in Section 6, and conclusions and recommendations for modifications to the LTMP are provided in Section 7.

2 GENERAL CONDITIONS

Overall conditions within the Project Area were generally uneventful throughout 2014. The GWET system was operational at design rates with the exception of scheduled maintenance and above normal annual precipitation. The S-3 Injection/Mass Removal remedy continued with seven injection events in 2014. Subsurface remedial activities associated with the SA-6 Chromium Remedy continued with the partial construction of the soil containment barrier wall and groundwater dewatering/depressurization pumping for soil excavation.

2.1 Annual Precipitation

Monthly precipitation data recorded at Newark Airport, approximately 2.5 miles southwest of SA-7 are provided in **Table 2-1** and shown on **Figure 2-1**. Precipitation was significantly higher than the 20-year averages in February, May, June, July, October and December. The months of August and September were noticeably drier than their historical averages. Total precipitation in 2014 was 54.69 inches or approximately 8.5 inches above the annual average of 46.25 inches.

2.2 Tidal Monitoring

Tidal fluctuations in the Hackensack River were monitored at the USGS 01392650 Passaic River tide gage in accordance with the New Jersey Tide Telemetry System's standard procedure. A reference point has been established for this gage on the NGVD-1929 vertical datum. This datum is used for all reported groundwater elevation data in this report. The data logger is programmed to record river stage at 6-minute intervals. These data are used to correct groundwater levels for tidal impacts based on tidal lag and efficiency values previously determined for monitoring wells screened in the Intermediate, Deep, and Bedrock zones. There are no tidal influences in the Shallow Zone monitoring wells. The mean tidal elevation is approximately +1.2 feet (NGVD-1929).

2.3 Monitoring Well Inventory

A list of the groundwater monitoring wells currently in service within the Project Area is provided on **Table 2-2**. The wells are organized by hydrogeologic zone. Information regarding the total depth, screen interval, and reference point elevation are also provided. The well locations are shown on the groundwater elevation contour maps provided in **Section 4**. There were no new monitoring wells installed in 2014. Bedrock monitoring wells KP-MW-6BR (Kearny Point) and 090-MW-18BR (up gradient) were deleted from the LTMP in accordance with the recommendations provided in Section 7 of the Integrated Annual Groundwater Performance Report for 2013. Bedrock monitoring well 073-MW-1BR was modified from a Flute well to a shallow bedrock open hole well in June 2014 to

facilitate extending the casing vertically upward to meet proposed grades associated with the SA-6 Chromium Remedy. Numerous monitoring wells were abandoned in accordance with the Monitoring Well Abandonment Plan for SA-6 North and South. Since this is an on-going effort, the status of well abandonment changes frequently. Abandoned wells at the end of 2014 are noted on **Table 2-2**.

3 GROUNDWATER EXTRACTION

The Deep Overburden Groundwater Extraction and Treatment (GWET) system was in operation throughout 2014. Pumping from the contingent pumping system at NJCU was not required and the contingent pumping systems in SA-6 North and South were not installed as of the end of 2014. Groundwater pumping for dewatering of the Deep zone was conducted throughout the year on SA-6 South to facilitate soil excavation.

3.1 GWET System Operation

The GWET system consists of three extraction wells pumping at a combined rate of 54.5 gpm with discharge via independent force mains to the waste water treatment plant located on SA-6 North. Wells PW-1 and PW-2 are located on the Difeo property on the north side of SA-6 North and pump from the Deep and Intermediate zones, respectively. Well 115-MW-203BR was replaced with well 115-MW-215BR in March of 2014. This well is located on the north side of Site 115 and pumps from the upper Bedrock zone.

3.1.1 Pumping Rates

Flow rate monitoring was conducted on each of the three force mains using flow meters located within the treatment plant. The flow rates are controlled by a manually-operated valve and adjusted as necessary to maintain design rates of 40 gpm and 7.5 gpm for wells PW-1 and PW-2 respectively, and 7 gpm for the bedrock extraction well. These rates were maintained throughout the period with the exception of occasional downtime for O&M activities. **Table 3-1** identifies the events that resulted in a shutdown of more than 8 hours. In general, system shutdowns in 2014 were due to routine force main cleaning and activities related to the relocation of the treatment plant.

3.1.2 Force Main Acid Flushing

The GWET force main from extraction well PW-2 to the treatment plant is subject to fouling due to mineralization of groundwater from the Intermediate Zone. As a result, periodic cleaning of the line with hydrochloric acid is conducted on an as-needed basis as determined through monitoring of groundwater discharge trends and line pressures. There were no acid-flushing events conducted during 2014.

3.1.3 Well Redevelopment

Routine groundwater level monitoring in the GWET extraction wells indicated that the pumping level in PW-2 was declining in December 2014. As of this writing, based on the

results of redevelopment efforts in early 2015, the Parties have agreed to install a replacement well (PW-3) in 2015.

3.2 SA-6 North Contingent Groundwater Pumping System

The design of the SA-6 North contingent groundwater pumping system was changed from a series of vertical wells to a trench drain. Installation of the drain was begun in 2014 as part of the SA-6 Chromium Remedy. No pumping from the SA-6 North contingent groundwater pumping system was conducted in 2014.

3.3 SA-6 South Contingent Groundwater Pumping System

The design of the SA-6 South contingent groundwater pumping system was changed from a series of vertical wells to a trench drain. Installation of the drain was begun in 2014 as part of the SA-6 Chromium Remedy and used on an as-needed basis for shallow soil dewatering.

3.4 SA-5 NJCU Contingent Groundwater Pumping System

In accordance with the performance criteria set forth in the *Proposed Triggers for Operation of the SA-5 Contingent Groundwater Extraction and Treatment System* document and the NJCU LTMP, the contingent groundwater pumping system at the NJCU site was not operated during 2014.

3.5 SA-6 South Dewatering Pumping Operations

To facilitate soil excavation activities, groundwater pumping was conducted on SA-6 South to depressurize heads below Stratum D. Groundwater pumping from below Stratum D in 2014 was conducted using depressurization wells DW-1, DW-2, DW-3, DW-4 and DW-5, screened in the Intermediate Zone. In general, active pumping through the year transitioned from east to west to match soil excavation progress. The location of the wells is shown on the Intermediate Zone water level map in Section 4 (**Figure 4-2**) and the general periods of operation for each are summarized in **Table 3-2** below. Actual start/stop dates and daily flow rates were provided in monthly SA-6 Chromium Remedy progress reports.

Table 3-2. Average Flow Rates in SA-6 South Depressurization Wells (gpm)

Month 2014	DW-1	DW-2	DW-3	DW-4	DW-5
January		10			
February		10			
March	5	10			
April		6			
May			6		5
June					5
July				2.5	
August			4	3	
September			4		
October					
November				4.5	
December					

Note: Blanks indicate no pumping conducted.

4 HYDRAULIC MONITORING

Hydraulic monitoring in 2014 consisted of four quarterly rounds of groundwater elevation measurements in available wells in March, June, September, and December. The measured depth to groundwater was subtracted from the reference point elevation to determine the elevation of the groundwater surface. For those wells that are tidally influenced, the measured values were adjusted using a time-series method developed by the U.S. Geological Survey (Halford, 2006). The results for the four quarterly rounds are provided in **Table 4-1**. Groundwater elevations from the December 2014 round, six years after startup of the GWET system are plotted for the Shallow, Intermediate, Deep, and Bedrock zones on **Figures 4-1** through **4-4**, respectively and on **Figure 4-5** in cross section. Groundwater elevation data are reported in units of feet above mean sea level (amsl) in the NGVD-29 vertical datum.

4.1 Regional Groundwater Flow

4.1.1 Shallow Zone

Groundwater elevations in the Shallow zone range from 13 feet above msl on Site 154 to less than 3 feet above msl near the Hackensack River on Site 163. As a point of reference, the river has a mean tide elevation of approximately +1.2 feet relative to the NGVD-29 datum. As shown on **Figure 4-1**, shallow groundwater flow is generally from east to west across the region, but is locally impacted by subsurface features such as the completed SA-7 and SA-5 barrier walls, the partially completed SA-6 South barrier wall, deep sewer lines that run beneath JCMUA, JCIA, and Route 440, and shallower storm sewers that run along most of the side streets. Groundwater elevations within the shallow soils in the SA-6 North soil containment area varied greatly throughout the year due to recharge from precipitation within the partially installed barrier wall and pumping of the header systems for dewatering.

Shallow groundwater flow is diverted around the SA-7 barrier wall and moves onto SA-6 North and SA-6 South, ultimately discharging to the River or into other subsurface sewers that serve as local groundwater sinks. Areas of locally elevated groundwater are observed in both SA-6 North and SA-6 South along the SA-7 perimeter wall. These elevated zones are likely caused in part by soils with locally reduced hydraulic conductivity, and in part due to their location midway between groundwater discharge areas associated with the River to the west and storm sewers near Route 440 to the east.

At the NJCU site in Study Area 5, groundwater flow is generally from east to west. The north-south oriented “cross-wall” causes groundwater elevations to build up slightly east

of the wall relative to heads on the Home Depot property (Site 117). Further discussion regarding localized groundwater flow on the NJCU site is provided in **Section 4.3**.

4.1.2 Intermediate Zone

Groundwater elevations in the Intermediate zone are shown on **Figure 4-2** and range from over 6 feet above msl in SA-5 to less than mean sea level in the vicinity of the GWET pumping wells. Groundwater is diverted around the SA-7 barrier wall but is not impacted by near-surface features on SA-6 North to the same degree as in the Shallow zone. Groundwater elevations within the SA-7 barrier wall are relatively uniform in the range of two to three feet above msl. The impact of depressurization pumping at SA-6 South is negligible since the DW wells were not in operation during this water level round (December, 2014) as indicated in **Table 3-2**. Vertically, heads within the Intermediate zone are generally one to four feet lower than in the Shallow zone, which indicates a significant downward vertical gradient across Stratum D. This is especially the case west of Route 440 where Stratum D is nearly continuous across the site. **Figure 4-2** also illustrates that the combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides an effective capture zone in the upper lacustrine soils.

4.1.3 Deep Zone

Groundwater elevations in the Deep zone (**Figure 4-3**) are similar to those in the overlying Intermediate zone, although the influence of the SA-7 barrier wall is not as prominent. As noted in prior reports, groundwater flow in the Deep zone is, to a degree, able to move beneath the SA-7 barrier wall through gravel lenses in the underlying glacial till/ice contact deposits. At SA-5, the barrier wall does not extend down to the Deep zone and thus does not influence flow. The area of influence of the GWET pumping wells on groundwater flow in the Deep zone is also illustrated on **Figure 4-3**. The resulting combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides effective capture in this deeper flow zone.

4.1.4 Bedrock Zone

Groundwater elevation contours in the Upper Bedrock zone are shown on **Figure 4-4** and are relatively uniform compared to those in the overlying lacustrine units. The impact of the GWET pumping well 115-MW-215BR on groundwater flow is evident from the closely-spaced closed contours along the western border of SA-7. This area is characterized by the southwest-northeast trending high-permeability fracture zone which aids in the propagation of the capture zone parallel to the bulkhead as shown on **Figure 4-4**.

4.2 GWET System Capture Zone

Figure 4-5 illustrates that pumping from PW-1 and PW-2 creates a combined zone of influence causing groundwater to flow both laterally and vertically into the capture zone of the wells. The capture zone spans the various semi-confining layers but considering that the vertical anisotropy of the soil is likely on the order of 10:1, the primary component of flow to the wells is horizontal rather than vertical. It should be noted that the cross-section is drawn with a vertical exaggeration of 5X which tends to over-emphasize the vertical component of flow (i.e., the same cross-section drawn at true scale would more effectively illustrate that the majority of flow is horizontal). Based on the data provided in both plan view on **Figures 4-2 and 4-3** and in cross section on **Figure 4-5**, the combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides an effective capture zone that meets its design objectives.

4.3 New Jersey City University

Quarterly groundwater elevation data for the NJCU property are compiled in **Table 4-2** and mapped on **Figures 4-6 through 4-9**. NJCU site development activities required that the casing of several monitoring wells be raised and were thus inaccessible during the first quarterly event of the year. Upon completion of the work, the elevation of the new top of casing reference points were determined by survey as shown on **Table 4-2**. The results for each quarter are similar and indicate that groundwater flow is generally to the northwest as it moves onto Sites 90 and 184 from the east but then turns north as it is forced around the various barrier walls that block flow to the south and west. A “dead zone” is thus formed by the confluence of the two walls near the entrance to the Home Depot parking lot and the lack of recharge due to the overlying synthetic liner. As a result, groundwater largely bypasses the Commercial AOC located in this dead zone and thus does not promote the migration of hexavalent chromium to the north onto the Residential Area. This conclusion is supported by groundwater quality data from the sentinel wells as further discussed in **Section 5-5**.

An investigation was conducted in 2014 to re-evaluate groundwater conditions now that the surface has been re-graded and paved. The investigation consisted of monitoring groundwater responses to precipitation events using data loggers in selected wells. The following conclusions were drawn from the results of this evaluation.

- 1) Groundwater head in Sump A was shown to be at or below the elevation of the liner during approximately 90% of the three-month study period.
- 2) Increased head in Sump A due to precipitation events was relatively short-lived, with recovery occurring within approximately 72 hours after the event.

- 3) Potential pressurization of the sand below the liner near Sump A is a relatively infrequent and short-lived phenomenon which, due to slow groundwater flow rates, has no appreciable impact on groundwater flow at the site.
- 4) Based on these results of this study as noted above, it is recommended that ground water level measurements be continued on a quarterly basis, and that measurements do not occur within 72 hours of a measureable rainfall event. This procedure is to provide measurements that are unaffected by a temporary rise in groundwater elevation due to an individual rainfall event.

4.4 SA-7 Perimeter Pools

The LTMP program includes monitoring of the hydraulic gradients across the subsurface containment barrier (SCB) around the perimeter of SA-7. This is accomplished through monitoring of the head in each of the ten “perimeter pools” and comparing these data to groundwater elevations in various shallow piezometers located just outside of the SCB. The location of the perimeter pools, the design pool elevations, and water level trends are provided in **Appendix C**. The hydrographs illustrate the average ground surface elevation, the design pool elevation, the measured pool elevation, and the groundwater elevation in adjacent piezometers outside of the wall. Due to recent construction in SA-6 North and South, many of the former monitoring points have been abandoned in accordance with the approved SA-6 Chromium Remedy. Other piezometers have been installed for soil surcharge monitoring and have been used to supplement the monitoring of head outside of the pools.

Overall, the data indicate that, with a few exceptions, water levels within the SA-7 pools are greater than those outside of the SCB and thus outward gradients are occurring. In prior years, the exceptions included areas outside of pools N-3 and N-4 on Site 087, and a small portion of SA-6 South near pool S-3. However, as shown on the hydrographs in **Appendix C**, heads outside of the wall in these areas have declined significantly due to construction activities which included the redirection of runoff and groundwater dewatering in SA-6 South.

Going forward, groundwater levels outside of the SA-7 SCB wall are expected to continue to decline when the low permeability covers are installed in the open space areas for the SA-6 Chromium Remedy. If this is not the case, the contingent groundwater pumping systems will be available to lower water levels outside of the SA-7 barrier if warranted.

4.5 SA-6 North Containment Cell

A groundwater elevation contour map specific to SA-6 North will be provided in future annual reports after the containment cell has been constructed. Hydraulic gradients across the wall(s) will be determined at the perimeter piezometer locations and compared to performance criteria.

4.6 SA-6 South Containment Cell

A groundwater elevation contour map specific to SA-6 South will be provided in future annual reports after the containment cell has been completed and steady state groundwater levels can be assessed. Hydraulic gradients across the wall(s) will be determined at the perimeter piezometer locations and compared to performance criteria.

4.7 SA-5 Site 117

Groundwater movement beneath Site 117 is generally from northeast to southwest as illustrated on **Figures 4-1** through **4-3**. In the Shallow zone, the sewers beneath Route 440 serve as a groundwater sink and limit the further movement of groundwater to the south and west. In both the Shallow and Intermediate zones, a component of groundwater in the northwestern corner of Site 117 is diverted to the northwest, passing between the SA-7 SCB and the NJCU sheet pile wall. The relatively low groundwater elevations in this area are caused by sewer systems that are actively dewatered by the Jersey City MUA.

4.8 Miscellaneous Events

4.8.1 Depressurization Pumping for Soil Excavation on SA-6 South

To facilitate soil excavation activities, groundwater pumping was conducted on SA-6 South to depressurize heads below Stratum D. Groundwater pumping from below Stratum D in 2014 was conducted using depressurization wells DW-1, DW-2, DW-3, DW-4 and DW-5, screened in the Intermediate Zone. In general, active pumping through the year transitioned from east to west to match soil excavation progress. The location of the wells is shown on the Intermediate Zone water level map (**Figure 4-2**) and the general periods of operation for each are summarized in **Table 3-2**. Actual start/stop dates and daily flow rates were provided in monthly progress reports.

5 GROUNDWATER QUALITY MONITORING

Groundwater quality monitoring within the project area was conducted in 2014 in accordance with the GWET Long-Term Monitoring Plan (LTMP) and the other applicable area-specific monitoring plans as discussed in **Section 1.3** and listed on **Table 1-2**.

5.1 Deep Overburden Regional Plume Monitoring

In 2012 the frequency of regional monitoring of the Deep Overburden Plume changed from annual to biennial (every two years). The last sampling round was in December 2013 and thus the wells were not sampled in 2014. The next round of sampling is scheduled for November 2015.

5.2 GWET Extraction Wells

Groundwater from the three GWET pumping wells was sampled quarterly in 2014 as shown in **Table 5-1**. Samples were analyzed for total and hexavalent chromium and volatile organic chemicals (VOC). The results for hexavalent chromium are plotted on **Figure 5-1** and indicate that concentrations in the Deep zone (PW-1) have declined in an asymptotic fashion to their current level of approximately 35 ppm. Concentrations in the Intermediate zone (PW-2) have declined to about one third of their initial concentration since 2009. The observed slow decline in concentration is likely due to cleaner water being pulled into the pumping wells as confirmed by the in-situ sampling beneath the riverbed sediments discussed in Section 5.9. The cleaner water originates at the margins of the capture zone, including beneath the river, as the plume is pulled back. Hexavalent chromium concentrations in the bedrock have been generally stable at approximately 15 to 20 ppm.

VOC data from the pumping wells are provided in **Table 5-1**. With the exception of carbon tetrachloride and on one occasion chloroform (laboratory estimated value), VOCs have not been detected in the bedrock pumping well. Deep overburden pumping well PW-1 contains the highest VOC concentrations with the most prevalent compounds being chlorinated volatile organics such as trichloroethene (TCE) and its daughter products cis- and trans-dichloroethene and vinyl chloride. These same constituents were detected in the Intermediate zone pumping well PW-2 albeit at lower concentrations. Benzene was also detected in relatively low concentrations in PW-1 and PW-2 samples.

Figure 5-2 illustrates a time-series plot of TCE in each of the GWET pumping wells. The data indicate that concentrations in both PW-1 and PW-2 are in the 50 to 120 ppb range and are continuing to decline slowly. As previously reported, the source of the VOCs in the groundwater is not related to Honeywell.

5.3 SA-6 South

Groundwater monitoring wells were not sampled on SA-6 South in 2014. As shown in **Table 1-2**, the L-well sampling program will be continued after one full year of seasonal hydraulic fluctuations following completion of the Chromium Remedy scheduled for 2017.

5.4 SA-6 North

Groundwater monitoring wells were not sampled on SA-6 North in 2014, with the exception of S-3 Sand Mass Removal Injection program discussed in **Section 6**.

5.5 New Jersey City University

Groundwater samples were collected quarterly in 2014 from the three “sentinel” wells at NJCU. The objective of the monitoring program is to provide early warning of potential chromium migration in groundwater from the Commercial AOC (in the southwest corner of Site 90) to the Residential Area to the north. The results are provided on **Figure 5-3** and indicate that hexavalent chromium was not detected above the reporting limit of 5.5 ppb in any of the samples from well 184-MW-04 and 184-MW-05 during 2014. Hexavalent chromium was reported above the reporting limit (but below 70 ppb) in 184-MW-06 during each round in 2014 at concentrations comparable with previous results. This well is located upgradient of the Commercial AOC and thus these results are not unexpected.

Total chromium was not detected above 70 ppb in wells 184-MW-04 and 184-MW-05 in either the filtered or unfiltered samples throughout 2014. Total chromium was detected at 81.4 ppb in the second quarterly round in the unfiltered sample from 184-MW-06; however, each of the filtered samples collected in 2014 was below the NJGWQC of 70 ppb. These variable results are likely due to differences in turbidity and serves to underscore that trivalent chromium can sorb onto particulates within the sample and be reported in the total chromium result.

5.6 Plume Diversion Area Monitoring

In accordance with the approved L-Well Groundwater Monitoring Plan (L-Well GWMP) which was part of the 100% SA-6 Chromium Remedy Design, the following wells in the Plume Diversion Area of SA-6 South were sampled in May 2013 to provide a pre-remedy baseline and will be sampled once more after the remedy is complete to evaluate if the deep plume in this area has shifted position due to the installation of the soil containment cell.

124-MW-106T	124-MW-103L
124-MW-107T	124-MW-104T
124-MW-G02T	124-MW-104L

119-MW-01T

124-MW-105T

119-MW-02T

124-MW-102T

Locations 124-MW-102T, 124-MW-103L, and 124-MW-107T are located within the open space area and were thus abandoned during excavation activities in 2014. In addition, well 124-MW-104T was damaged during construction and also abandoned in 2014. In accordance with the approved L-Well GWMP and subsequent agreements with Plaintiffs, the post-remedy sampling at these four locations will be conducted using direct push methods after placement of excavated materials and installation of barrier walls but prior to the installation of the cap. This will take place in 2015. The remaining locations will be sampled one year after the SA-6 Chromium Remedy is complete in accordance with the L-Well GWMP. This sampling is expected to take place in 2017.

5.7 SA-5 Site 117

Groundwater sampling for water quality analysis was not conducted at Site 117 in 2014.

5.8 SA-5 Sites 079/153

Groundwater sampling was conducted on July 24, 2014 in existing monitoring wells 079-MW-001 and 079-MW-A02 in accordance with the Remedial Action Report and Confirmatory Sampling Work Plan (September 2011) for Site 079. The results were documented in the Post Treatment Sampling Results Report dated February 2015. Hexavalent chromium was not reported above the reporting limit of 5.5 ppb, and total chromium was reported at a maximum concentration of 5.7 ppb, well below the NJGWQC of 70 ppb. The report recommended that no further groundwater sampling be conducted.

5.9 In-situ Sampling Beneath Riverbed Sediments

In accordance with Section 3.3 of the SA-7 Deep Overburden and Bedrock Groundwater Remedy Long-term Monitoring Plan, in-situ groundwater samples were collected within the lacustrine sand directly beneath the soft riverbed sediments in the Hackensack River. The objective of the sampling was to compare current chromium concentrations in groundwater with those measured in 2004, prior to operation of the GWET pumping system. The sampling was conducted on October 20th and 21st, 2014 at five locations that coincide with prior groundwater samples collected during the “off-site deep overburden investigation” in 2004. The original sample location IDs are shown on **Figure 5-4**, as are the 2004 concentration contours of hexavalent chromium in groundwater taken from Figure

4.4-4 of the Final Groundwater Investigation Report (HydroQual, 2007). Each in-situ groundwater sample was obtained using a GeoProbe sampler from a boat in the same manner as that used in the prior investigation.

Data from the 2014 resampling indicate a significant reduction in the extent of hexavalent chromium with four of the five locations reporting non-detect for hexavalent chromium compared to prior concentrations that ranged from 42 to 218 ppm. The fifth location, PW09-450, remained elevated with a reported hexavalent chromium concentration of 64.2 ppm, which is similar in magnitude to the prior concentration of 43 ppm. The LTMP calls for the next sampling event to take place in 5 years (2019), however, Honeywell may elect to conduct interim monitoring to further evaluate conditions around PW09-450.

6 S-3 INJECTION AND MASS REMOVAL PROGRAM

The S-3 Injection and Mass Removal program was initiated in 2012 and involves the injection of calcium polysulfide (CaSx) into the S-3 Sand beneath the project area in general accordance with the Operations Work Plan for In-Situ Chromium Mass Removal (Cornerstone, February 20, 2012). Changes to the plan, including both the location of the injection wells and the sequence of injection events, have taken place (in consultation with Plaintiffs' representatives) since the plan's inception. In 2013, a subsurface investigation was conducted to identify a suitable location for an injection well east of Route 440 as required by the Mass Removal Consent Decree (May 2010). The investigation found that the S-3 Sand is not present east of Route 440 and thus an injection well was not installed there. Instead, a new injection well (088-IW-03) was constructed west of Route 440 on the former JCIA property and was used for injections in 2014 along with wells 088-IW-01 and 088-IW-02.

6.1 CaSx Injection Events in 2014

Seven CaSx injection events were conducted in 2014 as summarized on **Table 6-1**. Three injection wells (088-IW-01, 088-IW-02, and 088-IW-03) were used as shown on **Figure 6-1**. During each event approximately 3,850 to 4,300 gallons of CaSx was injected into the S-3 Sand formation during the first day. The actual volume varied from event to event and was based on the maximum volume that could be transported in a single tanker truck within DOT weight limitations. As shown on **Table 6-1**, a combination of gravity flow and slight pressurization of the tanker was used to off-load the material at rates ranging from 7 to 14 gpm. The single exception was event # 15 in which the yield of well 088-IW-01 was below its historic performance resulting in a reduced flow rate of 3 to 4 gpm. A bench-scale study was subsequently conducted to evaluate various redevelopment chemicals and the well scheduled for cleaning and re-development in 2015.

During the second and third day of each event, clean water was injected into the well to aid flushing of the CaSx. The total volume of water used was approximately twice the volume of CaSx injected (7,700 to 8,500 gallons). The water was obtained from a MUA fire hydrant and the injection rates generally ranged from 10 to 12 gpm.

6.2 Mass Removal Summary

In accordance with the Operations Work Plan, three replicate samples from each batch were used to determine the sulfide content of the material. The geometric mean of these data was then calculated as shown on **Table 6-2**, and used to estimate the mass of hexavalent chromium stoichiometrically equivalent to the injected volume of CaSx. This calculation was conducted in accordance with the chemical reactions provided in Appendix C of the Operations Work Plan. As shown on **Table 6-3**, the stoichiometric equivalent mass reduced per event in 2014 ranged from 1.22 tons to 1.47 tons with an average of 1.34

tons per event. At the end of 2014, the stoichiometric equivalent of approximately 23 tons of hexavalent chromium had been treated leaving 27 tons remaining in the program. **Figure 6-2** provides a graph of the cumulative mass treated to date

For comparison, the mass of hexavalent chromium removed from the Deep Overburden Plume through historic pumping has also been calculated. As shown on **Figure 6-3**, historic pumping includes operation of the two depressurization wells, 115-DP-1 and 115-DP-2 during the SA-7 soil excavation remedy, and the GWET system pumping that has been ongoing since December 2008. The mass removed was calculated by multiplying the pumping rate of each well by the hexavalent chromium concentration of the discharge. Values for both parameters were determined on a monthly basis from historic records. The results indicate that over 78 tons of hexavalent chromium have been removed through groundwater extraction through the end of 2014.

6.3 Groundwater Quality Monitoring

Groundwater monitoring of injection wells and monitoring wells was conducted in accordance with the Operations Work Plan. Injection wells were sampled several days prior to each injection event, whereas monitoring wells were sampled semi-annually.

6.3.1 Monitoring Well Sampling.

Data from sampling of monitoring wells associated with the S-3 Sand Injection program are provided on **Tables A-1 through A-10** in **Appendix A** and further discussed below.

Well 088-MW-G19T: This well is located approximately 400 feet downgradient of injection well 088-IW-01 on the former JCIA property. Parameters used to indicate the presence of the CaSx reductant, such as ORP, calcium, and pH, were relatively consistent throughout the reporting period in this well. Hexavalent chromium concentrations were also relatively unchanged in 2014, ranging from 1,070 to 1,080 ppm.

Well 087-MW-29D: This well is located approximately 750 feet downgradient of injection well 088-IW-03 and is screened in the Intermediate Zone. Parameters used to indicate the presence of the CaSx reductant, such as ORP, calcium, and pH, were consistent throughout the reporting period in this well. Hexavalent chromium concentrations were also generally consistent ranging from 188 ppm to 190 ppm without a trend.

Well 115-DP-1: This is a former depressurization well located approximately 25 feet upgradient from 115-PW-21. (Well 115-PW-21 was used as a temporary injection well on August 20, 2012.) Hexavalent chromium concentrations are shown on **Table A-2** and continued at relatively low levels in the spring 2014 event (14.9 ppm), but then increased to a much higher level at the end of the year (1,300 ppm). As noted in the annual

performance report for 2013, these variable post-injection results are likely due to the fact that 115-DP-1 has a 25-foot long screen that extends approximately 20 feet above the top of the S-3 Sand into the S-2 Sand. Thus, during sampling, the well is likely influenced by both the remnants of the 2012 injection event and the elevated hexavalent chromium concentrations within the overlying S-2 formation. .

GWET Wells: Hexavalent chromium concentrations in extraction wells 087-PW-1 and PW-2 were generally consistent with the long-term downward trend as shown on **Figure 5-1**. Calcium concentrations in 2014 were also consistent with prior data indicating that impacts from the CaSx injections have not reached these wells.

6.3.2 Injection Well Sampling.

Sampling of the injection wells was conducted to assess how long the reductant remains in the groundwater at the point of contact. Injection wells were sampled once prior to the first injection event and then just prior to each injection event as shown on **Tables B-1 through B-10** in **Appendix B**. The scope of this portion of the sampling plan has been reduced due to the consistent nature of the results. The fact that hexavalent chromium concentrations have not rebounded between injections is likely due to the establishment of a reductive zone around the well. This zone is capable of treating hexavalent chromium in groundwater that moves into the area from upgradient. Currently, only the well to be used for injection is sampled and only for field parameters. Samples for laboratory analysis are not collected.

Indicator parameters measured in the field include pH, specific conductivity, dissolved oxygen, ORP, and turbidity. These data are shown on **Tables B-6 through B-10**. Of these, ORP appears to be the most reliable indicator of the presence of CaSx (reducing conditions) in groundwater. ORP values initially declined from several hundred mV to less than (minus) -400 mV and have been consistently in the -450 to -500 mV range. Groundwater pH is also a reasonably good indicator since the injected calcium polysulfide has a pH of between 11 and 12. Thus, an increase in pH provides a qualitative indication of calcium polysulfide influence at a specific location. Both ORP and pH indicate that reducing conditions have been established around each of the injection wells and that these conditions will persist for some time, facilitating the reduction of additional hexavalent chromium in groundwater moving into the region from upgradient.

6.4 Planned Activities for 2015

In accordance with the Operations Work Plan, the goal for 2015 will be to inject sufficient reductant in the S-3 Sand to reduce the stoichiometric equivalent of 10 tons of hexavalent chromium. Based on the results from 2014, this will require eight injection events throughout the year.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Compliance with Monitoring Requirements

Hydraulic and groundwater quality monitoring conducted in 2014 have fulfilled the various monitoring plan requirements in accordance with **Tables 1-1 and 1-2**.

7.2 Status of Groundwater CEA Certifications

Groundwater Classification Exception Areas were approved by NJDEP on February 16, 2012 for the three principle water bearing zones in the Project Area (Shallow Zone, Deep Overburden, and Bedrock). In 2013, NJDEP notified Honeywell that CEA biennial certifications are not due until the applicable Groundwater Remediation Permits are issued.

7.3 Recommendations for Monitoring Well Network

It is recommended that the abandonment and replacement of selected groundwater monitoring wells be conducted in accordance with the Monitoring Well Abandonment Plan for SA-6 North and South, and the L-Well GWMP.

7.4 Recommendations for Water Level Monitoring Frequency

Groundwater level monitoring will be conducted in accordance with the frequencies specified in the various hydraulic monitoring plans as summarized in **Table 1-1**. There are no recommended changes to these frequencies at this time.

7.5 Recommendations for Groundwater Quality Monitoring Frequency

The frequency of groundwater quality monitoring, well selection, and parameters for analysis are established in the monitoring plans for the various sub-areas. There are no proposed changes to these documents at this time. The next regional sampling event of the deep overburden plume is scheduled for December 2015. Recommendations regarding the frequency of LTMP events beyond 2015 will be considered based on those results.

7.6 Other Recommendations

There are no other recommendations regarding groundwater performance or monitoring in the Project Area at this time.

LIMITATIONS

The work product included in the attached was undertaken in full conformity with generally accepted professional consulting principles and practices and to the fullest extent as allowed by law we expressly disclaim all warranties, express or implied, including warranties of merchantability or fitness for a particular purpose. The work product was completed in full conformity with the contract with our client and this document is solely for the use and reliance of our client (unless previously agreed upon that a third party could rely on the work product) and any reliance on this work product by an unapproved outside party is at such party's risk.

The work product herein (including opinions, conclusions, suggestions, etc.) was prepared based on the situations and circumstances as found at the time, location, scope and goal of our performance and thus should be relied upon and used by our client recognizing these considerations and limitations. Cornerstone shall not be liable for the consequences of any change in environmental standards, practices, or regulations following the completion of our work and there is no warrant to the veracity of information provided by third parties, or the partial utilization of this work product.

TABLES

**TABLE 1-1
GROUNDWATER LEVEL MONITORING REQUIREMENTS
for Integrated Groundwater Monitoring Plan**

<u>Location</u>	<u>Monitoring Plan</u>	<u>Consent Decree</u>	<u>Depth</u>	<u>Frequency</u>	<u># Wells</u>	<u>2014 Activity or Estimated Start Date</u>
Regional ¹	GWET Long Term Monitoring Plan June 10, 2008	Deep Overburden and Bedrock Groundwater Remedies Consent Order	All Zones	Quarterly	150	On-going
Study Area 7	SA-7 Perimeter Pools	Final Judgement, ICO v Honeywell	Shallow and Interm.	Monthly	30	On-going
SA-6 South	SA-6 South GW Level Monitoring Plan Appendix J of SA-6 South 100% Design June 28, 2013	First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South	Shallow and Interm.	1st year - Monthly 2nd year - Quarterly 3rd year -Semi-Annual	13	Post Remedy (2017)
SA-6 North	SA-6 North GW Level Monitoring Plan Appendix J of SA-6 North 100% Design June 28, 2013	First Amended Consent Decree Regarding Remediation and Redevelopment of Study Area 6 North	Shallow and Interm.	1st year - Monthly 2nd year - Quarterly 3rd year -Semi-Annual	13	Post Remedy (2017)
Study Area 6 N&S	"Long Term Monitoring Plan" October 1, 2015	Due Same Consent Decrees as Above for SA-6 South and SA-6 North	Shallow	Quarterly	TBD	Post Remedy (2017)
SA-5 (NJCU) Sites 90 & 184	Long Term Monitoring Plan (2/29/12) ²	Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area	Shallow	Quarterly through 2013 future TBD ²	7	On-going
SA-5: Site 079	"Long Term Monitoring Plan" (4/25/14) ³	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	March 2014 then Annual	2	On-going
SA-5: Site153 South	Remedial Action Permit for GW ⁴	Consent Decree Regarding Sites 79 and 153 South	Shallow	Annual	2	2016
SA-5 Site 117	Remedial Action Permit for GW ⁴	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Annual	7	2016

¹ Includes available wells on SA-5, SA-6, SA-7, and surrounding areas historically considered part of the Deep Overburden Plume investigation..

²Post-remedy triggers plan under NJCU Consent Decree; updated LTMP plan in progress; future monitoring frequency TBD pending updated LTMP

³Updated LTMP issued

⁴Remedial Action Permit application in progress

**TABLE 1-2
GROUNDWATER QUALITY MONITORING REQUIREMENTS
for Integrated Groundwater Monitoring Plan**

<u>Location</u>	<u>Monitoring Plan</u>	<u>Consent Decree</u>	<u>Depth</u>	<u>Frequency</u>	<u># Wells</u>	<u>2014 Activity or Estimated Start Date</u>
Regional	GWET Long Term Monitoring Plan June 10, 2008	Deep Overburden and Bedrock Groundwater Remedies Consent Order	Shallow	Biennial	0	Dec. 2015 future events TBD Completed Oct. 2014
			Intermediate	Biennial	6	
			Deep	Biennial	12	
			Bedrock	Biennial	10	
			Beneath River	Every 5 years	5	
Regional	S-3 Injection Mass Removal Operations Work Plan 28, 2012	Final Feb. Deep Overburden and Bedrock Groundwater Mass Removal Consent Decree, May 18, 2010	Deep	Every injection event Semi-annual Sampling	3 6	On-going (8 events)
SA-6 South	SA-6 South Development AOC Appendix D of SA-6 South 100% Design Report June 28, 2013	First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South	Shallow	Qtly first year ¹	12	Post Remedy (2017) ⁵
SA-6 South	L-zone Wells (Plume Diversion Area) E of SA-6 South 100% Design 2013	Appendix June 28, First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South	Deep	Pre-Remedy Baseline Post Remedy	10 10*	Completed May 2013 Post Remedy (2017)
SA-5 (NJCU) Sites 90 & 184	Long Term Monitoring Plan (2/29/12) ³	Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area	Shallow	Years 1 and 2 - Quarterly Year 3+ TBD	3	On-going
SA-5 Site 117	Remedial Action Permit for GW (in progress)	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Biennial	7	2016
SA-5: Site 079	Long Term Monitoring Plan ²	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Once 2014 then TBD ⁴	2	Completed July. 2014 No further sampling recommended
SA-5: Site 153 South	Remedial Action Permit for GW (in progress)	Consent Decree Regarding Sites 79 and 153 South	Shallow	Biennial	2	2016

* Number and location of wells subject to field conditions during and after remedy construction.

Biennial = every two years

¹Monitoring begins 12 months after construction is complete

²Site 79/153 updated LTMP issued 4/25/14

³Post-remedy triggers plan under NJCU Consent Decree; updated LTMP plan in progress; future monitoring frequency TBD pending updated LTMP

⁴TBD based on water level monitoring data per LTMP

⁵SA-6 LTMP in progress (due 10/15/15)

Table 2-1
2014 Monthly Precipitation Data

Month	2014 Precipitation	Average Precipitation
January	2.68	3.98
February	4.89	2.96
March	4.09	4.21
April	3.38	3.92
May	8.74	4.46
June	4.75	3.4
July	6.19	4.68
August	1.63	4.02
September	2.25	4.01
October	6.04	3.16
November	4.67	3.88
December	5.38	3.57
Annual Total	54.69	46.25

Data Source: <http://www.nc-climate.ncsu.edu/cronos/?station=286026&temporal=monthly>
 Station name: Newark International Airport
 Station ID: 286026

**Table 2-2
Groundwater Monitoring Well Inventory**

<u>Well ID</u>	<u>Screen Zone</u>	<u>Ref. Pt. Elev.</u> (ft msl)	<u>Well Depth</u> (ft)	<u>Screen Length</u> (ft)	<u>Comments</u>
073-MW-4	Shallow	NA	NA	NA	Abandoned 5/30/14 for soil excavation
073-MW-5	Shallow	6.81	15	13	Abandoned 4/11/14 for soil excavation
073-MW-BB11	Shallow	7.87	13	10	Abandoned Feb. 2014 for soil excavation
073-MW-Y10	Shallow	6.42	13	10	Abandoned 4/11/14 for soil excavation
073-PZ-001	Shallow	7.24	13	5	Abandoned 4/12/14 for soil excavation
079-MW-01	Shallow	8.80	NA	NA	
079-MW-A2	Shallow	8.10	13	10	
079-MW-C6	Shallow	11.00	13	10	
087-MW-001	Shallow	12.67	15	13	Abandoned 2/26/14 for soil excavation
087-MW-101	Shallow	12.21	12	NA	
087-MW-102	Shallow	11.65	13	NA	
087-MW-119	Shallow	12.97	11	NA	
087-MW-120	Shallow	12.30	11	NA	
087-MW-121	Shallow	11.76	12	NA	
087-MW-A26	Shallow	10.10	13	10	
087-MW-I30	Shallow	10.86	14	10	
087-MW-O19	Shallow	13.50	13	10	Abandoned Feb. 2014 for soil excavation
087-MW-O23	Shallow	11.79	13	10	
087-MW-O29	Shallow	10.08	14	10	
087-MW-S19	Shallow	14.47	14	10	Abandoned 2/26/14 for soil excavation
087-MW-U28	Shallow	14.08	16	10	
087-MW-W25	Shallow	18.26	18	10	
087-MW-Y20	Shallow	19.06	20	10	Abandoned Feb. 2014 for soil excavation
087-PZ-001	Shallow	17.50	18	5	Abandoned Feb. 2014 for soil excavation
087-PZ-003	Shallow	13.10	18	5	
087-PZ-005	Shallow	14.92	20	5	Abandoned Feb. 2014 for soil excavation
088-MW-001	Shallow	9.34	15	13	Abandoned Feb. 2014 for soil excavation
088-MW-002	Shallow	12.81	15	13	
088-MW-101	Shallow	11.56	12	NA	
088-MW-102	Shallow	17.54	19	NA	
088-MW-103	Shallow	11.44	35	NA	
088-PZ-001	Shallow	10.67	12	5	
088-PZ-003	Shallow	12.07	15	5	
090-MW-F14	Shallow	20.50	15	10	Abandoned for NJCU Development
090-PZ-05	Shallow	17.20	NA	NA	
090-PZ-06	Shallow	17.60	NA	NA	
115-E1-SO	Shallow	7.42	6.95	NA	Abandoned 4/2/14 for soil excavation
115-E2-SO	Shallow	10.05	10	NA	
115-E3-SO	Shallow	12.57	NA	NA	
115-E5-SO	Shallow	NA	NA	NA	
115-W1-SO	Shallow	12.59	NA	NA	
115-W3-SO	Shallow	NA	13.93	NA	
115-W5-SO	Shallow	12.43	NA	NA	
117-MW-A05	Shallow	18.48	16	NA	
117-MW-A14	Shallow	17.33	17	NA	
117-MW-A62	Shallow	18.32	15	NA	
117-MW-A85	Shallow	17.40	15	NA	

**Table 2-2
Groundwater Monitoring Well Inventory**

<u>Well ID</u>	<u>Screen Zone</u>	<u>Ref. Pt. Elev.</u>	<u>Well Depth</u>	<u>Screen Length</u>	<u>Comments</u>
		(ft msl)	(ft)	(ft)	
117-MW-A89	Shallow	13.17	16	NA	
117-MW-A99	Shallow	15.95	14	NA	
117-MW-I4S	Shallow	15.49	NA	NA	
124-MW-02	Shallow	9.00	9.34	NA	Abandoned Oct. 2013 for soil excavation
124-MW-07	Shallow	NA	NA	NA	Abandoned Oct. 2013 for soil excavation
124-MW-09	Shallow	NA	NA	NA	Abandoned Oct. 2013 for soil excavation
124-MW-10	Shallow	10.06	11	8	
124-MW-11	Shallow	9.05	8	6	
125-MW-01	Shallow	8.71	NA	NA	Abandoned Feb. 2014 for soil excavation
125-PZ-001	Shallow	9.50	13	5	Abandoned Feb. 2014 for soil excavation
125-PZ-003	Shallow	8.89	8.5	5	Abandoned Feb. 2014 for soil excavation
134-MW-2	Shallow	7.36	10	9	Abandoned 7/25/14 for soil excavation
134-MW-Q08	Shallow	8.37	13	10	Abandoned Feb. 2014 for soil excavation
134-MW-V09	Shallow	7.98	13	10	
134-PZ-001	Shallow	7.47	16	5	Abandoned Feb. 2014 for soil excavation
134-PZ-003	Shallow	8.34	13	5	Abandoned 4/1/14 for soil excavation
140-MW-01	Shallow	NA	NA	NA	Abandoned 5/30/14 for soil excavation
140-MW-106	Shallow	NA	NA	NA	Abandoned 5/30/14 for soil excavation
140-MW-04	Shallow	7.18	NA	NA	
140-MW-06	Shallow	8.33	6	NA	Abandoned 5/30/14 for soil excavation
140-MW-07	Shallow	7.70	6	NA	Abandoned 5/30/14 for soil excavation
140-MW-08	Shallow	8.13	10	8	
140-MW-1R	Shallow	7.61	11	NA	
140-PZ-001	Shallow	8.29	11.5	5	Abandoned Feb. 2014 for soil excavation
153-MW-02	Shallow	NA	NA	NA	
153-MW-05	Shallow	NA	NA	NA	
153-MW-A13	Shallow	9.62	10	6	
153-MW-A15	Shallow	11.00	12.15	10	
154-MW-A01	Shallow	18.06	14.61	NA	
154-MW-A06	Shallow	19.87	15.12	NA	
154-MW-A5A	Shallow	19.16	14	NA	
154-MW-B6A	Shallow	20.71	13.68	NA	
154-MW-C6A	Shallow	20.37	13.41	NA	
154-MW-D01	Shallow	18.78	14.28	NA	
154-MW-E08	Shallow	22.00	14.4	NA	
163-MW-R05	Shallow	7.22	NA	NA	Abandoned Feb. 2014 for soil excavation
163-MW-CC8R	Shallow	NA	NA	NA	Abandoned 2/25/14 for soil excavation
163-MW-Y6R	Shallow	NA	NA	NA	Abandoned 2/25/14 for soil excavation
184-MW-001	Shallow	12.09	12	10	
184-MW-C10	Shallow	15.20	16	10	Abandoned for NJCU Development
184-MW-04	Shallow	8.74	NA	NA	
184-MW-05	Shallow	17.18	NA	NA	
184-MW-06	Shallow	19.20	NA	NA	
SA6-MW-AA1	Shallow	17.80	15	10	
Sump A	Shallow	15.95	NA	NA	
Sump B	Shallow	14.71	NA	NA	
073-PZ-002	Intermediate	7.26	26.5	5	Abandoned 4/2/14 for soil excavation
087-MW-13	Intermediate	12.93	40	10	
087-MW-35	Intermediate	18.29	40	10	
087-MW-A26D	Intermediate	10.35	28	10	

**Table 2-2
Groundwater Monitoring Well Inventory**

<u>Well ID</u>	<u>Screen Zone</u>	<u>Ref. Pt. Elev.</u>	<u>Well Depth</u>	<u>Screen Length</u>	<u>Comments</u>
		(ft msl)	(ft)	(ft)	
087-MW-O29D	Intermediate	10.32	56	NA	
087-MW-W25D	Intermediate	18.17	66	10	
087-OBS-1D	Intermediate	15.13	42.8	NA	
087-OBS-2D	Intermediate	12.68	NA	NA	
087-OBS-5D	Intermediate	12.72	39.83	NA	
087-OBS-6D	Intermediate	11.24	NA	NA	
087-PW-2	Intermediate	13.02	NA	NA	
087-PZ-002	Intermediate	17.44	36	5	Abandoned Feb. 2014 for soil excavation
087-PZ-004	Intermediate	13.18	29	5	
087-PZ-006	Intermediate	15.06	36	5	Abandoned Feb. 2014 for soil excavation
088-MW-15	Intermediate	12.09	35	10	
088-PZ-002	Intermediate	10.56	25	5	
088-PZ-004	Intermediate	12.05	27	5	
090-MW-07	Intermediate	14.00	40	10	
115-E1-DI	Intermediate	16.72	44.85	NA	
115-E1-DO	Intermediate	9.21	37.11	NA	
115-E2-DO	Intermediate	10.24	35	NA	
115-E3-DO	Intermediate	12.39	34	NA	
115-E4-DO	Intermediate	17.87	NA	NA	
115-E5-DO	Intermediate	15.72	NA	NA	
115-E6-DI	Intermediate	19.89	48.35	NA	
115-E6-DO	Intermediate	19.74	51.1	NA	
115-MW-20	Intermediate	14.19	NA	NA	
115-MW-E14D	Intermediate	18.05	35	10	
115-W1-DO	Intermediate	12.63	NA	NA	Abandoned 4/25/14 for soil excavation
115-W4-DO	Intermediate	8.79	41.22	NA	Abandoned 4/25/14 for soil excavation
117-MW-I1	Intermediate	11.08	22	10	
117-MW-I2	Intermediate	17.59	28	10	
117-MW-I3	Intermediate	15.59	28	10	
117-MW-I5	Intermediate	18.76	37	15	
124-MW-102D	Intermediate	9.38	30	10	Abandoned Oct. 2013 for soil excavation
124-MW-103D	Intermediate	9.58	29	10	Abandoned Oct. 2013 for soil excavation
124-MW-104D	Intermediate	9.08	26	10	Abandoned Oct. 2013 for soil excavation
124-MW-105D	Intermediate	9.63	24	10	Abandoned Oct. 2013 for soil excavation
124-MW-G02D	Intermediate	9.59	28	10	
125-PZ-002	Intermediate	9.31	26	5	Abandoned Feb. 2014 for soil excavation
125-PZ-004	Intermediate	8.93	25	5	Abandoned Feb. 2014 for soil excavation
134-PZ-002	Intermediate	7.81	26.5	5	
134-PZ-004	Intermediate	8.22	26.5	5	Abandoned 4/1/14 for soil excavation
140-MW-P05D	Intermediate	7.44	30	10	
140-PZ-002	Intermediate	8.08	25	5	Abandoned Feb. 2014 for soil excavation
SA6-MW-AA1D	Intermediate	19.36	32	10	
087-MW-01	Deep	12.80	60	10	
087-MW-03	Deep	13.77	95	10	Abandoned 4/1/14 for soil excavation
087-MW-08	Deep	12.98	99	10	
087-MW-34	Deep	12.73	70	5	
087-MW-A26T	Deep	9.92	56	15	
087-MW-W25T	Deep	18.19	91	15	
087-OBS-1L	Deep	15.27	67.05	NA	
087-OBS-1T	Deep	15.23	100	NA	

**Table 2-2
Groundwater Monitoring Well Inventory**

<u>Well ID</u>	<u>Screen Zone</u>	<u>Ref. Pt. Elev.</u>	<u>Well Depth</u>	<u>Screen Length</u>	<u>Comments</u>
		(ft msl)	(ft)	(ft)	
087-OBS-3L	Deep	12.88	65	NA	
087-OBS-4T	Deep	11.60	75.5	NA	
087-OBS-5T	Deep	12.62	81.9	NA	
087-PW-1	Deep	12.66	NA	NA	
088-MW-G19T	Deep	12.45	93	15	
088-IW-01	Deep	11.57	NA	NA	
088-IW-02	Deep	16.32	NA	NA	
088-IW-03	Deep	12.56	NA	NA	
090-MW-09	Deep	10.70	75	5	
115-MW-A12T	Deep	15.55	NA	NA	
115-MW-E14T	Deep	21.33	71	15	
115-OMW-E08TR	Deep	16.82	NA	NA	
115-PW-21	Deep	15.13	71	10	
117-MW-D1	Deep	11.08	41	10	
117-MW-D2	Deep	17.62	48	10	
117-MW-D3	Deep	18.85	80	10	
117-MW-I4	Deep	15.49	75	10	
119-MW-01T	Deep	10.78	62	10	
119-MW-02T	Deep	8.80	70	10	
124-MW-06	Deep	9.39	70	10	Abandoned Oct. 2013 for soil excavation
124-MW-102T	Deep	9.33	75	10	Abandoned Oct. 2013 for soil excavation
124-MW-103L	Deep	9.77	110	10	Abandoned Oct. 2013 for soil excavation
124-MW-104L	Deep	9.22	43	10	
124-MW-104T	Deep	9.31	67	10	Abandoned Oct. 2013 for soil excavation
124-MW-105T	Deep	9.33	62	10	
124-MW-106T	Deep	9.28	78	10	
124-MW-107T	Deep	9.08	70	10	Abandoned Oct. 2013 for soil excavation
124-MW-G02T	Deep	9.50	69	10	
153-MW-A13T	Deep	9.34	58	15	
SA6-MW-AA1T	Deep	15.31	70	10	
073-MW-10BR-1	Rock	6.67	155	10	
073-MW-10BR-2	Rock	6.67	170	10	
073-MW-10BR-3	Rock	6.67	195	15	
073-MW-10BR-4	Rock	6.67	227	15	
073-MW-10BR-5	Rock	6.67	327	15	
073-MW-1BR-1	Rock	7.58	144	15	
073-MW-1BR-2	Rock	7.58	209	15	
073-MW-1BR-3	Rock	7.58	264	15	
073-MW-1BR-4	Rock	7.58	295	15	
073-MW-1BR-5	Rock	7.58	329	15	
079-MW-13BR-1	Rock	13.08	121	10	
079-MW-13BR-2	Rock	13.08	214	15	
079-MW-13BR-3	Rock	13.08	284	15	
087-MW-14	Rock	10.68	97	10	
087-MW-I30T	Rock	10.59	80	15	
087-MW-O29T	Rock	9.98	102	15	
090-MW-18BR	Rock	16.36	154	15	Abandoned 2013: removed from LTMP
090-MW-7BR-1	Rock	12.66	134	15	
090-MW-7BR-2	Rock	12.66	NA	NA	
090-MW-7BR-3	Rock	12.66	NA	NA	

**Table 2-2
Groundwater Monitoring Well Inventory**

<u>Well ID</u>	<u>Screen Zone</u>	<u>Ref. Pt. Elev.</u>	<u>Well Depth</u>	<u>Screen Length</u>	<u>Comments</u>
		(ft msl)	(ft)	(ft)	
115-MW-203BR	Rock	8.70	162	20	
115-MW-211BR	Rock	17.41	NA	NA	
115-MW-215BR	Rock	8.82	143	20	
115-MW-216BR	Rock	18.02	131	20	
117-MW-3BR-1	Rock	12.34	155	15	
117-MW-3BR-2	Rock	12.34	263	15	
117-MW-8BR	Rock	12.94	125	10	
119-MW-11BR	Rock	10.75	159	20	
119-MW-12BR	Rock	11.26	154	20	
119-MW-16BR-1	Rock	8.61	151	15	
119-MW-16BR-2	Rock	8.61	187	15	
119-MW-16BR-3	Rock	8.61	247	15	
119-MW-2BR-1	Rock	8.43	163	15	
119-MW-2BR-2	Rock	8.43	245	15	
119-MW-2BR-3	Rock	8.43	315	15	
119-MW-4BR-1	Rock	8.77	179	15	
119-MW-4BR-2	Rock	8.77	229	15	
119-MW-4BR-3	Rock	8.77	314	15	
124-MW-17BR-1	Rock	9.56	153	15	
124-MW-17BR-2	Rock	9.56	337	15	
124-MW-8BR	Rock	9.71	NA	NA	
140-MW-9BR-1	Rock	7.32	153	15	
140-MW-9BR-2	Rock	7.32	222	15	
140-MW-9BR-3	Rock	7.32	272	15	
KP-MW-6BR-1	Rock	8.94	153	14	Inoperative 2013: removed from LTMP
KP-MW-6BR-2	Rock	8.94	231	15	Inoperative 2013: removed from LTMP
KP-MW-6BR-3	Rock	8.94	339	15	Inoperative 2013: removed from LTMP
SA6-MW-14BR	Rock	9.99	85	10	
SA6-MW-15BR	Rock	8.08	103	20	
SA6-MW-5BR-1	Rock	17.06	106	15	
SA6-MW-5BR-2	Rock	17.06	154	15	
SA6-MW-5BR-3	Rock	17.06	204	13	
SA6-MW-5BR-4	Rock	17.06	236	15	
SA6-MW-5BR-5	Rock	17.06	281	15	

Table 3-1

GWET Pumping Outages in 2014

Well ID	Start Date	End Date	Duration		Comment
			Days	Hours	
087-PW-1 & 087-PW-2	23-Jan-14	24-Jan-14	0	23.8	Shut down for power change over and controls prep.
087-PW-1	11-Feb-14	12-Feb-14	0	18.9	Routine maintenance
087-PW-2	11-Feb-14	12-Feb-14	0	11.2	Routine maintenance
087-PW-2	12-Feb-14	13-Feb-14	0	20.6	Routine maintenance
087-PW-2	13-Feb-14	14-Feb-14	0	22.9	Flow meter replacement
087-PW-1	10-Mar-14	12-Mar-14	2	9.3	Shut down for <i>Brownfields air release (?)</i>
087-PW-2	11-Mar-14	13-Mar-14	2	2.8	Bringing 115-MW-215BR on line.
087-PW-1, 087-PW-2, & 215-BR	4-Jul-14	5-Jul-14	0	11.5	Wells shut down by power outage.
215-BR	15-Jul-14	16-Jul-14	0	9.5	Well tripped off.

**Table 4-1
Groundwater Elevation Data from Quarterly Rounds in 2014**

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Groundwater Elevation (NGVD-29)			
					Mar-14	Jun-14	Sep-14	Dec-14
					(ft msl)	(ft msl)	(ft msl)	(ft msl)
073-MW-10BR-1	Rock	6.67	155	10	-1.33	-3.88	-17.56	NA
073-MW-10BR-2	Rock	6.67	170	10	-0.68	-0.96	-0.86	0.13
073-MW-10BR-3	Rock	6.67	195	15	-0.22	-1.76	-0.40	0.84
073-MW-10BR-4	Rock	6.67	227	15	0.50	0.18	0.31	1.63
073-MW-10BR-5	Rock	6.67	327	15	NA	NA	NA	NA
073-MW-1BR-1	Rock	7.58	144	15	-1.43	-1.66	NA	NA
073-MW-1BR-2	Rock	7.58	209	15	7.07	-1.10	NA	NA
073-MW-1BR-3	Rock	7.58	264	15	-0.46	0.30	NA	NA
073-MW-1BR-4	Rock	7.58	295	15	0.43	0.15	NA	NA
073-MW-1BR-5	Rock	7.58	329	15	0.53	0.12	NA	NA
073-MW-5	Shallow	6.81	15	13	NA	NA	NA	NA
073-MW-BB11	Shallow	7.87	13	10	NA	NA	NA	NA
073-MW-Y10	Shallow	6.42	13	10	NA	NA	NA	NA
073-PZ-001	Shallow	7.24	13	5	NA	NA	NA	NA
073-PZ-002	Intermediate	7.26	26.5	5	NA	NA	NA	NA
079-MW-01	Shallow	8.8	NA	NA	4.63	4.61	3.71	NA
079-MW-13BR-1	Rock	13.08	121	10	7.49	7.67	7.03	7.81
079-MW-13BR-2	Rock	13.08	214	15	7.48	7.88	7.19	7.86
079-MW-13BR-3	Rock	13.08	284	15	7.01	7.96	6.93	7.88
079-MW-A2	Shallow	8.1	13	10	3.91	4.03	NA	NA
079-MW-C6	Shallow	11	13	10	4.69	5.62	4.26	NA
087-IW-01	Deep	11.51	NA	NA	2.95	3.14	2.44	4.27
087-MW-001	Shallow	12.67	15	13	NA	NA	NA	NA
087-MW-01	Deep	12.8	60	10	3.82	3.92	3.19	3.27
087-MW-03	Deep	13.77	95	10	NA	NA	NA	NA
087-MW-08	Deep	12.98	99	10	2.84	1.71	1.09	1.56
087-MW-101	Shallow	12.21	12	NA	3.40	3.91	2.91	3.24
087-MW-102	Shallow	11.65	13	NA	3.45	4.27	2.96	3.29
087-MW-119	Shallow	12.97	11	NA	NA	6.11	6.01	6.21
087-MW-120	Shallow	12.3	11	NA	5.50	5.35	5.23	5.40
087-MW-121	Shallow	11.76	12	NA	3.22	3.59	2.67	3.09
087-MW-13	Intermediate	12.93	40	10	2.36	2.21	-1.20	0.95
087-MW-14	Rock	10.68	97	10	2.49	4.02	1.82	3.93
087-MW-34	Deep	12.73	70	5	0.32	0.14	-0.58	-0.35
087-MW-35	Intermediate	18.29	40	10	0.91	1.57	1.76	0.92
087-MW-A26	Shallow	10.1	13	10	3.72	3.90	2.92	3.79
087-MW-A26D	Intermediate	10.35	28	10	3.35	3.65	2.80	3.38
087-MW-A26T	Deep	9.92	56	15	3.30	3.60	2.80	3.30
087-MW-I30	Shallow	10.86	14	10	4.65	4.73	4.09	4.39
087-MW-I30T	Rock	10.59	80	15	2.35	4.22	1.37	3.70
087-MW-O19	Shallow	13.5	13	10	NA	NA	NA	NA

**Table 4-1
Groundwater Elevation Data from Quarterly Rounds in 2014**

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Groundwater Elevation (NGVD-29)			
					Mar-14	Jun-14	Sep-14	Dec-14
					(ft msl)	(ft msl)	(ft msl)	(ft msl)
087-MW-O23	Shallow	11.79	13	10	NA	NA	NA	NA
087-MW-O29	Shallow	10.08	14	10	4.76	4.86	4.18	4.59
087-MW-O29D	Intermediate	10.32	56	NA	1.94	2.10	1.54	1.87
087-MW-O29T	Rock	9.98	102	15	2.24	2.18	1.66	1.97
087-MW-S19	Shallow	14.47	14	10	NA	NA	NA	NA
087-MW-U28	Shallow	14.08	16	10	6.39	6.64	6.71	6.63
087-MW-W25	Shallow	18.26	18	10	1.42	5.85	6.05	5.61
087-MW-W25D	Intermediate	18.17	66	10	4.71	1.58	1.84	1.23
087-MW-W25T	Deep	18.19	91	15	1.13	1.44	1.25	1.48
087-MW-Y20	Shallow	19.06	20	10	NA	NA	NA	NA
087-OBS-1D	Intermediate	15.13	42.8	NA	NA	2.02	2.06	1.93
087-OBS-1L	Deep	15.27	67.05	NA	NA	3.26	1.23	3.01
087-OBS-1T	Deep	15.23	100	NA	NA	2.00	1.74	1.63
087-OBS-2D	Intermediate	12.68	NA	NA	-0.93	-1.12	-1.62	-1.58
087-OBS-3L	Deep	12.88	65	NA	2.08	0.76	-0.38	0.42
087-OBS-4T	Deep	11.6	75.5	NA	1.36	1.36	0.70	1.03
087-OBS-5D	Intermediate	12.72	39.83	NA	1.97	1.04	1.39	0.83
087-OBS-5T	Deep	12.62	81.9	NA	1.48	0.45	0.08	0.10
087-OBS-6D	Intermediate	11.24	NA	NA	3.26	3.08	2.49	2.79
087-PW-1	Deep	12.66	NA	NA	-20.85	-22.67	NA	-22.98
087-PW-2	Intermediate	13.02	NA	NA	2.24	-18.57	NA	-20.95
087-PZ-001	Shallow	17.5	18	5	NA	NA	NA	NA
087-PZ-002	Intermediate	17.44	36	5	NA	NA	NA	NA
087-PZ-003	Shallow	13.1	18	5	6.18	5.60	4.23	NA
087-PZ-004	Intermediate	13.18	29	5	2.86	NA	2.31	NA
087-PZ-005	Shallow	14.92	20	5	NA	NA	NA	NA
087-PZ-006	Intermediate	15.06	36	5	NA	NA	NA	NA
088-IW-01	Deep	11.58	NA	NA	3.81	4.06	3.20	NA
088-IW-02	Deep	16.34	NA	NA	3.36	3.62	2.69	NA
088-IW-03	Deep	12.56	NA	NA	6.94	3.17	2.57	NA
088-MW-001	Shallow	9.34	15	13	5.57	5.59	4.35	5.75
088-MW-002	Shallow	12.81	15	13	7.83	7.46	6.31	NA
088-MW-101	Shallow	11.56	12	NA	3.94	4.24	2.75	NA
088-MW-102	Shallow	17.54	19	NA	5.63	5.87	3.46	NA
088-MW-103	Shallow	11.44	35	NA	3.53	3.88	NA	NA
088-MW-15	Intermediate	12.09	35	10	NA	3.22	NA	2.93
088-MW-G19T	Deep	12.45	93	15	3.17	3.14	2.56	3.10
088-PZ-001	Shallow	10.67	12	5	6.68	6.75	5.57	6.66
088-PZ-002	Intermediate	10.56	25	5	4.31	4.44	3.81	4.12
088-PZ-003	Shallow	12.07	15	5	6.34	6.07	5.14	NA
088-PZ-004	Intermediate	12.05	27	5	2.97	2.99	2.47	2.91

**Table 4-1
Groundwater Elevation Data from Quarterly Rounds in 2014**

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Groundwater Elevation (NGVD-29)			
					Mar-14	Jun-14	Sep-14	Dec-14
					(ft msl)	(ft msl)	(ft msl)	(ft msl)
090-MW-07	Intermediate	14	40	10	-0.38	3.88	2.98	3.08
090-MW-09	Deep	10.7	75	5	5.20	5.99	4.92	5.09
090-MW-18BR	Rock	16.36	154	15	NA	NA		NA
090-MW-7BR-1	Rock	12.66	134	15	4.83	5.39	4.51	5.02
090-MW-7BR-2	Rock	12.66	NA	NA	4.85	5.38	-0.73	4.98
090-MW-7BR-3	Rock	12.66	NA	NA	4.88	5.31	4.63	5.13
090-MW-F14	Shallow	20.5	15	10	NA	NA		NA
090-PZ-05	Shallow	17.2	15.35	NA	8.96	8.91	7.22	7.47
090-PZ-06	Shallow	17.6	16.59	NA	11.36	11.24	9.32	9.95
115-E1-DI	Intermediate	16.72	44.85	NA	2.98	3.17	2.43	2.83
115-E1-DO	Intermediate	9.21	37.11	NA	NA	NA	NA	NA
115-E1-SO	Shallow	7.42	6.95	NA	NA	NA	NA	NA
115-E2-DO	Intermediate	10.24	35	NA	3.99	4.70	3.79	2.22
115-E2-SO	Shallow	10.05	10	NA	5.99	6.03	5.39	5.27
115-E3-DO	Intermediate	12.39	34	NA	5.11	5.48	4.64	4.96
115-E3-SO	Shallow	12.57	NA	NA	6.84	6.57	5.95	5.73
115-E4-DO	Intermediate	17.87	45.46	NA	3.94	NA	3.27	3.78
115-E5-DO	Intermediate	15.72	NA	NA	2.96	3.11	2.39	NA
115-E5-SO	Shallow	NA	NA	NA	NA	NA	NA	NA
115-E6-DI	Intermediate	19.89	48.35	NA	2.86	3.12	2.32	2.76
115-E6-DO	Intermediate	19.74	51.1	NA	15.43	2.74	7.50	3.55
115-MW-20	Intermediate	14.19	NA	NA	2.34	2.75	2.55	2.86
115-MW-203BR	Rock	8.7	162	20	0.71	0.65	1.89	NA
115-MW-211BR	Rock	17.41	NA	NA	3.71	4.16	3.51	3.90
115-MW-215BR	Rock	8.82	143	20	-3.01	-3.54	-3.56	-3.55
115-MW-216BR	Rock	18.02	131	20	3.85	4.26	3.60	3.97
115-MW-A12T	Deep	15.55	NA	NA	0.74	0.84	0.87	0.90
115-MW-E14D	Intermediate	18.05	35	10	2.57	2.81	2.01	2.44
115-MW-E14T	Deep	21.33	71	15	3.05	3.25	2.49	2.91
115-OMW-E08TR	Deep	16.82	NA	NA	3.26	3.48	2.70	3.11
115-PW-21	Deep	15.13	71	10	2.72	2.95	2.16	2.62
115-W1-DO	Intermediate	12.63	NA	NA	2.17		NA	NA
115-W1-SO	Shallow	12.59	NA	NA	9.98	NA	NA	NA
115-W3-SO	Shallow	NA	13.93	NA	NA	NA	NA	NA
115-W4-DO	Intermediate	8.79	41.22	NA	1.76	NA	NA	NA
115-W5-SO	Shallow	12.43	NA	NA	8.47	9.08	5.28	NA
117-MW-3BR-1	Rock	12.34	155	15	5.45	6.05	5.20	5.68
117-MW-3BR-2	Rock	12.34	263	15	6.21	6.74	5.91	6.34
117-MW-8BR	Rock	12.94	125	10	5.63	5.99	5.22	5.71
117-MW-A05	Shallow	18.48	16	NA	7.14	7.66	6.63	6.76
117-MW-A14	Shallow	17.33	17	NA	5.41	5.52	4.81	4.99

**Table 4-1
Groundwater Elevation Data from Quarterly Rounds in 2014**

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Groundwater Elevation (NGVD-29)			
					Mar-14	Jun-14	Sep-14	Dec-14
					(ft msl)	(ft msl)	(ft msl)	(ft msl)
117-MW-A62	Shallow	18.32	15	NA	5.91	6.40	5.90	NA
117-MW-A85	Shallow	17.4	15	NA	4.98	5.39	5.02	4.85
117-MW-A89	Shallow	13.17	16	NA	4.60	4.88	3.93	4.32
117-MW-A99	Shallow	15.95	14	NA	5.55	6.07	5.56	5.26
117-MW-D1	Deep	11.08	41	10	2.66	3.42	2.71	2.89
117-MW-D2	Deep	17.62	48	10	5.20	4.75	4.34	2.89
117-MW-D3	Deep	18.85	80	10	6.44	6.63	5.65	6.02
117-MW-I1	Intermediate	11.08	22	10	4.03	4.63	3.77	4.35
117-MW-I2	Intermediate	17.59	28	10	5.56	5.18	5.21	6.57
117-MW-I3	Intermediate	15.59	28	10	5.30	5.66	4.81	5.00
117-MW-I4	Deep	15.49	75	10	5.84	5.71	6.04	5.60
117-MW-I4S	Shallow	15.49	NA	NA	5.68	6.27	NA	NA
117-MW-I5	Intermediate	18.76	37	15	6.55	7.02	6.31	6.11
119-MW-01T	Deep	10.78	62	10	1.81	2.91	2.06	2.41
119-MW-02T	Deep	8.8	70	10	2.52	3.19	2.48	2.95
119-MW-11BR	Rock	10.75	159	20	NA	4.09	3.44	3.88
119-MW-12BR	Rock	11.26	154	20	5.27	5.61	4.88	5.29
119-MW-16BR-1	Rock	8.61	151	15	4.46	4.89	5.55	NA
119-MW-16BR-2	Rock	8.61	187	15	4.35	4.77	4.13	4.36
119-MW-16BR-3	Rock	8.61	247	15	4.47	4.63	4.17	4.42
119-MW-2BR-1	Rock	8.43	163	15	-1.86	-1.20	-0.48	-1.65
119-MW-2BR-2	Rock	8.43	245	15	-0.84	-0.47	-0.33	-1.09
119-MW-2BR-3	Rock	8.43	315	15	-1.25	-0.57	NA	-0.82
119-MW-4BR-1	Rock	8.77	179	15	3.27	-0.14	3.69	3.59
119-MW-4BR-2	Rock	8.77	229	15	3.80	4.37	3.73	3.53
119-MW-4BR-3	Rock	8.77	314	15	3.80	4.42	3.76	3.71
124-MW-02	Shallow	9	9.34	NA	NA	NA	NA	NA
124-MW-06	Deep	9.39	70	10	NA	NA	NA	NA
124-MW-10	Shallow	10.06	11	8	4.99	4.95	4.66	5.66
124-MW-102D	Intermediate	9.38	30	10	NA	NA	NA	NA
124-MW-102T	Deep	9.33	75	10	NA	NA	NA	NA
124-MW-103D	Intermediate	9.58	29	10	NA	NA	NA	NA
124-MW-103L	Deep	9.77	110	10	NA	NA	NA	NA
124-MW-104D	Intermediate	9.08	26	10	NA	NA	NA	NA
124-MW-104L	Deep	9.22	43	10	1.97	3.48	2.59	4.11
124-MW-104T	Deep	9.31	67	10	NA	NA	NA	NA
124-MW-105D	Intermediate	9.63	24	10	NA	NA	NA	NA
124-MW-105T	Deep	9.33	62	10	1.26	3.22	2.31	3.61
124-MW-106T	Deep	9.28	78	10	NA	3.28	2.39	3.07
124-MW-107T	Deep	9.08	70	10	NA	NA	NA	NA
124-MW-11	Shallow	9.05	8	6	4.64	4.38	3.07	NA

**Table 4-1
Groundwater Elevation Data from Quarterly Rounds in 2014**

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Groundwater Elevation (NGVD-29)			
					Mar-14	Jun-14	Sep-14	Dec-14
					(ft msl)	(ft msl)	(ft msl)	(ft msl)
124-MW-17BR-1	Rock	9.56	153	15	3.84	1.34	3.77	3.99
124-MW-17BR-2	Rock	9.56	337	15	3.92	1.27	3.90	3.88
124-MW-8BR	Rock	9.71	NA	NA	3.79	4.22	3.52	3.80
124-MW-G02D	Intermediate	9.59	28	10	0.89	2.87	1.76	2.58
124-MW-G02T	Deep	9.5	69	10	1.39	3.15	2.80	3.03
125-MW-01	Shallow	8.71	NA	NA	NA	NA	NA	NA
125-PZ-001	Shallow	9.5	13	5	NA	NA	NA	NA
125-PZ-002	Intermediate	9.31	26	5	7.13	NA	NA	NA
125-PZ-003	Shallow	8.89	8.5	5	8.19	NA	NA	NA
125-PZ-004	Intermediate	8.93	25	5	8.07	NA	NA	NA
134-MW-Q08	Shallow	8.37	13	10	NA	NA	NA	NA
134-MW-V09	Shallow	7.98	13	10	NA	NA	NA	NA
134-PZ-001	Shallow	7.47	16	5	NA	NA	NA	NA
134-PZ-002	Intermediate	7.81	26.5	5	NA	NA	NA	NA
134-PZ-003	Shallow	8.34	13	5	NA	NA	NA	NA
134-PZ-004	Intermediate	8.22	26.5	5	NA	NA	NA	NA
140-MW-04	Shallow	7.18	NA	NA	4.69	4.60	2.02	2.81
140-MW-06	Shallow	8.33	6	NA	7.35	NA	NA	NA
140-MW-07	Shallow	7.7	6	NA	4.10	NA	NA	NA
140-MW-08	Shallow	8.13	10	8	4.03	4.14	0.64	1.59
140-MW-10	Shallow	10.06	11	8	7.57	NA	NA	4.99
140-MW-1R	Shallow	7.61	11	NA	4.73	4.74	2.05	2.79
140-MW-9BR-1	Rock	7.32	153	15	1.40	1.59	1.78	1.70
140-MW-9BR-2	Rock	7.32	222	15	2.80	3.29	3.02	3.10
140-MW-9BR-3	Rock	7.32	272	15	2.66	3.24	3.01	3.01
140-MW-P05D	Intermediate	7.44	30	10	1.53	1.90	NA	NA
140-PZ-001	Shallow	8.29	11.5	5	NA	NA	NA	NA
140-PZ-002	Intermediate	8.08	25	5	NA	NA	NA	NA
153-MW-A13	Shallow	9.62	10	6	3.21	4.02	2.68	3.84
153-MW-A13T	Deep	9.34	58	15	3.71	3.42	2.66	3.14
153-MW-A15	Shallow	11	12.15	10	2.60	2.83	1.80	2.46
154-MW-A01	Shallow	18.06	14.61	NA	11.84	11.50	10.65	11.26
154-MW-A06	Shallow	19.87	15.12	NA	12.89	13.56	11.30	13.40
154-MW-A5A	Shallow	19.16	14	NA	11.97	11.79	10.85	11.47
154-MW-B6A	Shallow	20.71	13.68	NA	12.78	13.13	11.70	12.94
154-MW-C6A	Shallow	20.37	13.41	NA	12.77	12.54	11.54	12.22
154-MW-D01	Shallow	18.78	14.28	NA	NA	12.72	11.63	12.10
154-MW-E08	Shallow	22	14.4	NA	14.03	13.73	12.28	13.40
163-MW-R05	Shallow	7.22	NA	NA	NA	NA	NA	NA
184-MW-001	Shallow	12.09	12	10	NA	NA	NA	NA
184-MW-04	Shallow	8.74	NA	NA	4.39	3.93	3.53	3.75

**Table 4-1
Groundwater Elevation Data from Quarterly Rounds in 2014**

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Groundwater Elevation (NGVD-29)			
					Mar-14	Jun-14	Sep-14	Dec-14
					(ft msl)	(ft msl)	(ft msl)	(ft msl)
184-MW-05	Shallow	14.71	NA	NA	6.99	7.03	5.42	5.99
184-MW-06	Shallow	19.20	NA	NA	NA	NA	NA	NA
184-MW-C10	Shallow	15.2	16	10	NA	NA	NA	NA
KP-MW-6BR-1	Rock	8.94	153	14	NA	NA	NA	NA
KP-MW-6BR-2	Rock	8.94	231	15	NA	NA	NA	NA
KP-MW-6BR-3	Rock	8.94	339	15	NA	NA	NA	NA
SA6-MW-14BR	Rock	9.99	85	10	NA	3.78	3.25	3.59
SA6-MW-15BR	Rock	8.08	103	20	1.34	2.22	1.54	1.76
SA6-MW-5BR-1	Rock	17.06	106	15	1.90	2.61	NA	NA
SA6-MW-5BR-2	Rock	17.06	154	15	2.63	3.29	NA	3.12
SA6-MW-5BR-3	Rock	17.06	204	13	3.83	3.67	NA	3.73
SA6-MW-5BR-4	Rock	17.06	236	15	3.09	3.80	3.02	3.82
SA6-MW-5BR-5	Rock	17.06	281	15	3.25	3.90	NA	3.85
SA6-MW-AA1	Shallow	17.8	15	10	4.29	4.36	4.10	3.86
SA6-MW-AA1D	Intermediate	19.36	32	10	1.50	1.80	1.14	1.28
SA6-MW-AA1T	Deep	15.31	70	10	1.41	1.67	1.08	1.22
Sump A	Shallow	15.95	NA	NA	NA	NA	NA	NA
Sump B	Shallow	13.04	NA	NA	NA	NA	NA	NA

* - See Table 4-2 for Reference Point Elevations.

Table 4-2
Summary of Groundwater Elevations Near NJCU
2014

Location	Post-const. Ref. pt.* Elev. (ft, msl)	<u>03/13/14</u>		<u>06/17/14</u>		<u>09/09/14</u>		<u>12/15/14</u>	
		Depth to GW (ft.)	GW Elev. (ft., msl)	Depth to GW (ft.)	GW Elev. (ft., msl)	Depth to GW (ft.)	GW Elev. (ft., msl)	Depth to GW (ft.)	GW Elev. (ft., msl)
079-MW-01	8.80	4.17	4.63	4.19	4.61	5.09	3.71	4.53	4.27
079-MW-A02	8.10	4.19	3.91	4.07	4.03	abandoned	NA	abandoned	NA
Sump A (North)	15.95	8.35	7.60	8.83	7.12	NA	NA	9.42	6.53
Sump B (South)	13.04	5.36	7.68	4.89	8.15	5.74	7.30	5.91	7.13
090-PZ-5	17.20	8.24	8.96	8.29	8.91	9.98	7.22	9.73	7.47
090-PZ-6	17.10	6.24	10.86	6.36	10.74	8.28	8.82	7.65	9.45
184-MW-4	8.74	4.35	4.39	4.81	3.93	5.21	3.53	4.99	3.75
184-MW-5	14.71	NA*	NA	7.68	7.03	9.29	5.42	8.72	5.99
184-MW-6	15.92	NA*	NA	6.27	9.65	8.04	7.88	7.72	8.20

NA* Not available due to site construction

* NGVD29 site datum

Table 5-1
Summary of Groundwater Quality Data from GWET Wells

Parameter	1-Apr-14			28-May-14		
	PW-1 (ug/L)	PW-2 (ug/L)	115-MW- 215BR (ug/L)	PW-1 (ug/L)	PW-2 (ug/L)	115-MW- 215BR (ug/L)
Benzene	2.9	4.0	ND	3.4	4.7	ND
Carbon Tetrachloride	4.4J	2.8	1.9	7.0	4.3	2.7
Chloroform	26.5	12.0	ND	31.3	14.0	0.25J
1,1-Dichloroethene	0.42J	ND	ND	0.77J	ND	ND
cis-1,2-Dichloroethene	96	8.1	ND	144	ND	ND
trans-1,2-Dichloroethene	3.4	ND	ND	5.3	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Trichloroethene	91.3	43.4	ND	119	54.8	ND
1,1-Dichloroethane	0.45J	ND	ND	0.61J	ND	ND
Methylene chloride	0.77J	ND	ND	0.92J	ND	ND
Vinyl chloride	13.5	2.7	ND	21.2	3.8	ND
1,2-Dichlorobenzene	0.72J	ND	ND	0.70J	ND	ND
Chlorobenzene	0.38J	ND	ND	0.40J	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND
Hexavalent Chromium	33,400	12,500	15,100	34,700	12,700	19,700
Total Chromium	36,900	16,400	16,600	35,500	14,500	19,600

ND = Not detected above reporting limit.

J = estimated value.

Table 5-1 (continued)
 Summary of Groundwater Quality Data from GWET Wells

Parameter	9-Sep-14			18-Dec-14		
	PW-1 (ug/L)	PW-2 (ug/L)	115-MW- 215BR (ug/L)	PW-1 (ug/L)	PW-2 (ug/L)	115-MW- 215BR (ug/L)
Benzene	3.7	4.7	ND	3.2	4.0	ND
Carbon Tetrachloride	7.3	4.8	3.0	5.2	4.2	2.9
Chloroform	28.1	11.3	ND	25.8	9.4	ND
1,1-Dichloroethene	0.62J	ND	ND	0.57	ND	ND
cis-1,2-Dichloroethene	128	9.6	ND	112	8.6	ND
trans-1,2-Dichloroethene	4.5	ND	ND	3.5	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Trichloroethene	123	57.4	ND	97	44.4	ND
1,1-Dichloroethane	0.55J	ND	ND	0.46	ND	ND
Methylene chloride	0.74J	ND	ND	0.77	0.20	ND
Vinyl chloride	25.2	3.8	ND	15.4	2.5	ND
1,2-Dichlorobenzene	0.82J	ND	ND	0.66	ND	ND
Chlorobenzene	0.42J	ND	ND	0.37	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND
Hexavalent Chromium	34,200	11,100	15,700	35,900	12,200	15,900
Total Chromium	37,600	19,300	17,900	34,100	12,700	15,900

ND = Not detected above reporting limit.

J = estimated value.

Table 6-1
Summary of S-3 Injection Events
First Three Years of Operation

<u>Event #</u>	<u>Injection Dates</u>	<u>Injection Well</u>	<u>Injection History</u>	<u>Volume Calmet Injected (gallons)</u>	<u>Volume Water Injected (gallons)</u>	<u>Average Injection Rate (gpm)</u>	<u>Pressurization Required (psi)</u>
1	05/20/12	088-IW-01	First	4,291	9,135	9.0 to 10.9	0
2	07/01/12	088-IW-02	First	4,267	9,000	10.0	0
3	08/20/12	115-PW-21	First	4,350	9,440	12.0	0
4	10/01/12	115-DP-2	First	4,340	9,022	10-11.5	3 to 5
5	12/09/12	088-IW-02	Second	4,230	9,006	11-12.5	0 to 2
6	03/17/13	088-IW-01	Second	4,305	9,027	5.0 to 10.0	0
7	06/23/13	088-IW-03	First	4,320	9,007	7.0 to 11.5	0 to 4
8	08/18/13	088-IW-02	Third	4,171	8,400	10 to 12	0
9	09/22/13	088-IW-01	Third	4,242	8,500	7 to 10	0
10	10/20/13	088-IW-03	Second	3,954	7,950	6 to 9	4 to 7
11	12/08/13	088-IW-02	Fourth	4,080	8,200	10.0	2 to 7
12	03/30/14	088-IW-01	Fourth	4,300	8,400	12 to 14	3 to 8
13	04/27/14	088-IW-03	Third	4,130	8,250	7 to 9	4 to 8
14	06/01/14	088-IW-02	Fifth	4,200	8,400	11.0	0
15	07/13/14	088-IW-01	Fifth	4,240	8,500	3 to 4	12 to 15
16	08/24/14	088-IW-03	Fourth	4,210	8,400	9.0	5 to 7
17	09/21/14	088-IW-02	Sixth	4,250	8,500	13.0	3 to 5
18	10/29/14	088-IW-03	Fifth	3,844	7,700	11.0	8 to 10

Table 6-2
Calculation of Percent Sulfide in CaSx Samples

<u>Event</u>	<u>Product Name</u>	<u>CaSx Manufacturer</u>	<u>Sulfide %</u>			<u>Sulfide % Geometric Mean</u>
			<u>T-1</u>	<u>T-2</u>	<u>T-3</u>	<u>Mean</u>
1	Calmet	TKI	5.10	4.91	5.01	5.01
2	Calmet	TKI	5.31	5.12	5.44	5.29
3	Calmet	TKI	5.19	5.25	5.19	5.21
4	Calmet	TKI	5.48	5.41	5.45	5.45
5	Calcium Polysulfide	Graus	6.48	6.48	6.56	6.51
6	Calcium Polysulfide	Graus	4.30	4.31	4.33	4.31
7	Calcium Polysulfide	Graus	3.84	3.84	4.06	3.91
8	Calcium Polysulfide	Graus	5.12	5.48	5.40	5.33
9	Calcium Polysulfide	Graus	5.08	4.88	4.92	4.96
10	Calcium Polysulfide	Graus	5.17	5.13	5.16	5.15
11	Calcium Polysulfide	Graus	5.18	5.13	5.11	5.14
12	Calcium Polysulfide	Graus	5.44	5.12	5.22	5.26
13	Calcium Polysulfide	Graus	5.07	5.06	5.50	5.21
14	Calcium Polysulfide	Graus	5.98	5.97	5.83	5.93
15	Calcium Polysulfide	Graus	4.98	5.06	5.14	5.06
16	Calcium Polysulfide	Graus	6.23	6.20	6.02	6.15
17	Calcium Polysulfide	Graus	6.21	6.13	5.80	6.04
18	Calcium Polysulfide	Graus	6.14	6.39	6.42	6.31

TKI = 'TKI = Tessenderlo Kerley, Inc.

Graus = Graus = Graus Chemicals

T- Trij T- Triplicate #

Table 6-3
Summary of Stoichiometrically Equivalent Cr(VI) Mass Reduced
S-3 Injection/Mass Removal Program

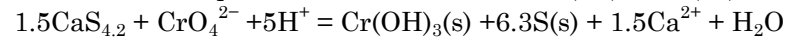
<u>Event #</u>	<u>Injection Date</u>	<u>Injection Well</u>	<u>Mass CaSx Delivered (tons)</u>	<u>Volume CaSx Injected^(a) (gallons)</u>	<u>Geometric mean Sulfide %^(b)</u>	Stoichiometric	Cumulative
						<u>Equivalent Mass Cr(VI) Reduced^(c) (tons)</u>	<u>Stoichiometric Equivalent Mass Cr(VI) Reduced (tons)</u>
1	5/20/12	088-IW-01	22.53	4,291	5.01%	1.22	1.22
2	7/1/12	088-IW-02	22.40	4,267	5.29%	1.28	2.50
3	8/20/12	115-PW-21	22.84	4,350	5.21%	1.29	3.79
4	10/1/12	115-DP-2	22.79	4,340	5.45%	1.34	5.13
5	12/9/12	088-IW-02	22.42	4,230	6.51%	1.58	6.71
6	3/17/13	088-IW-01	22.60	4,305	4.31%	1.05	7.76
7	6/23/13	088-IW-03	22.68	4,320	3.91%	0.96	8.72
8	08/18/13	088-IW-02	22.13	4,171	5.33%	1.28	9.99
9	09/22/13	088-IW-01	22.27	4,242	4.96%	1.19	11.19
10	10/20/13	088-IW-03	20.76	3,954	5.15%	1.16	12.34
11	12/08/13	088-IW-02	21.43	4,080	5.14%	1.19	13.53
12	03/30/14	088-IW-01	22.57	4,300	5.26%	1.28	14.82
13	04/27/14	088-IW-03	21.68	4,130	5.21%	1.22	16.04
14	06/01/14	088-IW-02	22.05	4,200	5.93%	1.41	17.45
15	07/13/14	088-IW-01	22.26	4,240	5.06%	1.22	18.67
16	08/24/14	088-IW-03	22.10	4,210	6.15%	1.47	20.14
17	09/21/14	088-IW-02	22.31	4,250	6.04%	1.46	21.60
18	10/29/14	088-IW-03	20.18	3,844	6.31%	1.38	22.97

(a) Mass CaSx Delivered / CaSx density

(b) see Table 6.2

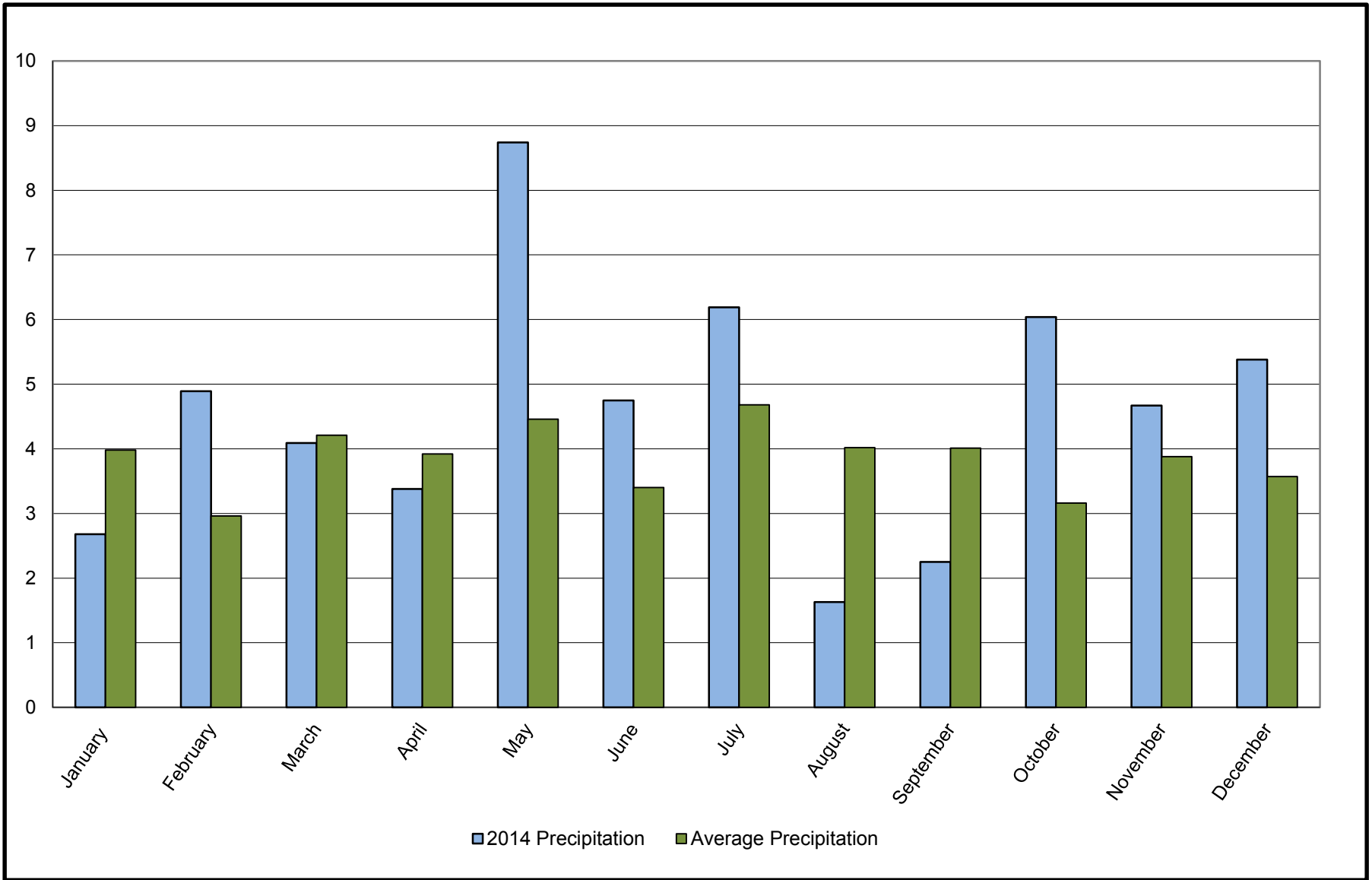
(c) Mass CaSx Delivered \times Sulfide% \times (51.996/32.065) / 1.5;

The factor 1.5 represents the molar ratio of S(-II) to Cr(VI) in the balanced redox reaction:



51.996 and 32.065 are the atomic masses of Cr and S, respectively

FIGURES

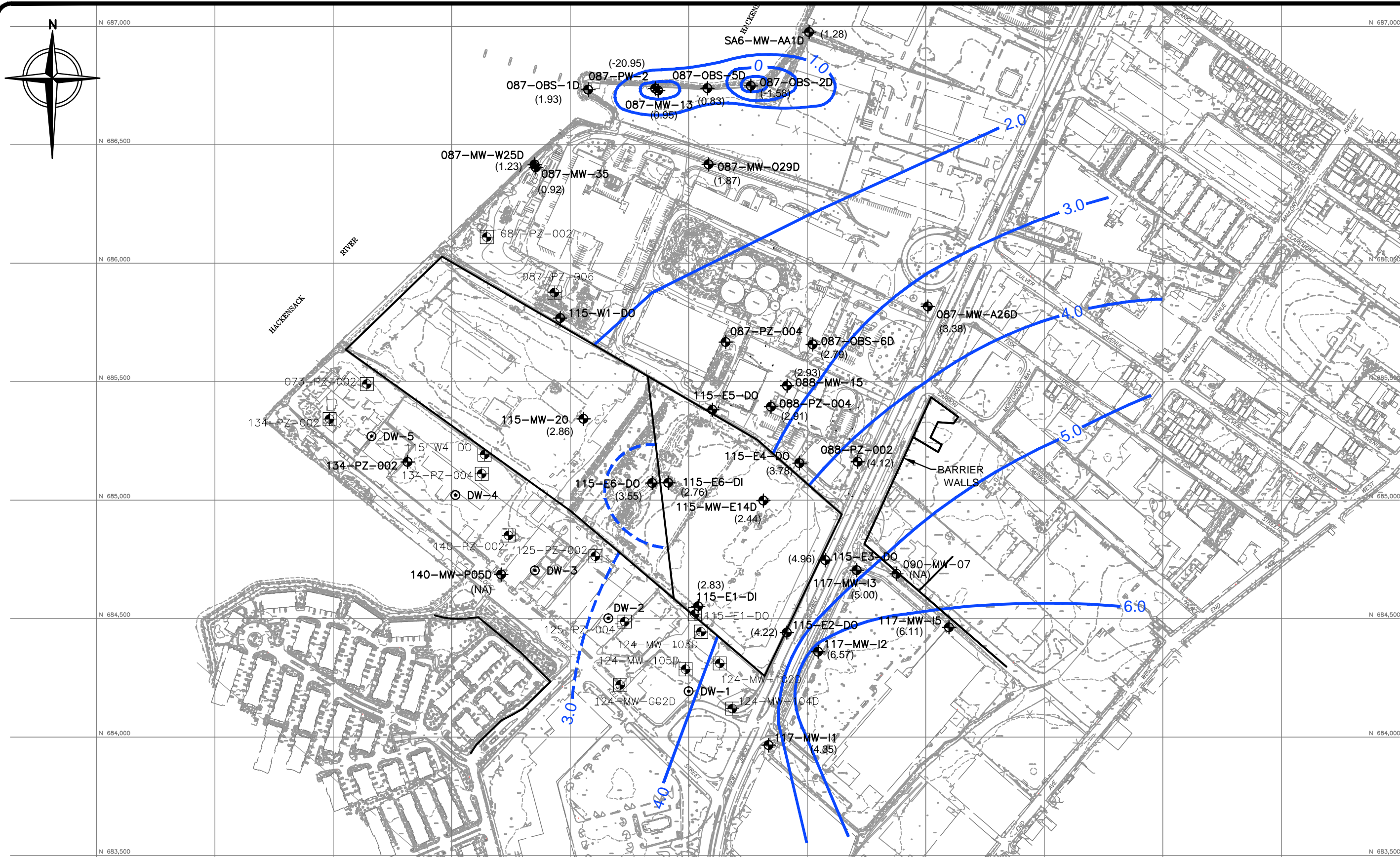


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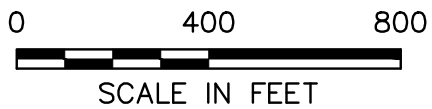
HONEYWELL
Jersey City, New Jersey
2014 Monthly Precipitation

Figure
2-1



LEGEND:

- ◆ 087-MW-029D INTERMEDIATE ZONE MONITORING WELL
- ⊙ DW-3 DEPRESSURIZATION WELL
- ◻ 115-W4-DO ABANDONED WELL
- (4.35) WATER LEVEL ELEVATION (FT, MSL)
- 1.0 GROUNDWATER CONTOUR (FT, MSL)



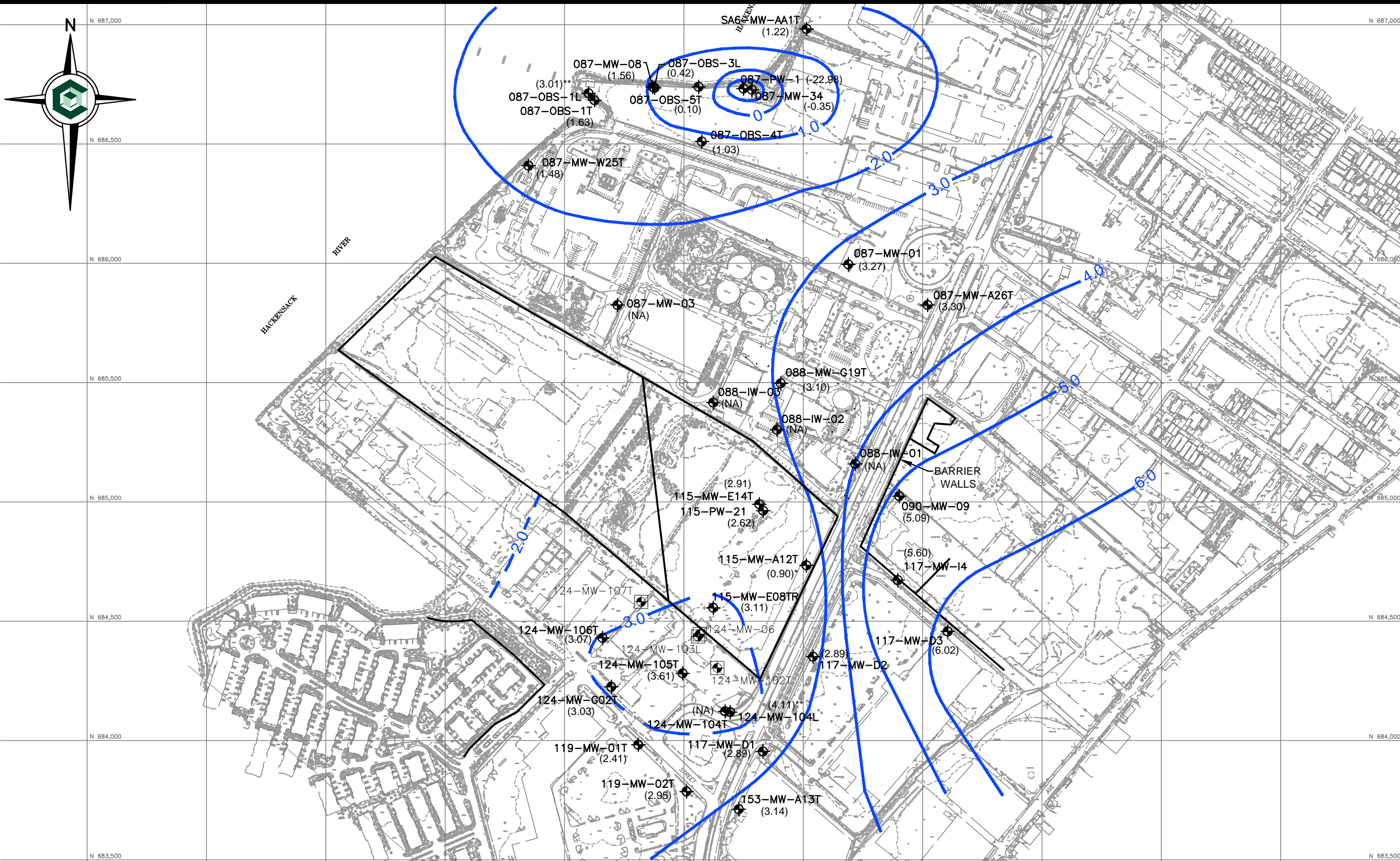
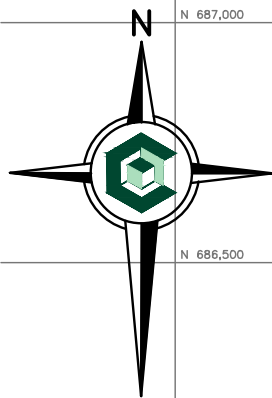
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HONEYWELL
DECEMBER 2014
GWET LTMP
GROUNDWATER ELEVATION CONTOURS
INTERMEDIATE ZONE

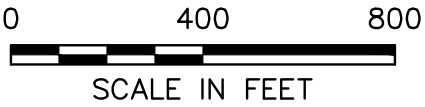
FIGURE NO.
4-2
PROJECT NO.



LEGEND:

- 087-MW-029D DEEP ZONE MONITORING WELL
- 124-MW-107T ABANDONED WELL
- WATER LEVEL ELEVATION (FT, MSL)
- 1.0 GROUNDWATER CONTOUR (FT, MSL)

- * REFERENCE POINT ELEVATION NOT ACCURATE
- ** SCREENED BETWEEN INTERMEDIATE AND DEEP ZONES



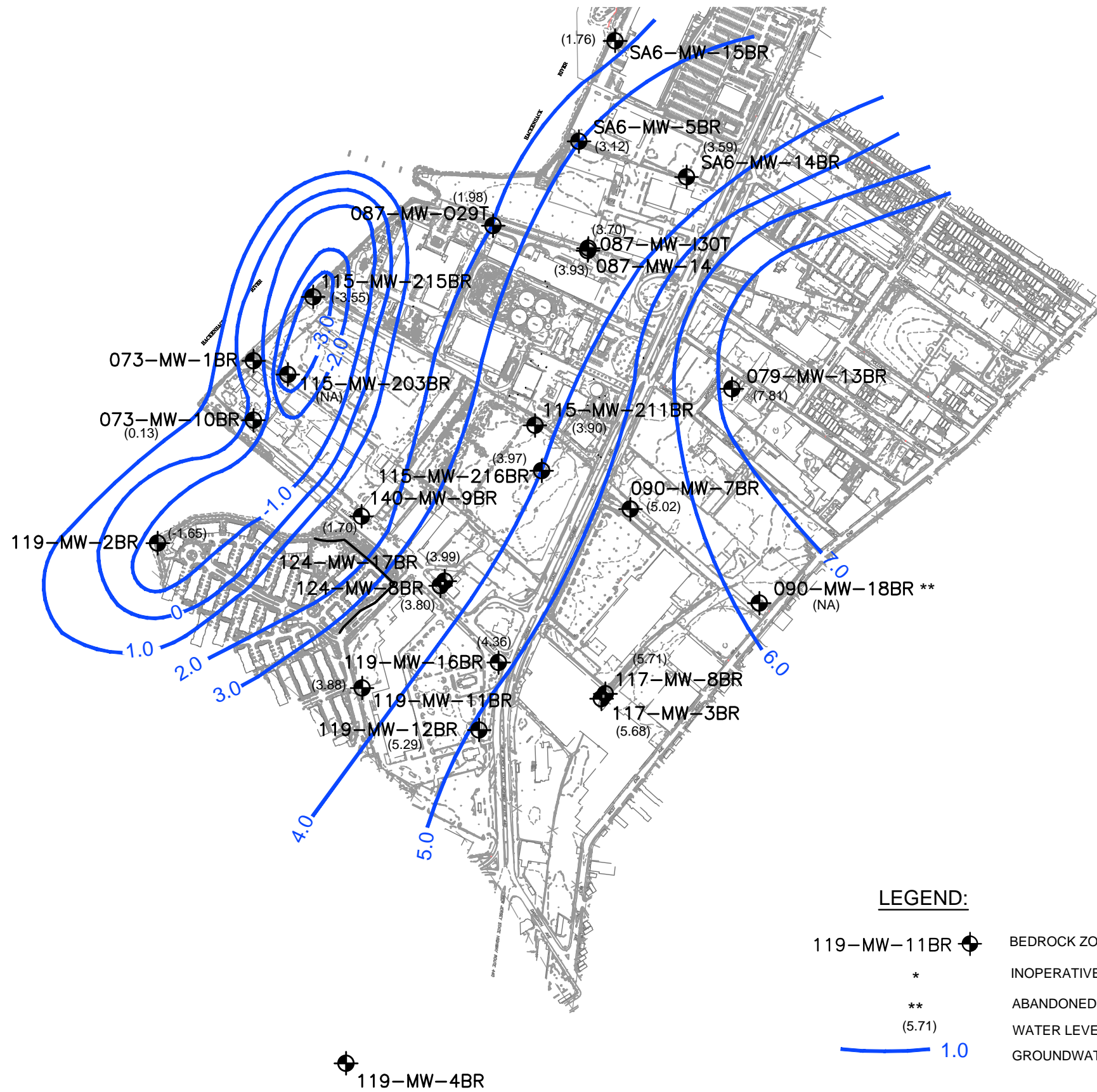
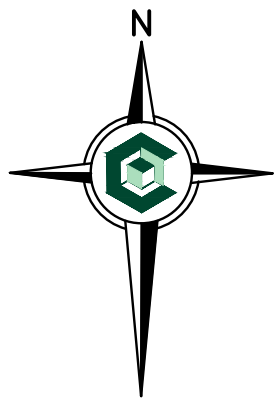
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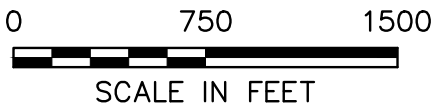
HONEYWELL
DECEMBER 2014
GWET LTMP
GROUNDWATER ELEVATION CONTOURS
DEEP ZONE

FIGURE NO.
4-3
PROJECT NO.



LEGEND:

- 119-MW-11BR BEDROCK ZONE MONITORING WELL
- * INOPERATIVE IN 2013: STATUS UNDER EVALUATION
- ** ABANDONED BY NJCU CONTRACTORS: STATUS UNDER EVALUATION
- (5.71) WATER LEVEL ELEVATION (FT, MSL)
- 1.0 GROUNDWATER CONTOUR (FT, MSL)



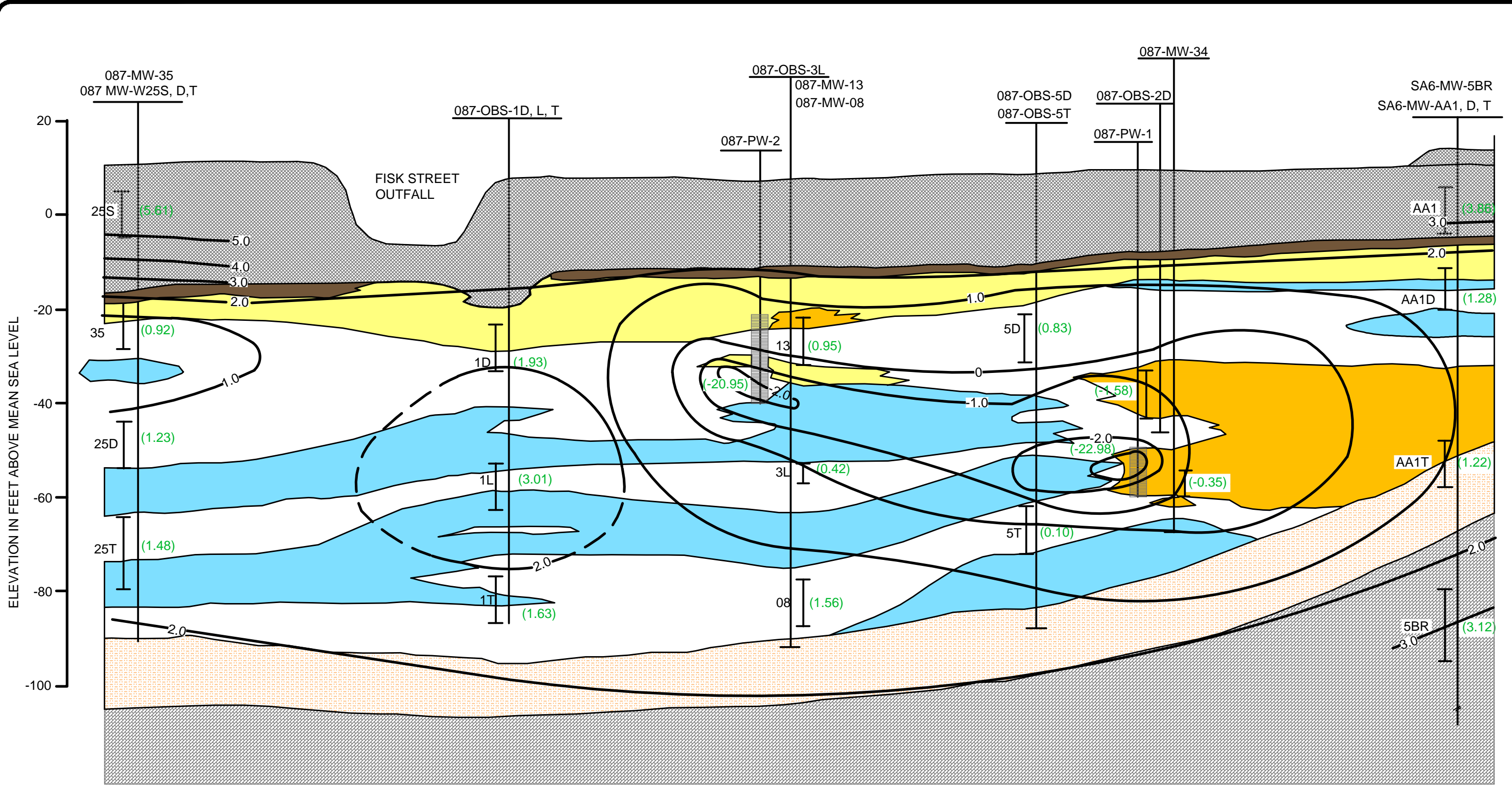

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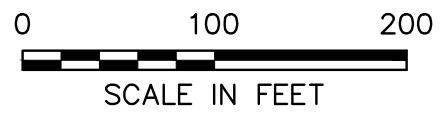
HONEYWELL
DECEMBER 2014
GWET LTMP
GROUNDWATER ELEVATION CONTOURS
BEDROCK ZONE

FIGURE NO.
4-4
PROJECT NO.



LEGEND:

FILL	INTERBED SILTS AND CLAYS	WELL DESIGNATION
MEADOW MAT	GLACIAL TILL	GROUND SURFACE
FINE TO MEDIUM SAND	PASSAIC FORMATION	SCREENED INTERVAL
FINE, MEDIUM TO COARSE SAND	FINE TO VERY FINE SAND	



cornerstone
environmental

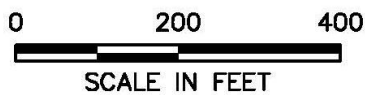
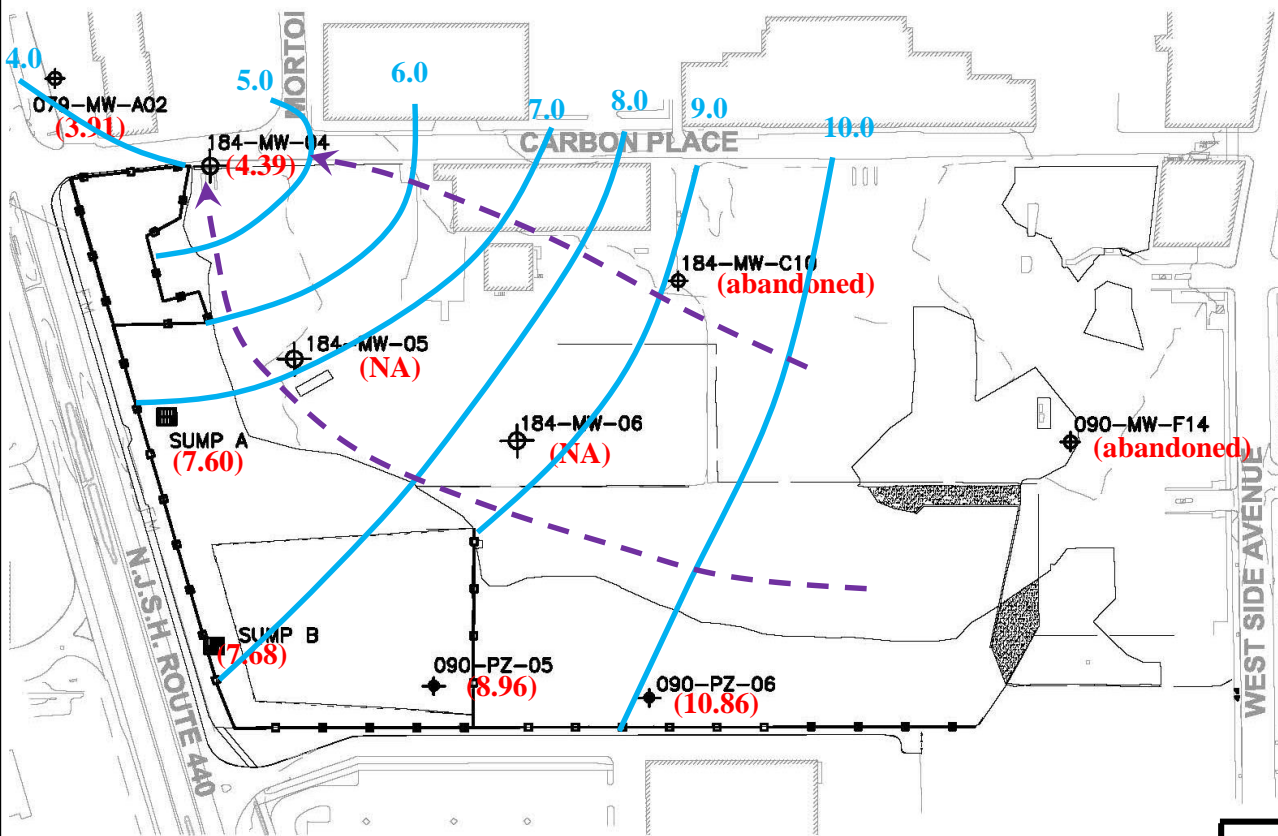
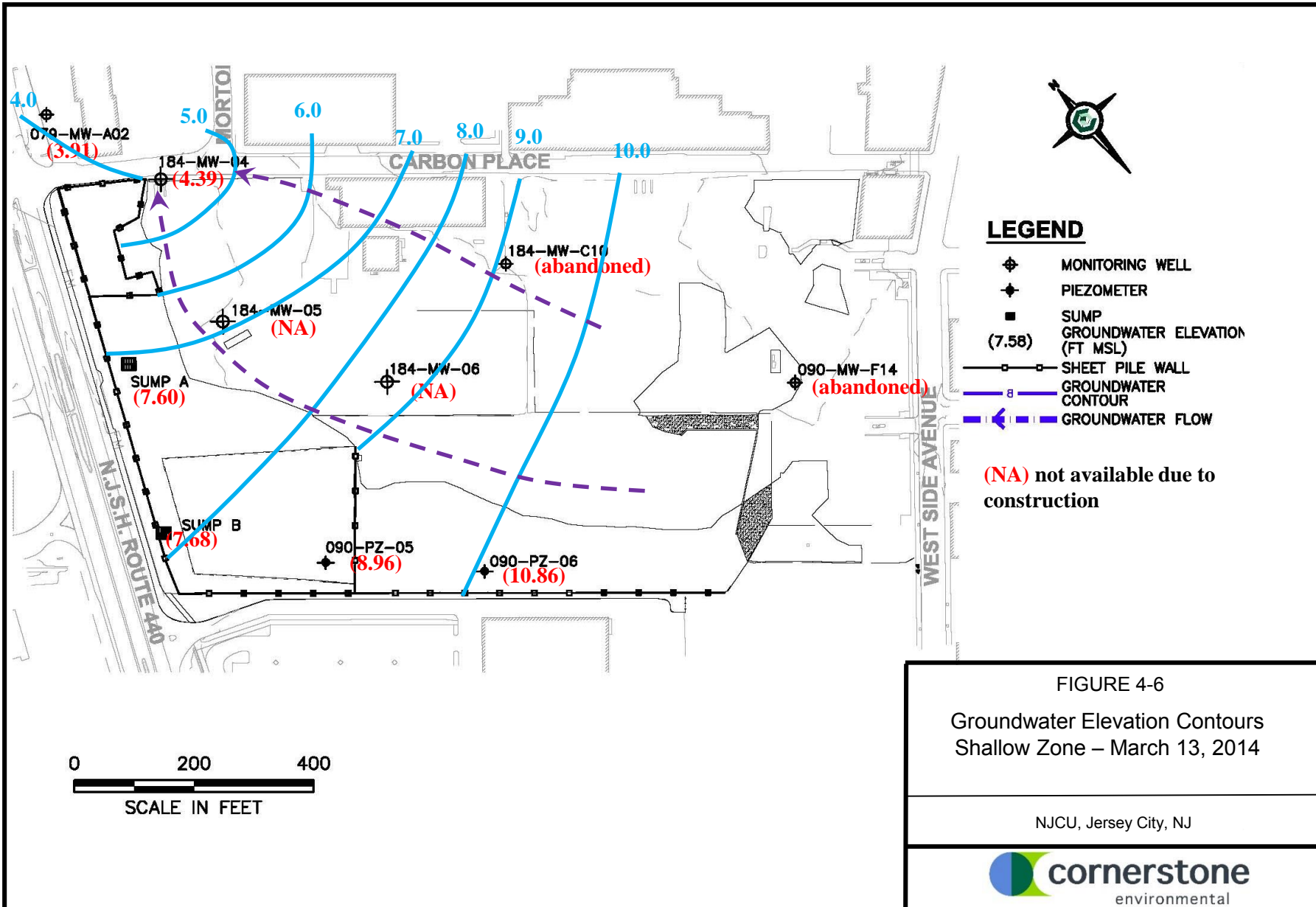
PREPARED BY:
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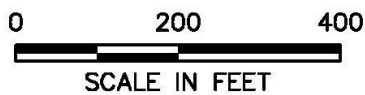
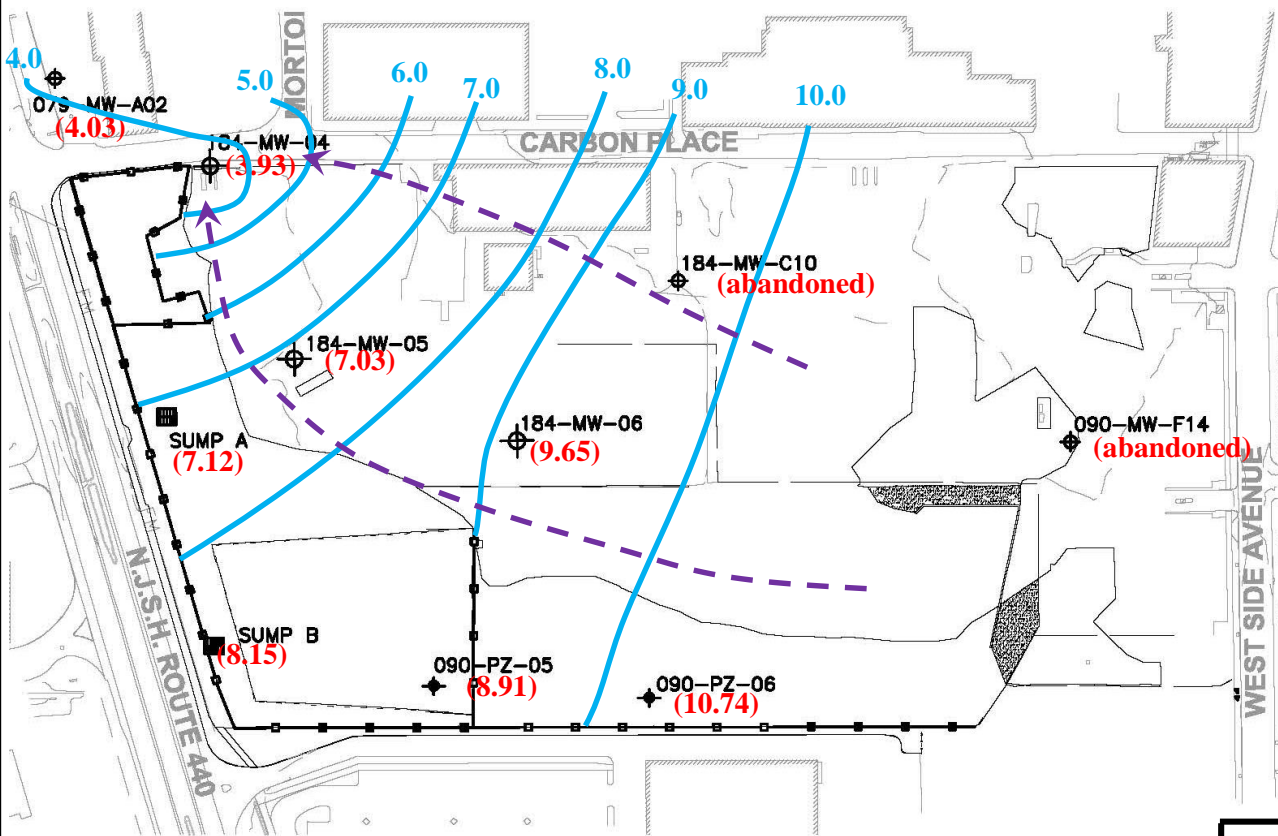
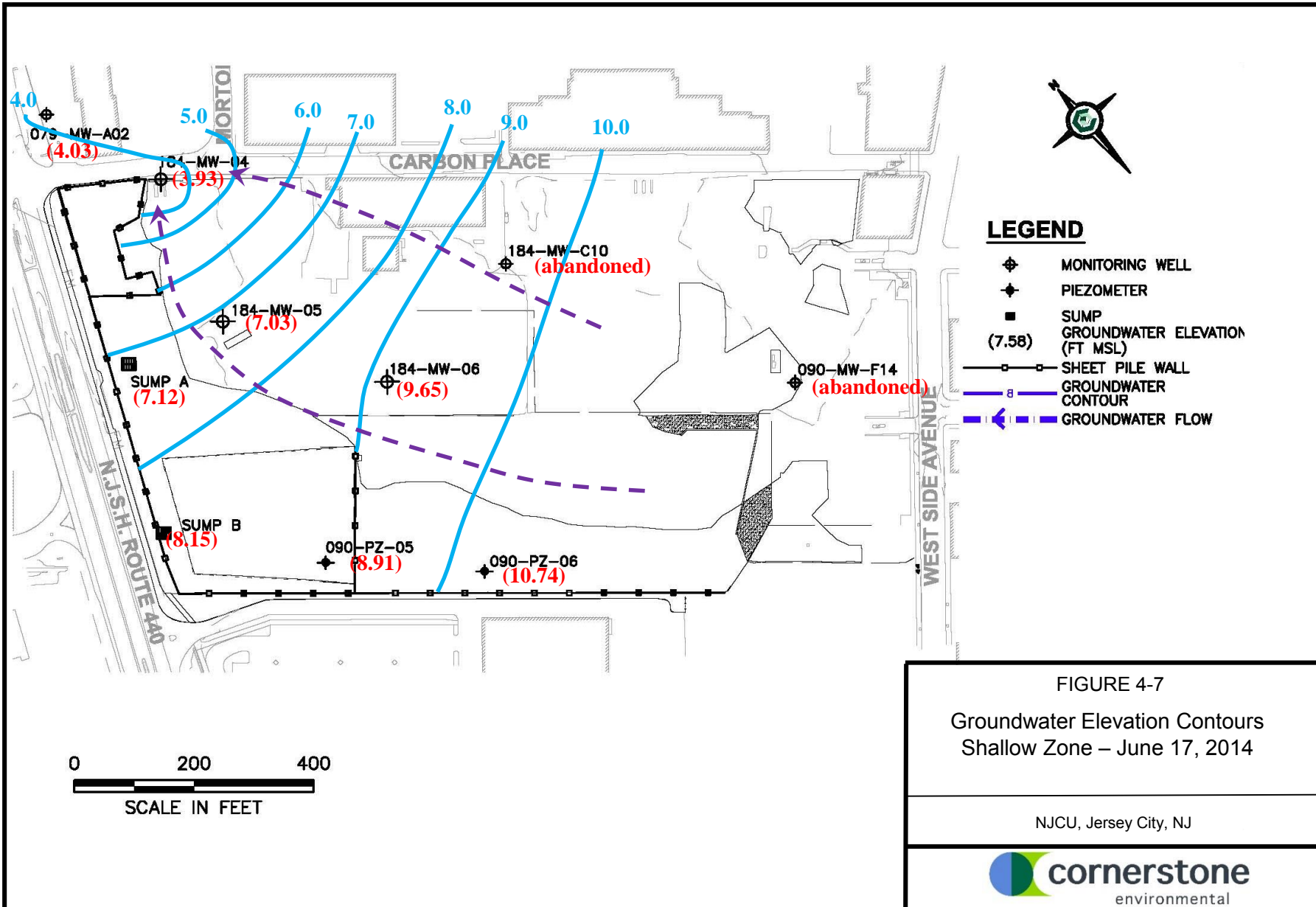
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HONEYWELL

**GROUNDWATER ELEVATIONS
IN CROSS-SECTION
DECEMBER 2014**

FIGURE NO.
4-5
PROJECT NO.





WEST SIDE AVENUE

MORTON

CARBON PLACE

N.J.S.H. ROUTE 440

SUMP A
(7.12)

SUMP B
(8.15)

075-MW-A02
(4.03)

184-MW-04
(3.93)

184-MW-05
(7.03)

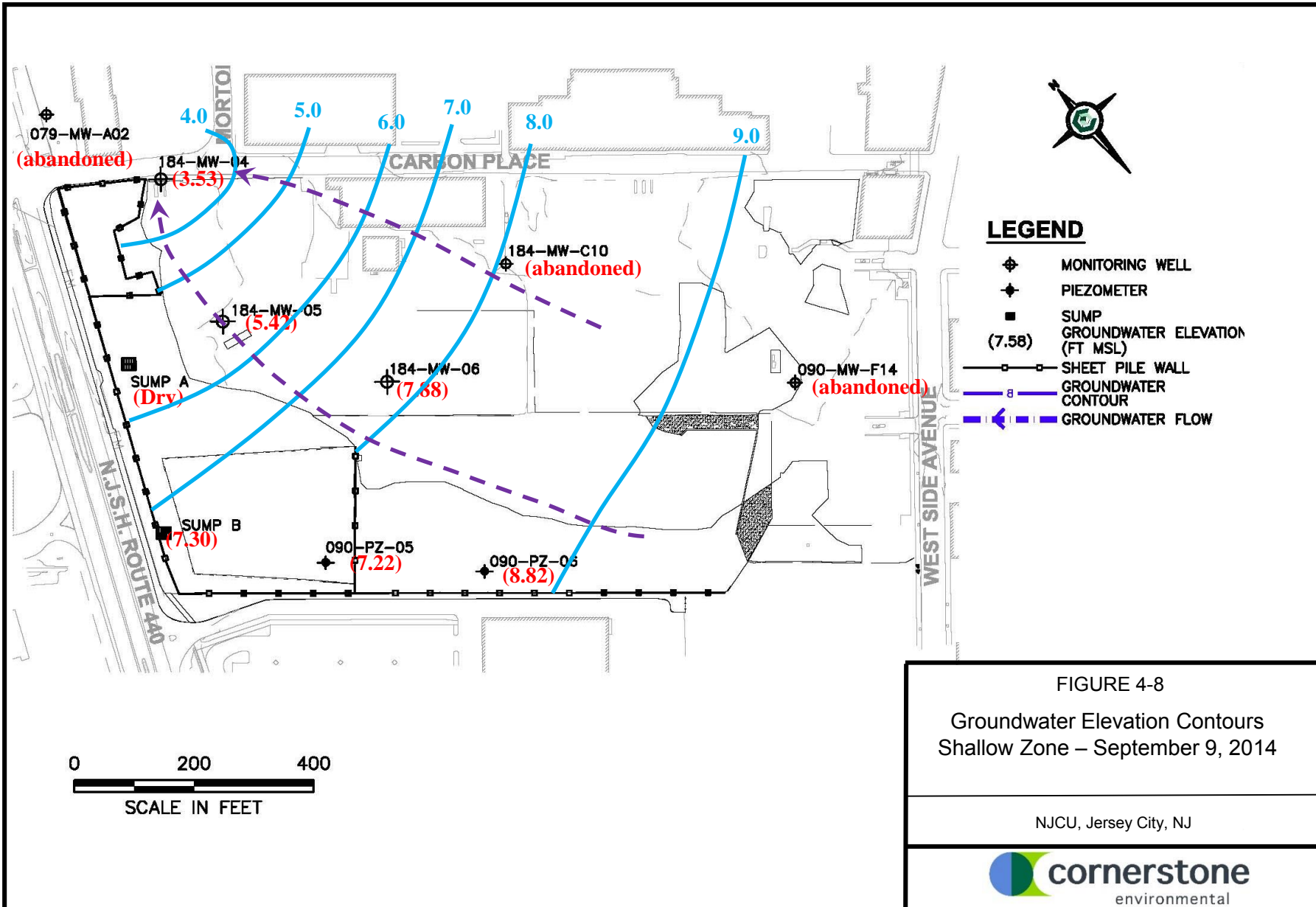
184-MW-C10
(abandoned)

184-MW-06
(9.65)

090-MW-F14
(abandoned)

090-PZ-05
(8.91)

090-PZ-06
(10.74)



079-MW-A02
(abandoned)

184-MW-04
(3.53)

184-MW-05
(5.42)

184-MW-06
(7.68)

090-PZ-05
(7.22)

090-PZ-05
(8.82)

184-MW-C10
(abandoned)

090-MW-F14
(abandoned)

4.0 5.0 6.0 7.0 8.0 9.0

SUMP A
(Dry)

SUMP B
(7.30)

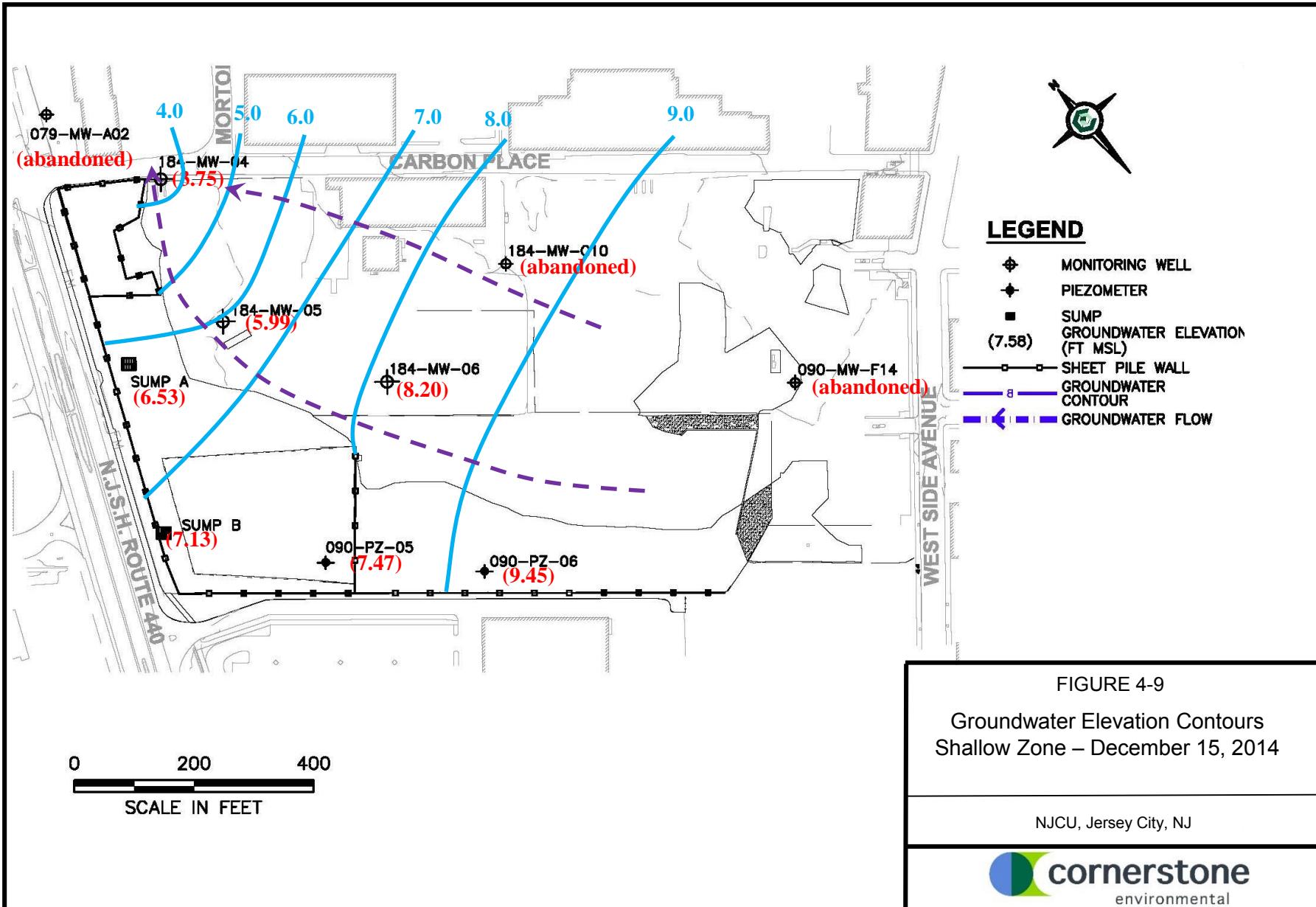
MORTON

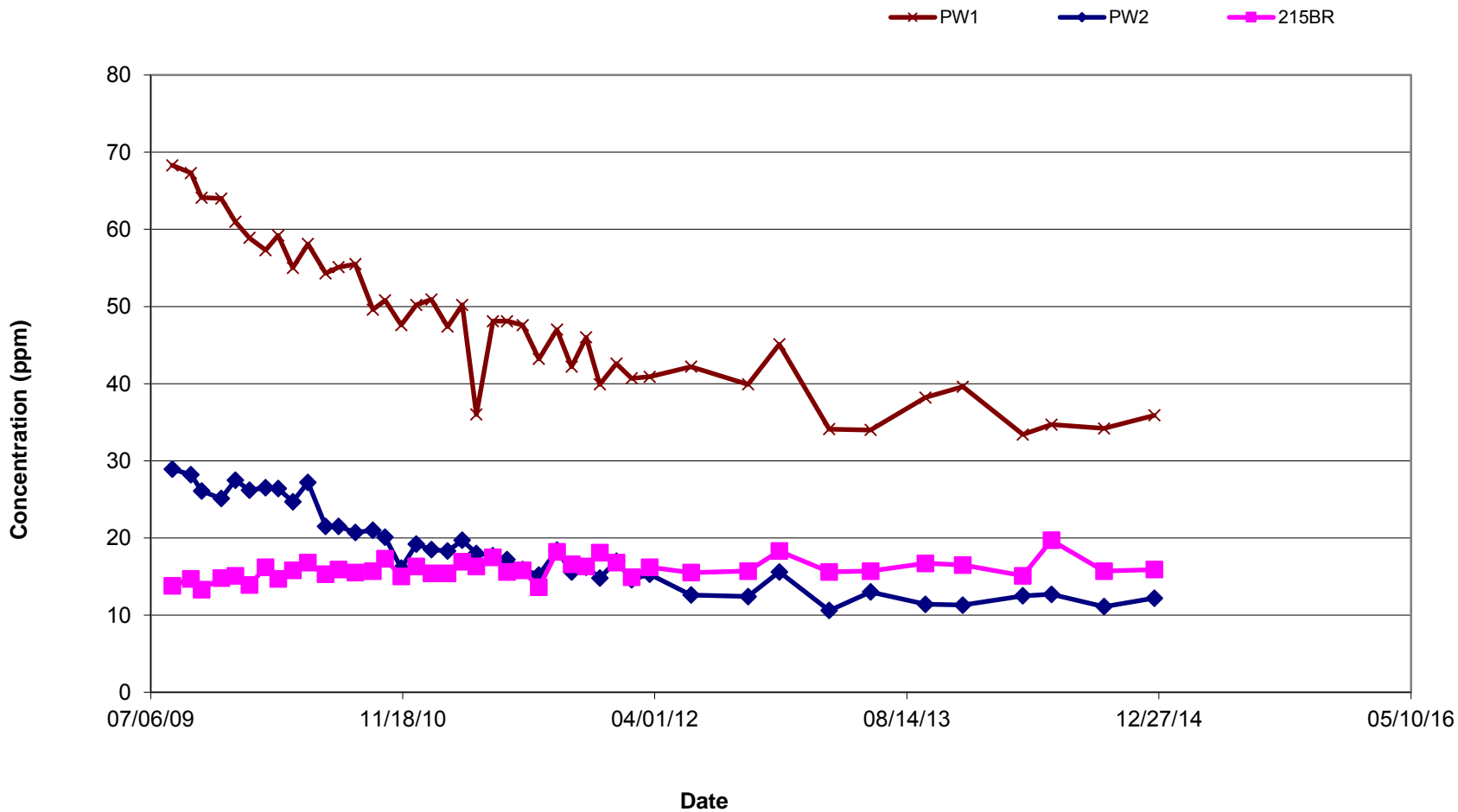
CARSON PLACE

N.J.S.H. ROUTE 440

WEST SIDE AVENUE

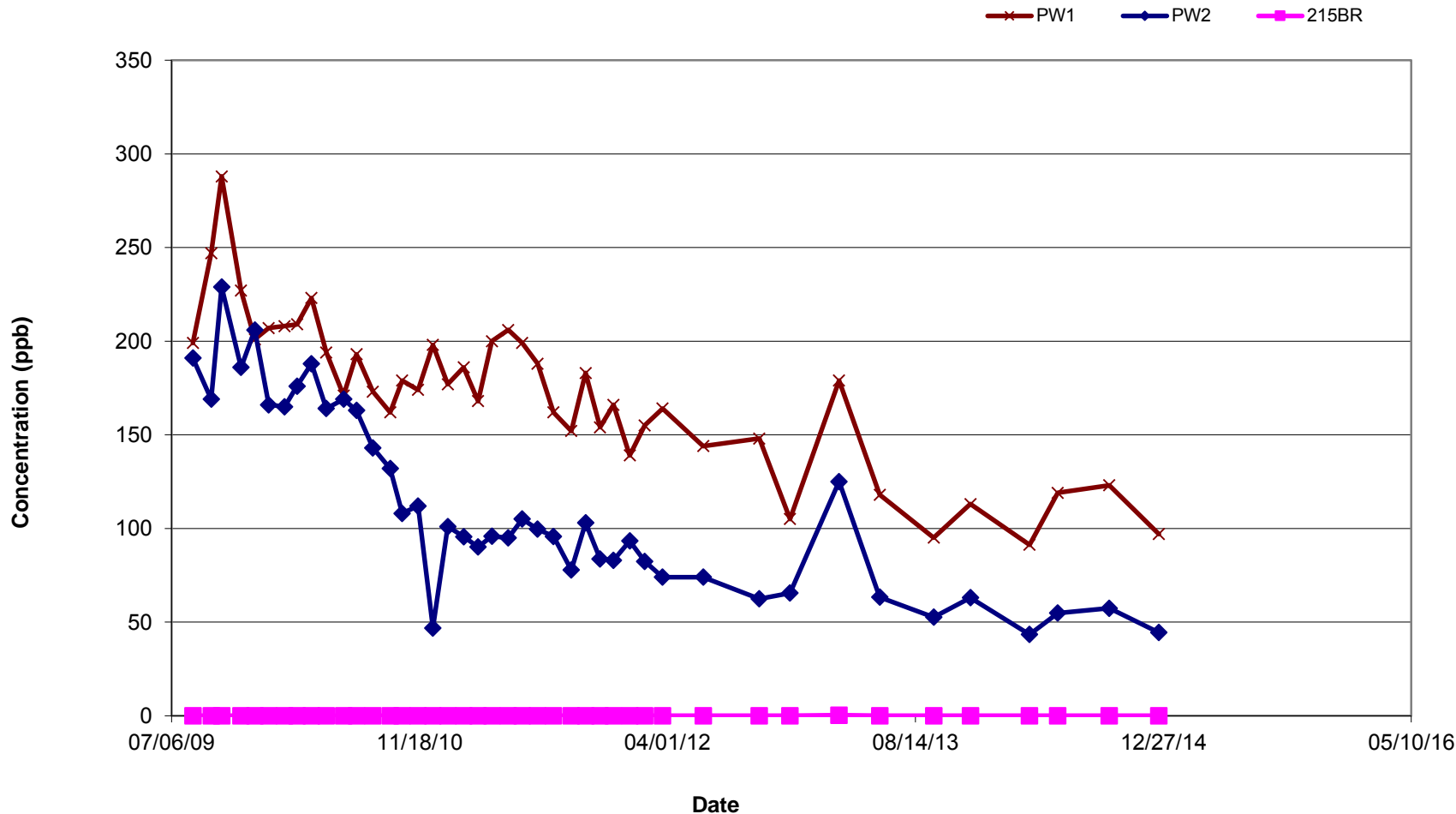






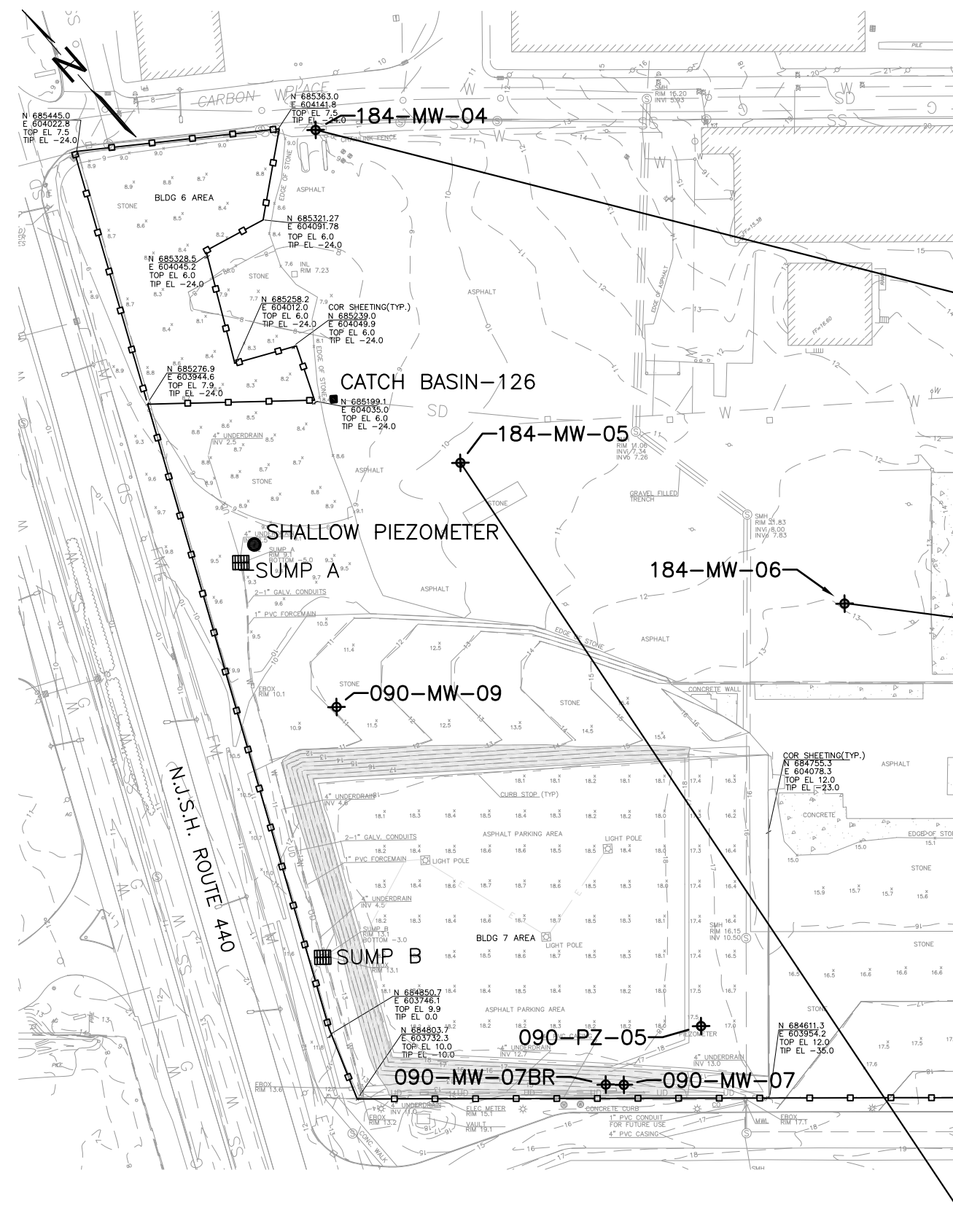
HONEYWELL
 Jersey City, New Jersey
 Hexavalent Chromium Trends
 In GWET Extraction Wells

FIGURE NO.
 5-1
 PROJECT NO.



HONEYWELL
 Jersey City, New Jersey
 Trichloroethylene Trends
 In GWET Extraction Wells

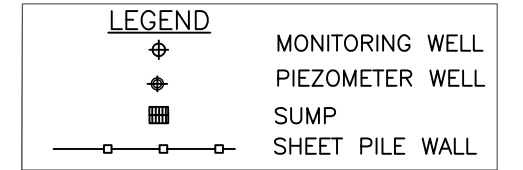
FIGURE NO.
 5-2
 PROJECT NO.



184-MW-04				
Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
03/07/2012	4.0U	4.0U	5.5 UJ	5.5 UJ
06/18/2012	154	4.0U	5.3 U	5.3 U
09/06/2012	47	4.0 U	5.5 U	5.5 U
12/06/2012	4.0 U	4.0 U	5.5 UJ	5.5 UJ
03/18/2013	40 U	40 U	5.5 U	5.5 UJ
06/12/2013	82.5	4.0U	5.5	5.5
09/05/2013	4.6	4.0 U	5.5 UJ	5.5 U
12/09/2013	14.7	4.9	5.5 U	5.5 U
04/08/2014	6	4.0 U	5.5 U	5.5 U
06/24/2014	16.4	4.0 U	5.5 U	5.5 U
09/23/2014	12.4	5.8	5.5 U	5.5 U
12/04/2014	27.4	5.7	5.5 U	5.5 U

184-MW-06				
Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
03/07/2012	17.7	14.6	8J	9.7J
06/18/2012	38.3	32.4	13	6.2
09/06/2012	24.3	10.6	5.5 U	5.5 U
12/06/2012	17.6	7.9	5.5 UJ	5.5 UJ
03/18/2013	70.1 J	40 U	17	14 J
06/12/2013	Not Analyzed (1)	Not Analyzed (1)	Not Analyzed (1)	Not Analyzed (1)
09/05/2013	15.6	13.1	11J	11
12/09/2013	37.3	15.3	12	15
04/8/2014	30.9	28.8	25	28
06/24/2014	81.4	5.1	15	15
09/23/2014	12.9	11.8	7.7	9.9
12/04/2014	9.9	9.8	8.8	8.8

184-MW-05				
Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
03/07/2012	14,400	5	5.5UJ	5UJ
03/07/2012 DUP	1,080	4	5.5UJ	5.5UJ
03/23/2012	450	3.1	Not Analyzed	Not Analyzed
03/23/2012 DUP	594	3.5	Not Analyzed	Not Analyzed
06/18/2012	171	7.5	5.3U	5.3U
06/18/2012 DUP	234	7.1	5.3U	5.3U
09/06/2012	1320	4.0 U	5.5 U	5.5 U
09/06/2012 DUP	210	4.0 U	5.5 U	5.5 U
12/06/2012	133	16.8	5.5 UJ	5.5 UJ
12/06/2012DUP	25.5	24.5	5.5 UJ	5.5 UJ
03/18/2013	328 J	40 U	5.5 U	5.5 UJ
03/18/2013DUP	980 J	40 U	5.5 U	5.5 UJ
06/12/2013	11.4	10.6	5.5U	6.6
06/12/2013 DUP	21.8	11.4	5.5	5.5U
09/05/2013	403	10.2	5.5 UJ	5.5 U
09/05/2013 DUP	595	9.3	5.5 UJ	5.5 U
12/09/2013	102	4.0 U	5.5 U	5.5 U
12/09/2013DUP	83	4.0 U	5.5 U	5.5 U
04/8/2014	45.1	4.3	5.5 U	5.5 U
04/8/2014DUP	43.7	4.3	5.5 U	5.5 U
06/24/2014	26.6	5.7	5.5 U	5.5 U
06/24/2014DUP	20.6	13.2	5.5 U	5.5 U
09/23/2014	15.4	4.0 U	5.5 U	5.5 U
09/23/2014DUP	20 U	20 U	5.5 U	5.5 U
12/4/2014	18.8	4.0 U	5.5 U	5.5 U
12/4/2014DUP	32.5	4.0 U	5.5 U	5.5 U



U - COMPOUND NOT DETECTED AT THE REPORTING LIMIT
 UG/L - MICROGRAMS PER LITER
 SHADED RESULTS INDICATE AN EXCEEDANCES OF THE GROUNDWATER QUALITY STANDARD OF 70 UG/L

NOTES:
 1. 184-MW-06 WAS DAMAGED AND WAS UNABLE TO BE SAMPLED FOR SECOND QUARTER 2013.



REV.	DATE	STATUS	DRFT BY	CHKD BY
11	01/09/15	UPDATE RESULT DATA	STR	JH
10	11/06/14	UPDATE RESULT DATA	STR	JH
9	10/07/14	UPDATE RESULT DATA	STR	JH
8	07/15/14	UPDATE RESULT DATA	STR	AG
7	04/25/14	UPDATE RESULT DATA	STR	AG
6	03/21/14	UPDATE RESULT DATA	STR	AG
5	01/08/14	UPDATE RESULT DATA	STR	AG
4	10/11/13	UPDATE RESULT DATA	STR	AG

AMEC PROJ No.: 3480130369
 DRAWING: 3480110369-6100-MWCB-000k

PREPARED/DATE: STR 05/31/12
 CHECKED/DATE: AG 05/31/12






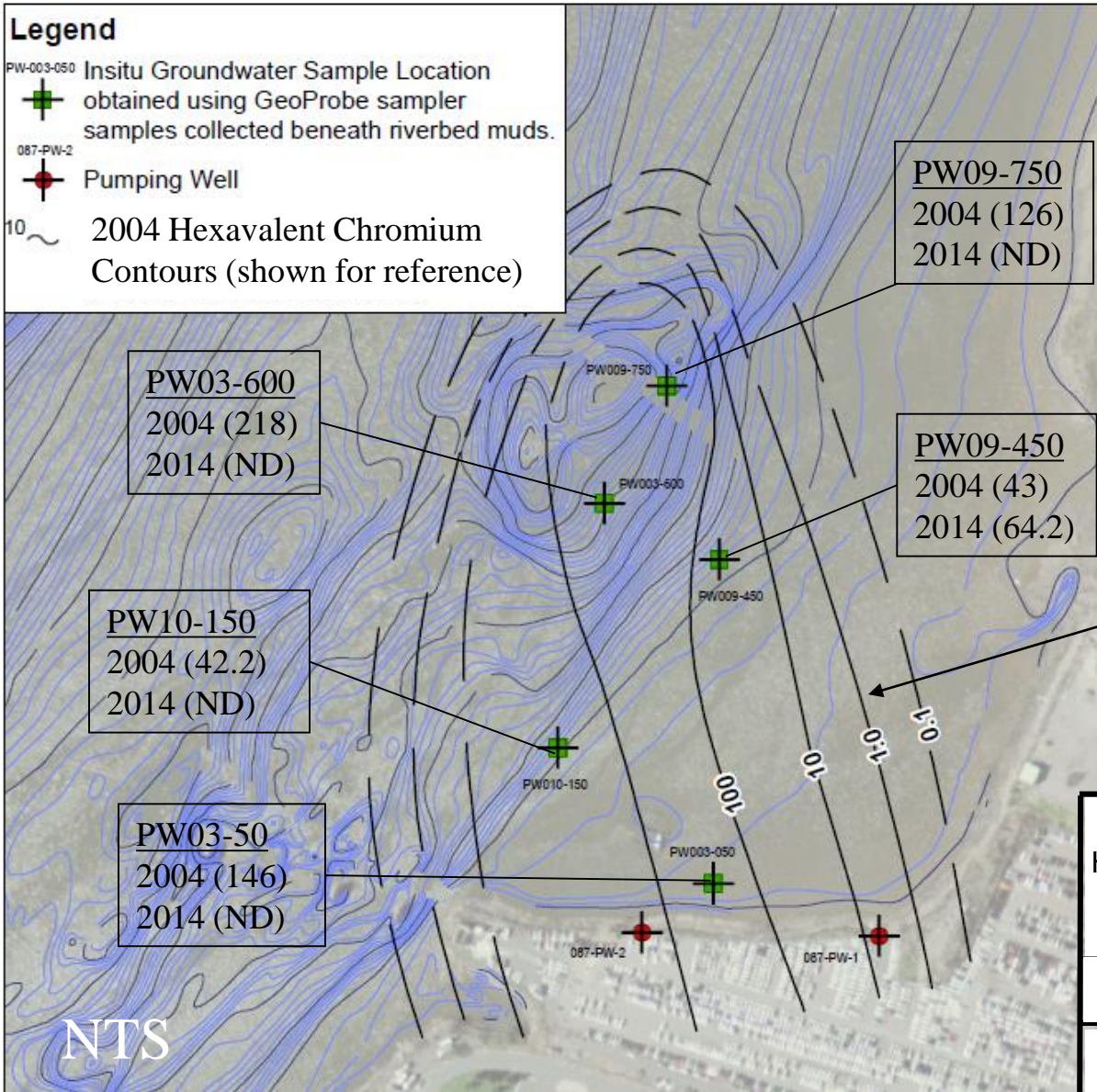
Figure 5-3
 Long-term Monitoring Results - NJCU

F:\CAD\HONEYWELL\JERSEY CITY\SA 5\SITE 90 & 184\NJC\3480110369-6100-MWCB-000k.dwg Fri, 09 Jun 2015 11:33am scott.rudnik Layout: 5-9

SOURCE MAP REFERENCE:
 "AS-BUILT SURVEY FINAL EXISTING CONDITIONS" BLOCK 1286.5, LOT 1 & BLOCK 1286,
 LOT 5 JERSEY CITY, NEW JERSEY HONEYWELL SITE ID 37288, 37811 & 37460 KENNON
 SURVEYING SERVICES INC. WARREN, NEW JERSEY SHEET 1 OF 2, PROJECT NUMBER 2201,
 DATED 01-13-12

Legend

-  Insitu Groundwater Sample Location obtained using GeoProbe sampler samples collected beneath riverbed muds.
-  Pumping Well
-  2004 Hexavalent Chromium Contours (shown for reference)



PW09-750
2004 (126)
2014 (ND)

PW03-600
2004 (218)
2014 (ND)

PW09-450
2004 (43)
2014 (64.2)

PW10-150
2004 (42.2)
2014 (ND)

PW03-50
2004 (146)
2014 (ND)

2014 Hexavalent Chromium Contour

Figure 5-4
Hexavalent Chromium Concentrations
In Groundwater Beneath
Riverbed Sediments (ppm)

Study Area 7, Jersey City, NJ
Long Term Monitoring Plan

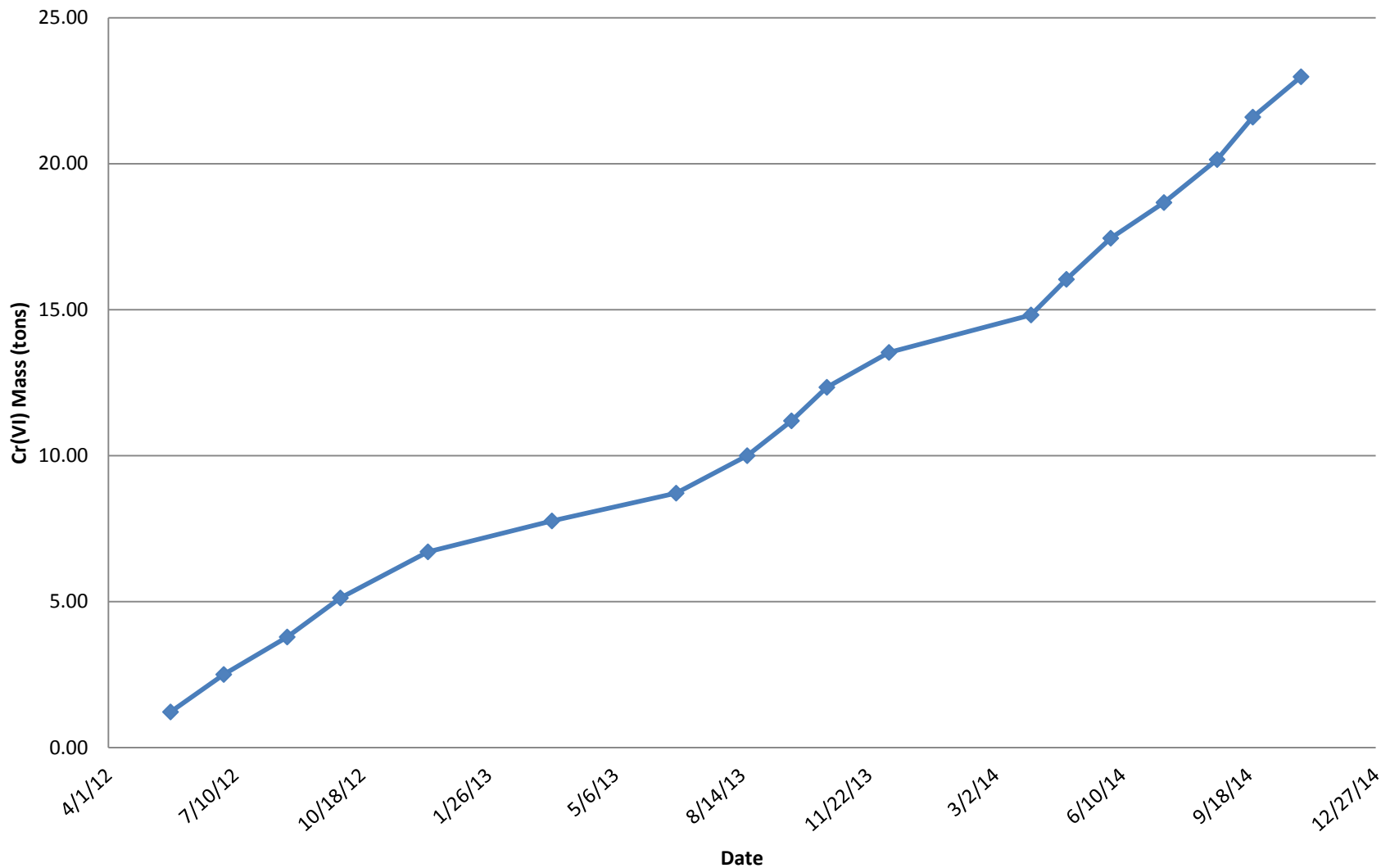



cornerstone
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HONEYWELL
Jersey City, New Jersey
Location of S-3 Injection Wells
Used in 2014

Figure
6-1

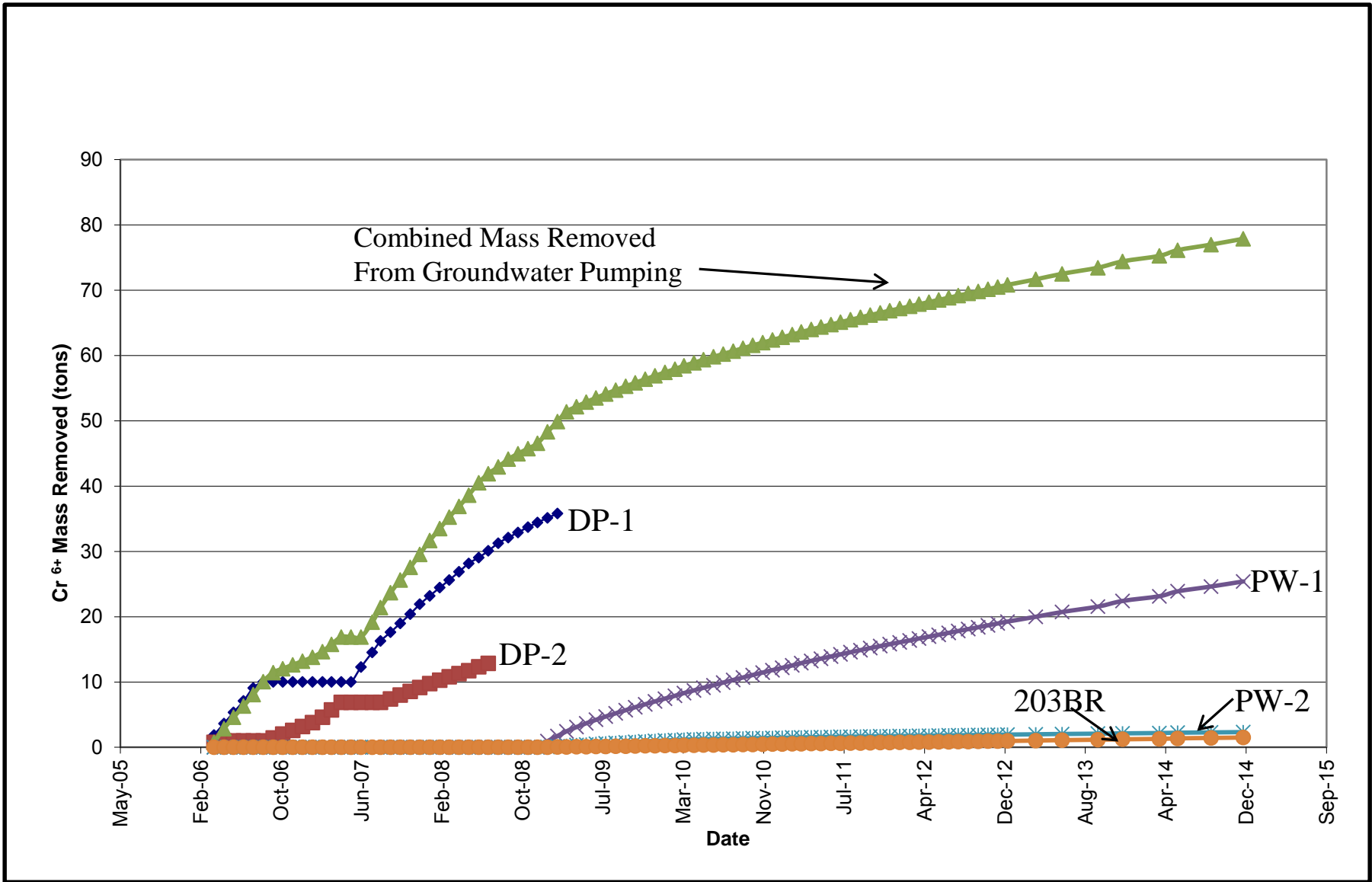


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HONEYWELL
Jersey City, New Jersey

Stoichiometrically Equivalent Cr(VI) Mass
Reduced in S-3 Sand by Injection

Figure
6-2



cornerstone
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HONEYWELL
Jersey City, New Jersey

**Cumulative Cr(VI) Mass Removed From
Groundwater by Pumping**

Figure
6-3

APPENDIX A

RESULTS OF PRE-INJECTION MONITORING IN MONITORING WELLS

Table A1
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Total Chromium in Unfiltered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	46.9	16.2	1,680	307	762	180	NR
2	6/28/2012	NR	NR	NR	NR	889	NR	NR
3	7/31/2012	NR	NR	NR	NR	989	NR	155
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	37.9	14.8	2,220	359	985	171	NR
6	3/17/2013	39.8	13.5	NR	NR	NR	NR	NR
7	6/3/2013	48.5	28.0	2,930	1,670	967	233	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	39.9	13.5	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	34.2	10.6	2,990	20.8	1,150	182	NR
12	3/30/2014	36.9	16.4	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	35.5	14.5	NR	15.5	982	188	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	37.6	19.3	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	341.0	127.0	NR	1,230	927	175	NR

Table A1
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Total Chromium in Filtered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	46.1	17.1	1,680	274	817	220	NR
2	6/28/2012	NR	NR	NR	NR	871	NR	NR
3	7/31/2012	NR	NR	NR	NR	993	NR	168
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	NA	NA	2,180	38	994	197	NR
6	3/17/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	NA	NA	2,920	1,680	1,130	243	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	NA	NA	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	NA	NA	2,820	18.8	764	189	NR
12	3/30/2014	NR	NR	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A2
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Hexavalent Chromium in Unfiltered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	43.9	15.1	2,600	389.0	777	189	NR
2	6/28/2012	NR	NR	NR	NR	933	NR	NR
3	7/31/2012	NR	NR	NR	NR	897	NR	195
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	45.1	15.6	2,690	39.3	1,150	235	NR
6	3/13/2013	34.1	10.6	NR	NR	NR	NR	NR
7	6/3/2013	34.0	13.0	2,110	1,470	1,050	177	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	38.2	11.4	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	39.6	11.3	3,060	19.0	1,230	192	NR
12	3/30/2014	33.4	12.5	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	34.7	12.7	NR	14.9	1,070	188	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	34.2	11.1	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	35.9	12.2	NR	1,300	1,080	190	NR

Table A2
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Hexavalent Chromium in Filtered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	42.8	14.9	2,210	375.0	1,120	199	NR
2	6/28/2012	NR	NR	NR	NR	909	NR	NR
3	7/31/2012	NR	NR	NR	NR	897	NR	203
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	NA	NA	2,590	45.4	1,210	233	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	NA	NA	2,790	1,380	1,040	179	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	NA	NA	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	NA	NA	2,880	19.3	959	195	NR
12	3/30/2014	NR	NR	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A3
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Sulfate in Unfiltered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	320	613	1,000	749	843	604	NR
2	6/28/2012	NR	NR	NR	NR	1,030	NR	NR
3	7/31/2012	NR	NR	NR	NR	1,020	NR	850
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	307	671	1,110	202	1,020	688	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	268	654	1,080	2,130	1,090	662	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	292	664	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	291	701	1,270	137	1,140	614	NR
12	3/30/2014	283	205	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

Table A3
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Sulfate in Filtered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	318.0	639	1,030	607	880	639	NR
2	6/28/2012	NR	NR	NR	NR	1,030	NR	NR
3	7/31/2012	NR	NR	NR	NR	945	NR	859
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	NA	NA	1,130	222	1,030	671	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	NA	NA	1,180	2,110	1,100	653	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	NA	NA	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	NA	NA	1,150	144	868	1,100	NR
12	3/30/2014	NR	NR	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A4
Results of Pre-injection Monitoring of Monitoring Wells

Calcium in Unfiltered Samples (ppm)								
Event #	Sample Date	087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	97.7	169	547	112	287	48.2	NR
2	6/28/2012	NR	NR	NR	NR	293	NR	NR
3	7/31/2012	NR	NR	NR	NR	284	NR	207
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	88.4	146	492	370	336	52.1	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	99.6	158	446	473	317	53.1	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	99.7	168	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	86.7	145	560	37.3	307	52.4	NR
12	3/30/2014	95.7	154	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	94.3	149	NR	30.9	287	56.2	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	97.9	164.0	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	105.0	160.0	NR	506	331	498	NR

Table A4
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Calcium in Filtered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	97.0	163	503	106	289	57.9	NR
2	6/28/2012	NR	NR	NR	NR	320	NR	NR
3	7/31/2012	NR	NR	NR	NR	314	NR	219
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	NA	NA	477	367	340	61.7	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	NA	NA	491	450	366	56.9	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	NA	NA	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	NA	NA	534	34.6	272	53.3	NR
12	3/30/2014	NR	NR	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A5
Results of Pre-injection Monitoring of Monitoring Wells

Iron in Unfiltered Samples (ppm)								
Event #	Sample Date	087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	<.5	< .5	< 25	0.764	<2	1.12	NR
2	6/28/2012	NR	NR	NR	NR	<10	NR	NR
3	7/31/2012	NR	NR	NR	NR	4.79	NR	1.62
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	<0.1	<0.1	NR	0.954	NR	<0.5	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	0.709	1.21	<5.0	<5.0	<5.0	1.19	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	0.345	<0.1	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	<0.1	<0.1	<10.0	0.535	<2.0	<1.0	NR
12	3/30/2014	<0.1	0.165	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

Table A5
Results of Pre-injection Monitoring of Monitoring Wells

Event #	Sample Date	Iron in Filtered Samples (ppm)						
		087-PW-1	087-PW-2	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	< .5	< .5	<25	<.5	<2	0.517	NR
2	6/28/2012	NR	NR	NR	NR	<3	NR	NR
3	7/31/2012	NR	NR	NR	NR	<2.5	NR	<0.5
3A	8/16/2012	NR	NR	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR	NR	NR
5	12/9/2012	NA	NA	NR	0.171	NR	<0.5	NR
6	3/13/2013	NR	NR	NR	NR	NR	NR	NR
7	6/3/2013	NA	NA	<5.0	<5.0	<5.0	<1.0	NR
8	8/18/2013	NR	NR	NR	NR	NR	NR	NR
9	9/22/2013	NA	NA	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR	NR	NR
11	12/8/2013	NA	NA	<10.0	0.120	<2.0	<0.5	NR
12	3/30/2014	NR	NR	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A6
Results of Pre-injection Monitoring of Monitoring Wells

Field pH (pH units)

Event #	Sample Date	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	6.84	7.29	7.72	7.73	NR
2	5/28/2012	NR	NR	7.83	NR	NR
3	7/31/2012	NR	NR	7.41	NR	7.15
3A	8/16/2012	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR
5	12/9/2012	7.36	7.97	7.47	7.35	NR
6	3/13/2013	NR	NR	NR	NR	NR
7	6/3/2013	6.94	6.99	7.74	7.75	NR
8	8/18/2013	NR	NR	NR	NR	NR
9	9/22/2013	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR
11	12/8/2013	6.82	8.00	7.83	7.78	NR
12	3/30/2014	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR
14	6/1/2014	NR	8.76	8.02	8.22	NR
15	7/13/2014	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR
18A	12/20/2014	NR	6.85	7.61	7.68	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A7
Results of Pre-injection Monitoring of Monitoring Wells

Field Specific Conductivity (ms/cm)

Event #	Sample Date	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	12.2	5.45	7.56	5.09	NR
2	6/28/2012	NR	NR	7.21	NR	NR
3	7/31/2012	NR	NR	7.66	NR	15.8
3A	8/16/2012	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR
5	12/9/2012	11.7	3.03	8.10	4.85	NR
6	3/13/2013	NR	NR	NR	NR	NR
7	6/3/2013	10.9	11.1	8.29	4.91	NR
8	8/18/2013	NR	NR	NR	NR	NR
9	9/22/2013	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR
11	12/8/2013	13.9	3.03	8.53	4.73	NR
12	3/30/2014	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR
14	6/1/2014	NR	3.44	9.47	5.29	NR
15	7/13/2014	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR
18A	12/20/2014	NR	13.0	10.7	5.73	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A8
Results of Pre-injection Monitoring of Monitoring Wells

Field Redox Potential (mv)

Event #	Sample Date	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	347	276	251	244	NR
2	6/28/2012	NR	NR	184	NR	NR
3	7/31/2012	NR	NR	187	NR	173
3A	8/16/2012	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR
5	12/9/2012	300	-153	104	-7.0	NR
6	3/13/2013	NR	NR	NR	NR	NR
7	6/3/2013	343	340	255	242	NR
8	8/18/2013	NR	NR	NR	NR	NR
9	9/22/2013	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR
11	12/8/2013	289	181	244	199	NR
12	3/30/2014	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR
14	6/1/2014	NR	242	231	237	NR
15	7/13/2014	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR
18A	12/20/2014	NR	300	248	215	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A9
Results of Pre-injection Monitoring of Monitoring Wells

Field Dissolved Oxygen (mg/L)

Event #	Sample Date	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	0.46	2.25	0.43	0.67	NR
2	6/28/2012	NR	NR	0.00	NR	NR
3	7/31/2012	NR	NR	0.00	NR	0.00
3A	8/16/2012	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR
5	12/9/2012	0.99	1.22	1.02	1.07	NR
6	3/13/2013	NR	NR	NR	NR	NR
7	6/3/2013	0.36	5.05	1.31	0.36	NR
8	8/18/2013	NR	NR	NR	NR	NR
9	9/22/2013	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR
11	12/8/2013	0.85	0.00	0.33	0.33	NR
12	3/30/2014	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR
14	6/1/2014	NR	3.96	0.00	0.00	NR
15	7/13/2014	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR
18A	12/20/2014	NR	0.0	0.0	0.0	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

Table A10
Results of Pre-injection Monitoring of Monitoring Wells

Field Turbidity (NTU)

Event #	Date	090-MW-09	115-DP-1	088-MW-G19T	087-MW-O29D	087-MW-03*
1	5/16/2012	0.0	0.0	74.3	0.0	NR
2	6/28/2012	NR	NR	64.0	NR	NR
3	7/31/2012	NR	NR	157	NR	19.0
3A	8/16/2012	NR	NR	NR	NR	NR
4	10/1/2012	NR	NR	NR	NR	NR
5	12/9/2012	177	0.0	650	708	NR
6	3/13/2013	NR	NR	NR	NR	NR
7	6/3/2013	52.7	0.0	47.8	11.5	NR
8	8/18/2013	NR	NR	NR	NR	NR
9	9/22/2013	NR	NR	NR	NR	NR
10	10/20/2013	NR	NR	NR	NR	NR
11	12/8/2013	10.0	19.6	0.0	12.1	NR
12	3/30/2014	NR	NR	NR	NR	NR
13	4/27/2014	NR	NR	NR	NR	NR
14	6/1/2014	NR	7.8	128	230	NR
15	7/13/2014	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR
18A	12/20/2014	NR	0.0	185	55	NR

NR: Not Required; the sampling frequency for monitoring wells in the S-3 Mass Removal Program is semi-annual .

* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

APPENDIX B

RESULTS OF PRE-INJECTION MONITORING IN INJECTION WELLS

Table B1
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Total Chromium in Unfiltered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	72.40	255.0	NR	NR	0.047	6,980	NR
2	6/28/2012	0.52	111.0	NR	NR	0.026	8,900	NR
3	7/31/2012	0.14	4.33	NR	NR	0.019	NR	NR
3A	8/16/2012	NR	NR	536	NR	NR	NR	NR
4	10/1/2012	0.155	4.19	<0.020	40.4	NR	NR	NR
5	12/9/2012	0.059	2.82	<0.050	NR	NR	NR	NR
6	3/13/2013	1.36	4.18	NR	NR	NR	NR	NR
7	6/3/2013	<0.050	36.2	NR	NR	NR	NR	98.6
8	8/18/2013	<10	5.4	NR	NR	NR	NR	0.114
9	9/22/2013	<.01	<.01	NR	NR	NR	NR	<.01
10	10/20/2013	<.1	0.198	NR	NR	NR	NR	<.02
11	12/8/2013	<.1	1.61	NR	NR	NR	NR	<.01
12	3/30/2014	<.02	<.02	NR	NR	NR	NR	<.02
13	4/27/2014	<.01	0.300	NR	NR	NR	NR	<.01
14	6/1/2014	<.01	0.174	NR	NR	0.0225	NR	<.01
15	7/13/2014	<.01	<.01	NR	NR	NR	NR	<.01
16	8/24/2014	<0.050	0.03	NR	NR	NR	NR	<.02
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	0.0397	NR	NR	NR	NR	NR	NR

Table B1
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Total Chromium in Filtered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	56.50	250.0	NR	NR	0.037	7120	NR
2	6/28/2012	0.56	104.0	NR	NR	0.022	7540	NR
3	7/31/2012	<.1	<.1	NR	NR	0.017	NR	NR
3A	8/16/2012	NR	NR	532	NR	NR	NR	NR
4	10/1/2012	<0.020	0.071	<0.020	41.4	NR	NR	NR
5	12/9/2012	<0.050	0.143	<0.050	NR	NR	NR	NR
6	3/13/2013	0.416	0.317	NR	NR	NR	NR	NR
7	6/3/2013	<0.050	1.76	NR	NR	NR	NR	110.0
8	8/18/2013	<.01	2.80	NR	NR	NR	NR	<.01
9	9/22/2013	<.01	<.01	NR	NR	NR	NR	<.01
10	10/20/2013	<.1	<.02	NR	NR	NR	NR	<.02
11	12/8/2013	<.1	<.01	NR	NR	NR	NR	<.01
12	3/30/2014	<.02	<.02	NR	NR	NR	NR	<.02
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B2
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Hexavalent Chromium in Unfiltered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-14	088-IW-03
1	5/16/2012	48.8	94.2	NR	NR	<0.010	7,250	NR
2	6/28/2012	<0.55	130.0	NR	NR	<0.005	9,130	NR
3	7/31/2012	<.55	<.55	NR	NR	<0.0055	NR	NR
3A	8/16/2012	NR	NR	594	NR	NR	NR	NR
4	10/1/2012	<0.55	<0.55	<0.50	40.9	NR	NR	NR
5	12/9/2012	<0.14	<0.14	<0.14	NR	NR	NR	NR
6	3/13/2013	<0.28	<0.55	NR	NR	NR	NR	NR
7	6/3/2013	<2.2	<0.5	NR	NR	NR	NR	116
8	8/18/2013	<.0055	<.0055	NR	NR	NR	NR	<.0055
9	9/22/2013	<.0055	<.0055	NR	NR	NR	NR	<.0055
10	10/20/2013	<.0055	<.0055	NR	NR	NR	NR	<.0055
11	12/8/2013	<.025	<.025	NR	NR	NR	NR	<.025
12	3/30/2014	<.028	<.028	NR	NR	NR	NR	<.028
13	4/27/2014	<.028	<.028	NR	NR	NR	NR	<.028
14	6/1/2014	<.0055	<.0055	NR	NR	<0.0055	NR	<.0055
15	7/13/2014	<.028	<.0055	NR	NR	NR	NR	<.0055
16	8/24/2014	<.028	<.028	NR	NR	NR	NR	<.028
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	<0.0055	NR	NR	NR	NR	NR	NR

Table B2
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Hexavalent Chromium in Filtered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-14	088-IW-03
1	5/16/2012	54.2	98.7	NR	NR	<0.010	7,390	NR
2	6/28/2012	<0.55	126.0	NR	NR	<0.005	8,760	NR
3	7/31/2012	<100	<.55	NR	NR	<.0055	NR	NR
3A	8/16/2012	NR	NR	621	NR	NR	NR	NR
4	10/1/2012	44.7*	<0.55	<0.55	44.7	NR	NR	NR
5	12/9/2012	<0.14	<0.14	<0.14	NR	NR	NR	NR
6	3/13/2013	<0.28	<0.55	NR	NR	NR	NR	NR
7	6/3/2013	<2.2	<0.55	NR	NR	NR	NR	110
8	8/18/2013	<.0055	<.0055	NR	NR	NR	NR	<.0055
9	9/22/2013	<.0055	<.0055	NR	NR	NR	NR	<.0055
10	10/20/2013	<.0055	<.0055	NR	NR	NR	NR	<.0055
11	12/8/2013	<.025	<.025	NR	NR	NR	NR	<.025
12	3/30/2014	<.028	<.028	NR	NR	NR	NR	<.028
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

* reported concentration questionable due to matrix interference

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B3
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Sulfate in Unfiltered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	147	95.7	NR	NR	49.6	3,160	NR
2	6/28/2012	861	315	NR	NR	50.6	4,640	NR
3	7/31/2012	474	1,390	NR	NR	40.3	NR	NR
3A	8/16/2012	NR	NR	1,290	NR	NR	NR	NR
4	10/1/2012	<400	479	740	395	NR	NR	NR
5	12/9/2012	244	227	830	NR	NR	NR	NR
6	3/13/2013	224	290	NR	NR	NR	NR	NR
7	6/3/2013	108	341	NR	NR	NR	NR	259
8	8/18/2013	138	275	NR	NR	NR	NR	152
9	9/22/2013	149	155	NR	NR	NR	NR	251
10	10/20/2013	<100	344	NR	NR	NR	NR	317
11	12/8/2013	<100	403	NR	NR	NR	NR	<160
12	3/30/2014	<500	<500	NR	NR	NR	NR	<500
13	4/27/2014	<100	357	NR	NR	NR	NR	469
14	6/1/2014	<50	358	NR	NR	NR	NR	<50
15	7/13/2014	<100	<100	NR	NR	NR	NR	188
16	8/24/2014	<100	461	NR	NR	NR	NR	804
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

Table B3
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Sulfate in Filtered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	157	111	NR	NR	50.0	3,140	NR
2	6/28/2012	1,010	290	NR	NR	56.2	4,360	NR
3	7/31/2012	506	1,390	NR	NR	39.9	NR	NR
3A	8/16/2012	NR	NR	1,250	NR	NR	NR	NR
4	10/1/2012	424	468	867	392	NR	NR	NR
5	12/9/2012	249	229	856	NR	NR	NR	NR
6	3/13/2013	259	289	NR	NR	NR	NR	NR
7	6/3/2013	107	346	NR	NR	NR	NR	257
8	8/18/2013	134	278	NR	NR	NR	NR	145
9	9/22/2013	137	150	NR	NR	NR	NR	252
10	10/20/2013	<100	337	NR	NR	NR	NR	310
11	12/8/2013	<100	410	NR	NR	NR	NR	<160
12	3/30/2014	<500	<500	NR	NR	NR	NR	<500
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B4
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Calcium in Unfiltered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	34.7	51.2	NR	NR	73.0	1,590	NR
2	6/28/2012	7,760	<50	NR	NR	69.3	1,370	NR
3	7/31/2012	2,900	14,300	NR	NR	603	NR	NR
3A	8/16/2012	#N/A	NR	370	NR	NR	NR	NR
4	10/1/2012	1,400	1,800	3,900	97.4	NR	NR	NR
5	12/9/2012	827	970	2,280	NR	NR	NR	NR
6	3/13/2013	586	2,060	NR	NR	NR	NR	NR
7	6/3/2013	3,320	432	NR	NR	NR	NR	61.5
8	8/18/2013	1,490	250	NR	NR	NR	NR	3,010
9	9/22/2013	1,650	6,680	NR	NR	NR	NR	1,550
10	10/20/2013	6,220	1,210	NR	NR	NR	NR	1,150
11	12/8/2013	6,060	1,100	NR	NR	NR	NR	7,670
12	3/30/2014	2,490	3,260	NR	NR	NR	NR	1,580
13	4/27/2014	2,390	1,600	NR	NR	NR	NR	1,160
14	6/1/2014	978	750	NR	NR	76.6	NR	896
15	7/13/2014	5,500	5,230	NR	NR	NR	NR	1,270
16	8/24/2014	4,620	1,030	NR	NR	NR	NR	1,000
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	100.00	NR	NR	NR	NR	NR	NR

Table B4
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Calcium in Filtered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	24.2	48.2	NR	NR	72.7	1,550	NR
2	6/28/2012	7,280	<50	NR	NR	69.0	1,460	NR
3	7/31/2012	3,310	12,900	NR	NR	58.8	NR	NR
3A	8/16/2012	#N/A	NR	366	NR	NR	NR	NR
4	10/1/2012	2,220	1,670	3,840	95.4	NR	NR	NR
5	12/9/2012	695	1,040	2,630	NR	NR	NR	NR
6	3/13/2013	375	1,870	NR	NR	NR	NR	NR
7	6/3/2013	2,810	359	NR	NR	NR	NR	67.7
8	8/18/2013	1,640	241	NR	NR	NR	NR	3,180
9	9/22/2013	1,720	6,350	NR	NR	NR	NR	1,590
10	10/20/2013	5,460	1,190	NR	NR	NR	NR	1,140
11	12/8/2013	5,810	1,080	NR	NR	NR	NR	6,680
12	3/30/2014	2,250	3,120	NR	NR	NR	NR	1,510
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B5
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Iron in Unfiltered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	5.060	4.070	NR	NR	0.516	<50	NR
2	6/28/2012	<5.0	1.900	NR	NR	0.502	<20	NR
3	7/31/2012	4.68	<0.5	NR	NR	NR	NR	NR
3A	8/16/2012	NR	NR	0.861	NR	NR	NR	NR
4	10/1/2012	0.835	0.255	0.464	<0.1	NR	NR	NR
5	12/9/2012	0.504	0.517	<0.5	NR	NR	NR	NR
6	3/13/2013	0.854	0.277	NR	NR	NR	NR	NR
7	6/3/2013	<0.5	0.478	NR	NR	NR	NR	0.509
8	8/18/2013	0.126	<0.1	NR	NR	NR	NR	<0.1
9	9/22/2013	<0.1	<0.1	NR	NR	NR	NR	0.114
10	10/20/2013	<0.5	<0.1	NR	NR	NR	NR	0.126
11	12/8/2013	<0.2	0.268	NR	NR	NR	NR	<0.2
12	3/30/2014	<0.2	<0.2	NR	NR	NR	NR	<0.2
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

Table B5
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Iron in Filtered Samples (ppm)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	0.327	<.2	NR	NR	0.386	<50	NR
2	6/28/2012	<5.0	<1.0	NR	NR	0.475	<10	NR
3	7/31/2012	<1.0	<0.5	NR	NR	0.41	NR	NR
3A	8/16/2012	NR	NR	<5.0	NR	NR	NR	NR
4	10/1/2012	<0.2	<0.2	0.429	<0.1	NR	NR	NR
5	12/9/2012	<0.5	<0.5	<0.5	NR	NR	NR	NR
6	3/13/2013	<0.1	<0.1	NR	NR	NR	NR	NR
7	6/3/2013	<0.5	<0.1	NR	NR	NR	NR	0.217
8	8/18/2013	<0.1	<0.1	NR	NR	NR	NR	<0.1
9	9/22/2013	<0.1	<0.1	NR	NR	NR	NR	<0.1
10	10/20/2013	<0.5	<0.1	NR	NR	NR	NR	<0.1
11	12/8/2013	<0.2	<0.1	NR	NR	NR	NR	<0.2
12	3/30/2014	<0.2	<0.2	NR	NR	NR	NR	<0.2
13	4/27/2014	NR	NR	NR	NR	NR	NR	NR
14	6/1/2014	NR	NR	NR	NR	NR	NR	NR
15	7/13/2014	NR	NR	NR	NR	NR	NR	NR
16	8/24/2014	NR	NR	NR	NR	NR	NR	NR
17	9/21/2014	NR	NR	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	NR
18A	12/20/2014	NR	NR	NR	NR	NR	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B6
Results of Pre-injection Monitoring of Injection Wells

Field pH (pH units)

Event #	Sample Date	088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	8.08	7.46	NR	NR	7.21	6.91	NR
2	5/28/2012	10.98	7.53	NR	NR	7.42	7.13	NR
3	7/31/2012	10.56	10.38	NR	NR	6.96	NR	NR
3A	8/16/2012	NR	NR	6.56	NR	NR	NR	NR
4	10/1/2012	10.95	11.19	11.52	7.65	NR	NR	NR
5	12/9/2012	8.27	9.46	10.74	NR	NR	NR	NR
6	3/13/2013	10.81	11.35	NR	NR	NR	NR	NR
7	6/3/2013	11.43	10.29	NR	NR	NR	NR	7.66
8	8/18/2013	10.70	11.5	NR	NR	NR	NR	11
9	9/22/2013	11.44	11.99	NR	NR	NR	NR	12
10	10/20/2013	10.71	11.20	NR	NR	NR	NR	10.74
11	12/8/2013	11.01	11.5	NR	NR	NR	NR	10.94
12	3/30/2014	10.45	11.95	NR	NR	NR	NR	10.90
13	4/27/2014	10.80	11.6	NR	NR	NR	NR	10.90
14	6/1/2014	11.30	11.88	NR	NR	7.74	NR	11.46
15	7/13/2014	9.42	9.90	NR	NR	NR	NR	10.11
16	8/24/2014	10.60	11.05	NR	NR	NR	NR	11.09
17	9/21/2014	NR	11.2	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	10.63
18A	12/20/2014	NR	NR	NR	NR	7.13	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B7
Results of Pre-injection Monitoring of Injection Wells

Field Specific Conductivity (ms/cm)

Event #	Sample Date	088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	1.78	1.68	NR	NR	2.81	6.27	NR
2	6/28/2012	32.7	1.41	NR	NR	2.11	30.3	NR
3	7/31/2012	14.2	47.0	NR	NR	2.33	NR	NR
3A	8/16/2012	NR	NR	5.16	NR	NR	NR	NR
4	10/1/2012	7.1	10.0	17.7	1.8	NR	NR	NR
5	12/9/2012	37.6	5.89	13.0	NR	NR	NR	NR
6	3/13/2013	5.47	9.79	NR	NR	NR	NR	NR
7	6/3/2013	3.15	17.0	NR	NR	NR	NR	2.99
8	8/18/2013	7.06	2.6	NR	NR	NR	NR	17
9	9/22/2013	7.22	25.9	NR	NR	NR	NR	8
10	10/20/2013	20.5	6.08	NR	NR	NR	NR	6.89
11	12/8/2013	22.7	6.1	NR	NR	NR	NR	27.1
12	3/30/2014	12.2	15.10	NR	NR	NR	NR	9.3
13	4/27/2014	14.20	8.9	NR	NR	NR	NR	7.3
14	6/1/2014	6.70	9.52	NR	NR	2.39	NR	12.40
15	7/13/2014	22.30	31.4	NR	NR	NR	NR	8.02
16	8/24/2014	17.00	21.0	NR	NR	NR	NR	5.84
17	9/21/2014	NR	16.0	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	28.70
18A	12/20/2014	NR	NR	NR	NR	2.75	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B8
Results of Pre-injection Monitoring of Injection Wells

Field Redox Potential (mv)

Event #	Sample Date	088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	93	230	NR	NR	-38	362	NR
2	6/28/2012	-533	140	NR	NR	-128	298	NR
3	7/31/2012	-498	-507	NR	NR	-49	NR	NR
3A	8/16/2012	NR	NR	263	NR	NR	NR	NR
4	10/1/2012	-508	-510	-498	170	NR	NR	NR
5	12/9/2012	-497	-497	-493	NR	NR	NR	NR
6	3/13/2013	-483	-505	NR	NR	NR	NR	NR
7	6/3/2013	-478	-509	NR	NR	NR	NR	245
8	8/18/2013	-500	-466	NR	NR	NR	NR	-500
9	9/22/2013	-516	-536	NR	NR	NR	NR	-516
10	10/20/2013	-509	-512	NR	NR	NR	NR	-496
11	12/8/2013	-524	-514	NR	NR	NR	NR	-521
12	3/30/2014	-462	-482	NR	NR	NR	NR	-450
13	4/27/2014	-505	-515	NR	NR	NR	NR	-505
14	6/1/2014	-505	-516	NR	NR	-81	NR	-509
15	7/13/2014	-519	-519	NR	NR	NR	NR	-500
16	8/24/2014	-502	-517	NR	NR	NR	NR	-498
17	9/21/2014	NR	-500	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	-503
18A	12/20/2014	NR	NR	NR	NR	-75	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

Table B9
Results of Pre-injection Monitoring of Injection Wells

Event #	Sample Date	Field Dissolved Oxygen (mg/L)						
		088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	0.38	0.51	NR	NR	1.02	0.37	NR
2	6/28/2012	0.00	0.00	NR	NR	0.00	0.10	NR
3	7/31/2012	0.52	4.73	NR	NR	0.00	NR	NR
3A	8/16/2012	NR	NR	0.00	NR	NR	NR	NR
4	10/1/2012	2.70	5.88	5.00	1.02	NR	NR	NR
5	12/9/2012	5.16	0.43	1.49	NR	NR	NR	NR
6	3/13/2013	8.56	5.37	NR	NR	NR	NR	NR
7	6/3/2013	0.24	0.42	NR	NR	NR	NR	5.22
8	8/18/2013	0.38	0.28	NR	NR	NR	NR	0
9	9/22/2013	2.19	2.29	NR	NR	NR	NR	3.20
10	10/20/2013	0.48	0.96	NR	NR	NR	NR	2.90
11	12/8/2013	1.95	1.36	NR	NR	NR	NR	1.45
12	3/30/2014	NA	2.61	NR	NR	NR	NR	2.95
13	4/27/2014	4.50	3.1	NR	NR	NR	NR	2.80
14	6/1/2014	0.00	0.00	NR	NR	0.00	NR	0.00
15	7/13/2014	0.48	0.38	NR	NR	NR	NR	0.36
16	8/24/2014	0.86	0.52	NR	NR	NR	NR	0.62
17	9/21/2014	NR	4.42	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	0.45
18A	12/20/2014	NR	NR	NR	NR	0.00	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

**Table B10
Results of Pre-injection Monitoring of Injection Wells**

Field Turbidity (NTU)

Event #	Sample Date	088-IW-01	088-IW-02	115-PW-21	115-DP-2	087-IW-01	117-MW-I4	088-IW-03
1	5/16/2012	15.2	39.4	NR	NR	0.0	3.6	NR
2	6/28/2012	>800	24.1	NR	NR	8.5	609	NR
3	7/31/2012	13.0	113	NR	NR	18.1	NR	NR
3A	8/16/2012	NR	NR	12.5	NR	NR	NR	NR
4	10/1/2012	0.0	34.1	0.0	0.0	NR	NR	NR
5	12/9/2012	0.0	0.0	0.0	NR	NR	NR	NR
6	3/13/2013	3.7	8.8	NR	NR	NR	NR	NR
7	6/3/2013	545	1.0	NR	NR	NR	NR	8.4
8	8/18/2013	0.0	3.2	NR	NR	NR	NR	0.0
9	9/22/2013	2.4	8.4	NR	NR	NR	NR	15.2
10	10/20/2013	0.0	0.0	NR	NR	NR	NR	0.0
11	12/8/2013	0.0	42.2	NR	NR	NR	NR	8.0
12	3/30/2014	1.4	16.3	NR	NR	NR	NR	2.1
13	4/27/2014	0.0	1.2	NR	NR	NR	NR	0.0
14	6/1/2014	7.8	38.0	NR	NR	4.4	NR	4.6
15	7/13/2014	0.00	0.00	NR	NR	NR	NR	0.0
16	8/24/2014	1.50	2.80	NR	NR	NR	NR	0.0
17	9/21/2014	NR	0.0	NR	NR	NR	NR	NR
18	10/26/2014	NR	NR	NR	NR	NR	NR	0.00
18A	12/20/2014	NR	NR	NR	NR	4.800	NR	NR

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

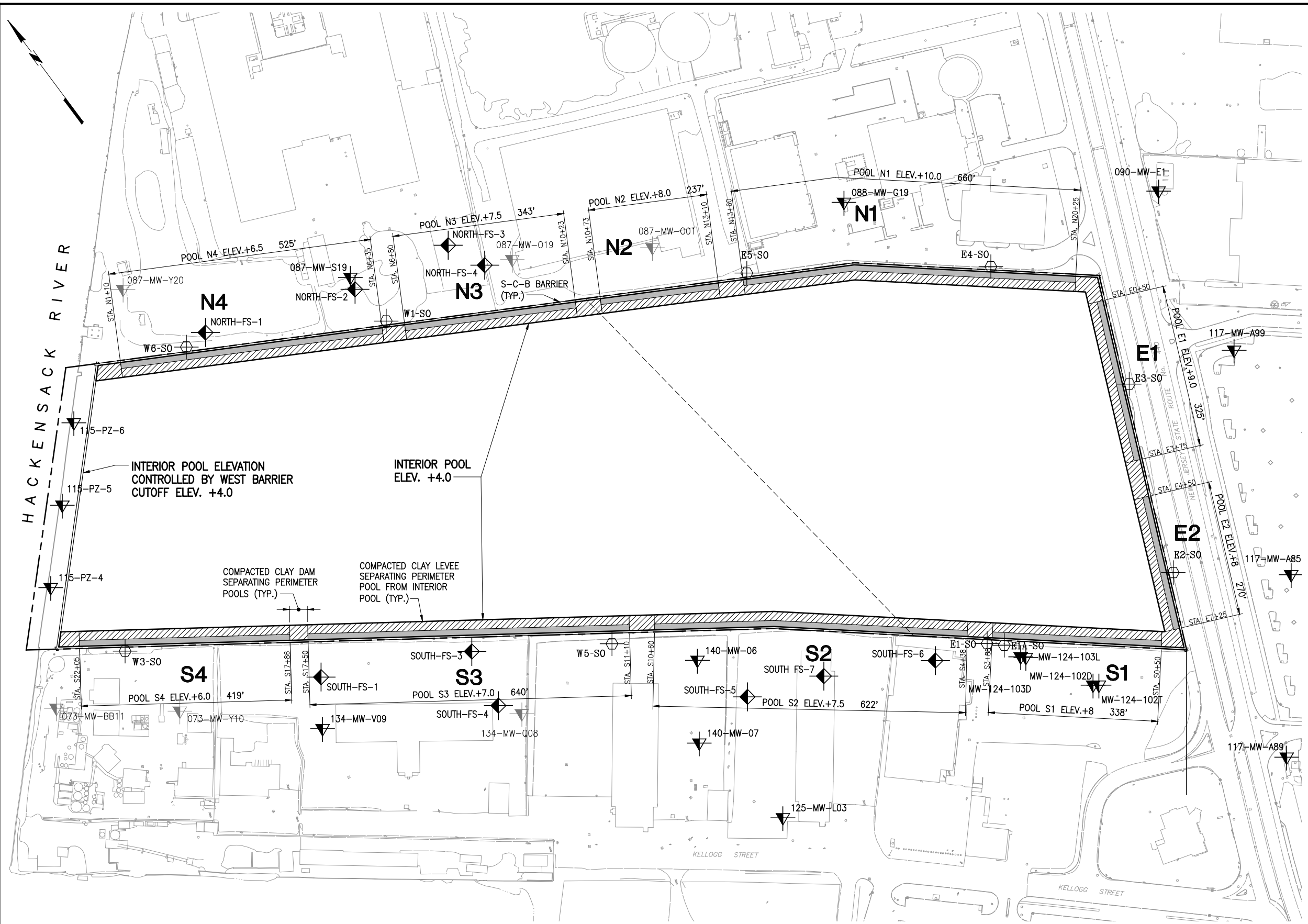
- Sample collected just prior to first injection in indicated well
- Sample collected just prior to second injection in indicated well
- Sample collected just prior to third injection in indicated well
- Sample collected just prior to fourth injection in indicated well
- Sample collected just prior to fifth injection in indicated well
- Sample collected just prior to sixth injection in indicated well

APPENDIX C







SA-7 PERIMETER POOL HYDROGRAPHS

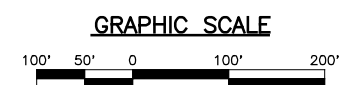
Oct 03, 2014 at 10:39am

CA:\DWG\102\10210\DWG\10210_PerimeterPool_PP-1.dwg



LEGEND

-  FILL TYPE A CLAY
-  FILL TYPE B GRANULAR FILL
-  SHALLOW WELL INSTALLED BY OTHERS
-  SHALLOW WELL ABANDONED IN 2014 IN ACCORDANCE WITH STUDY AREA 6 100% DESIGN
-  SHALLOW WELL INSTALLED FOR STUDY AREA 7 REMEDIATION
-  SURCHARGE MONITORING STANDPIPE INSTALLED IN 2014 IN ACCORDANCE WITH STUDY AREA 6 100% DESIGN



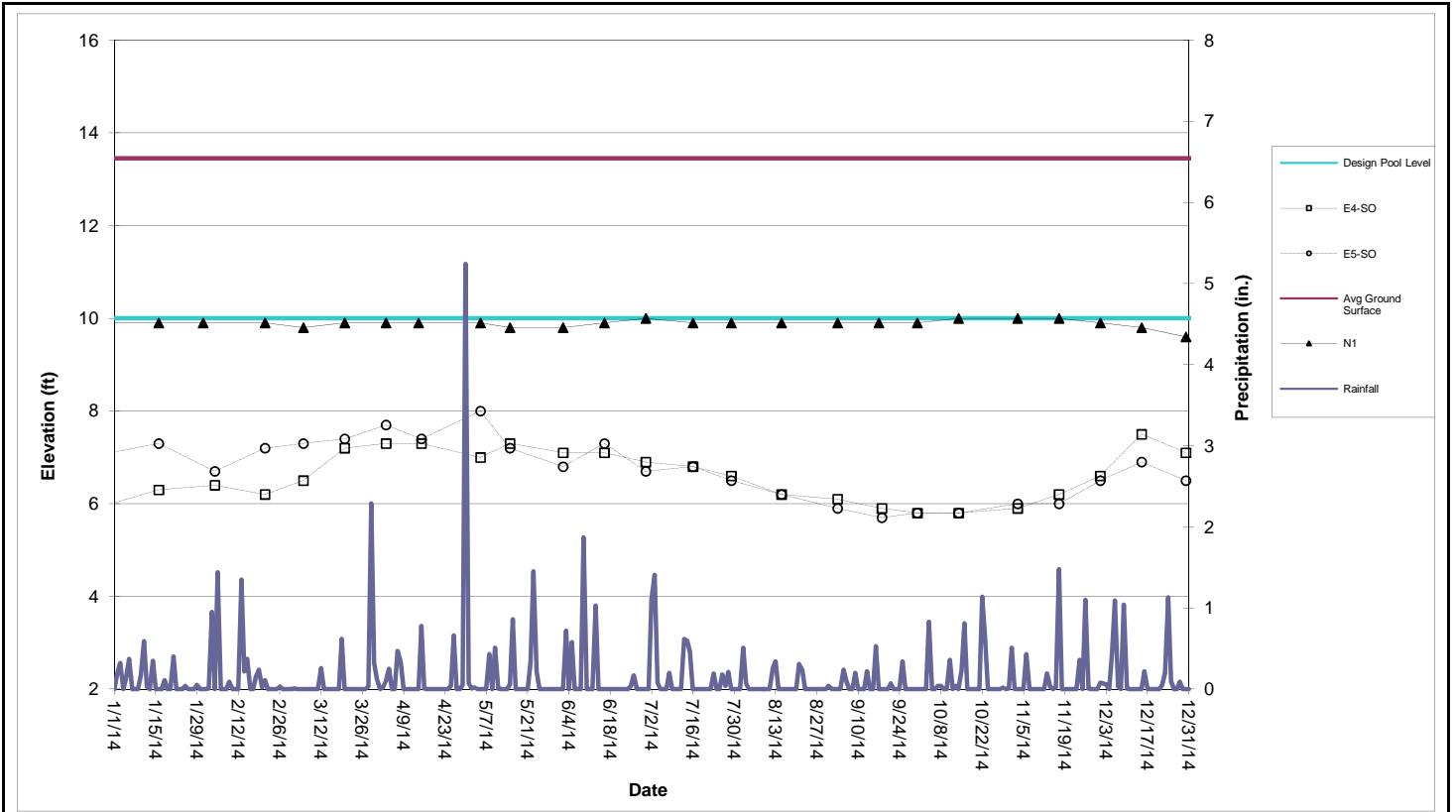
IN PROGRESS
10-02-2014

**STUDY AREA 7
PERIMETER POOL DESIGN ELEVATIONS**

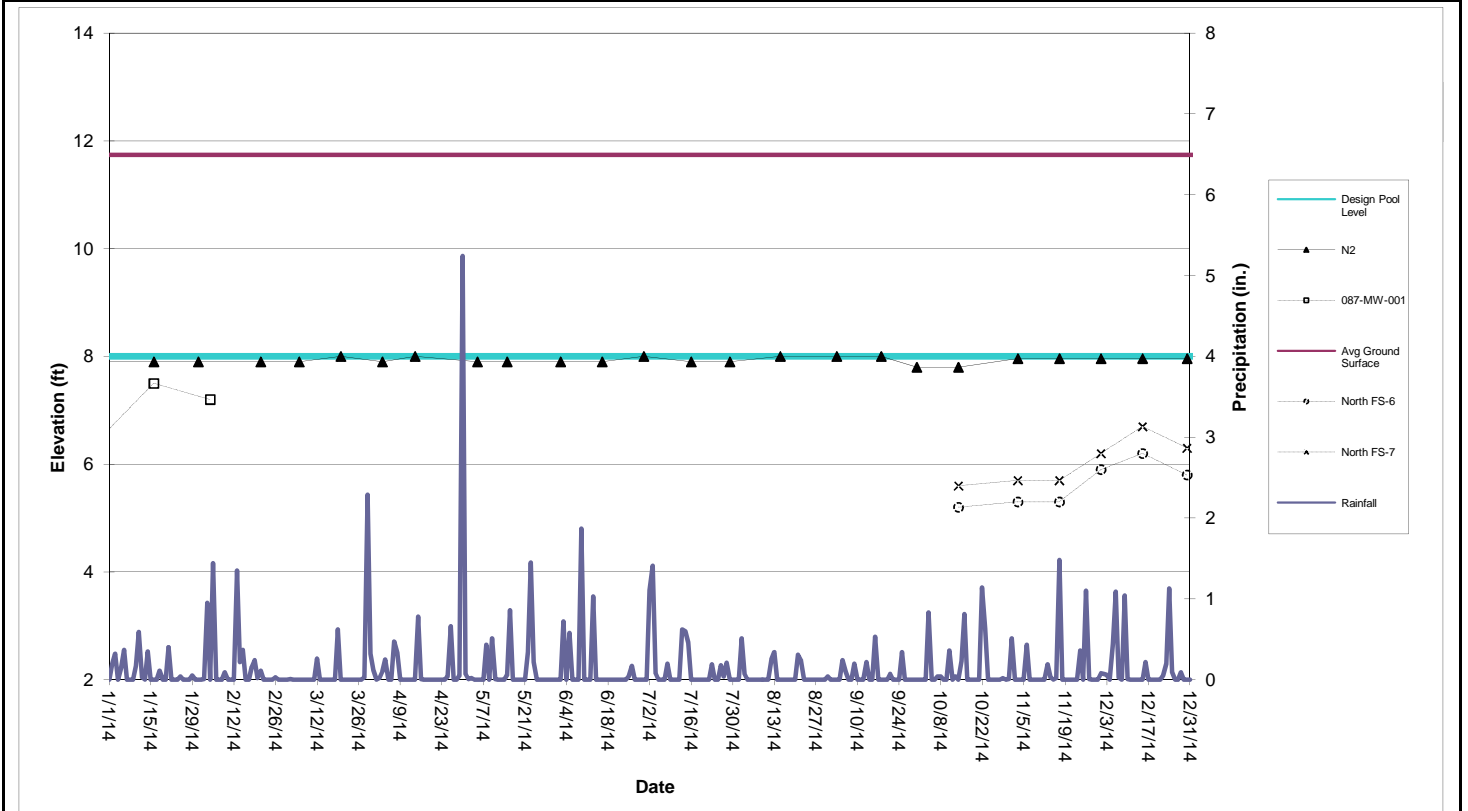
NEW JERSEY

MUESER RUTLEDGE CONSULTING ENGINEERS FILE NO. 10210
14 PENN PLAZA - 225 WEST 34th STREET DRAWING NO. PP-1

Attachment C: Perimeter Pools

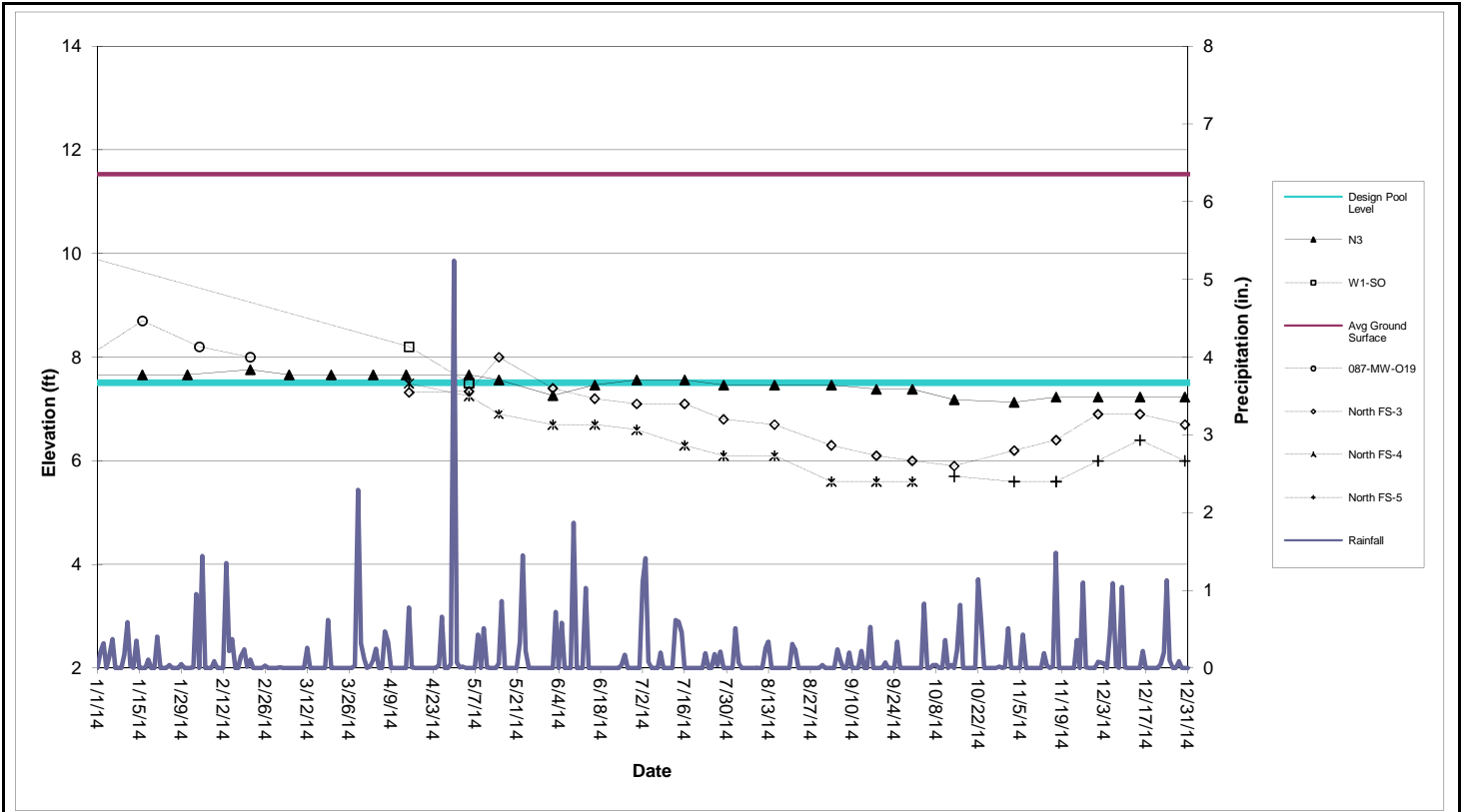


Perimeter Pool N1 (Sta. N13+60 to N20+25)

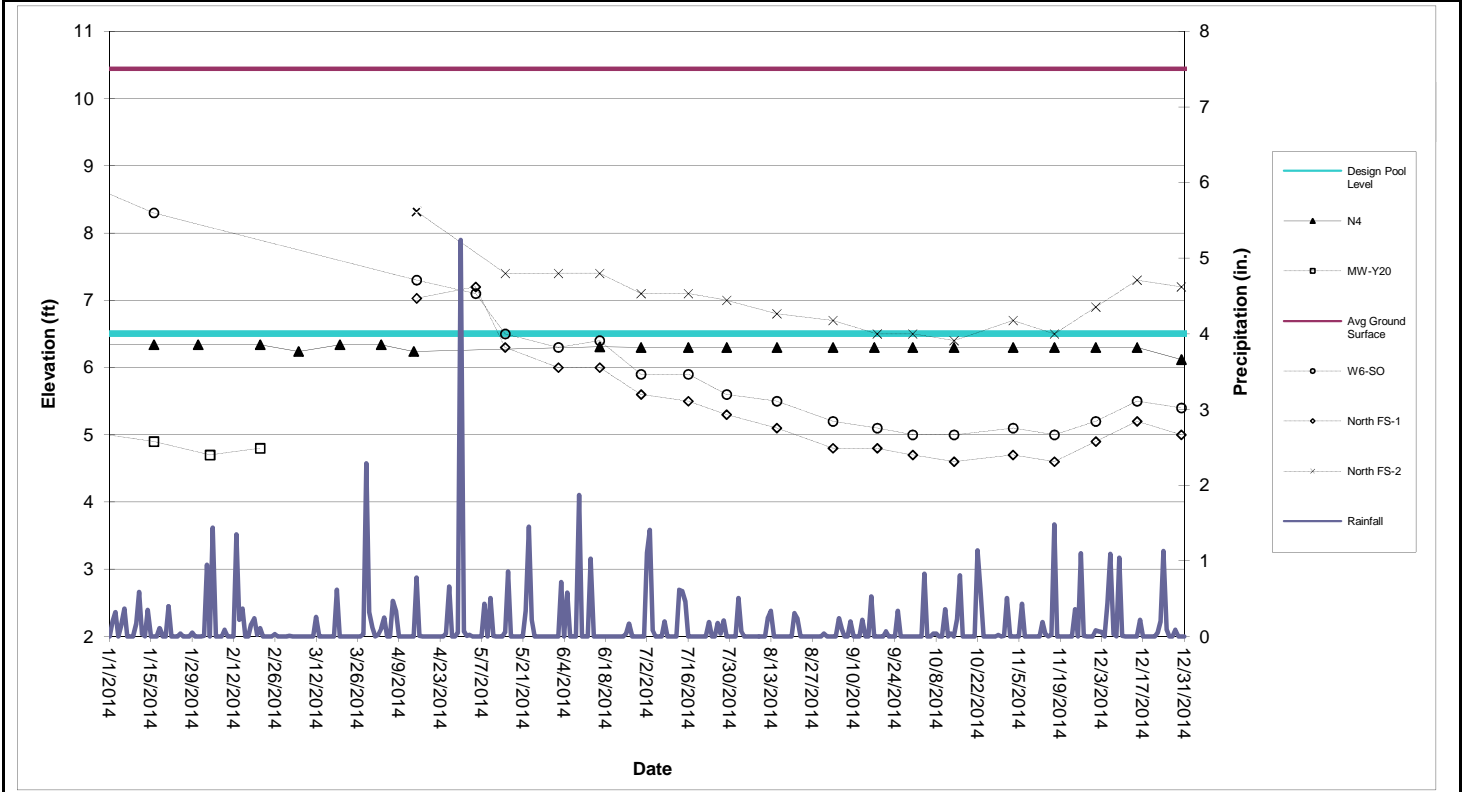


Perimeter Pool N2 (Sta. N10+73 to N13+10)

Attachment C: Perimeter Pools

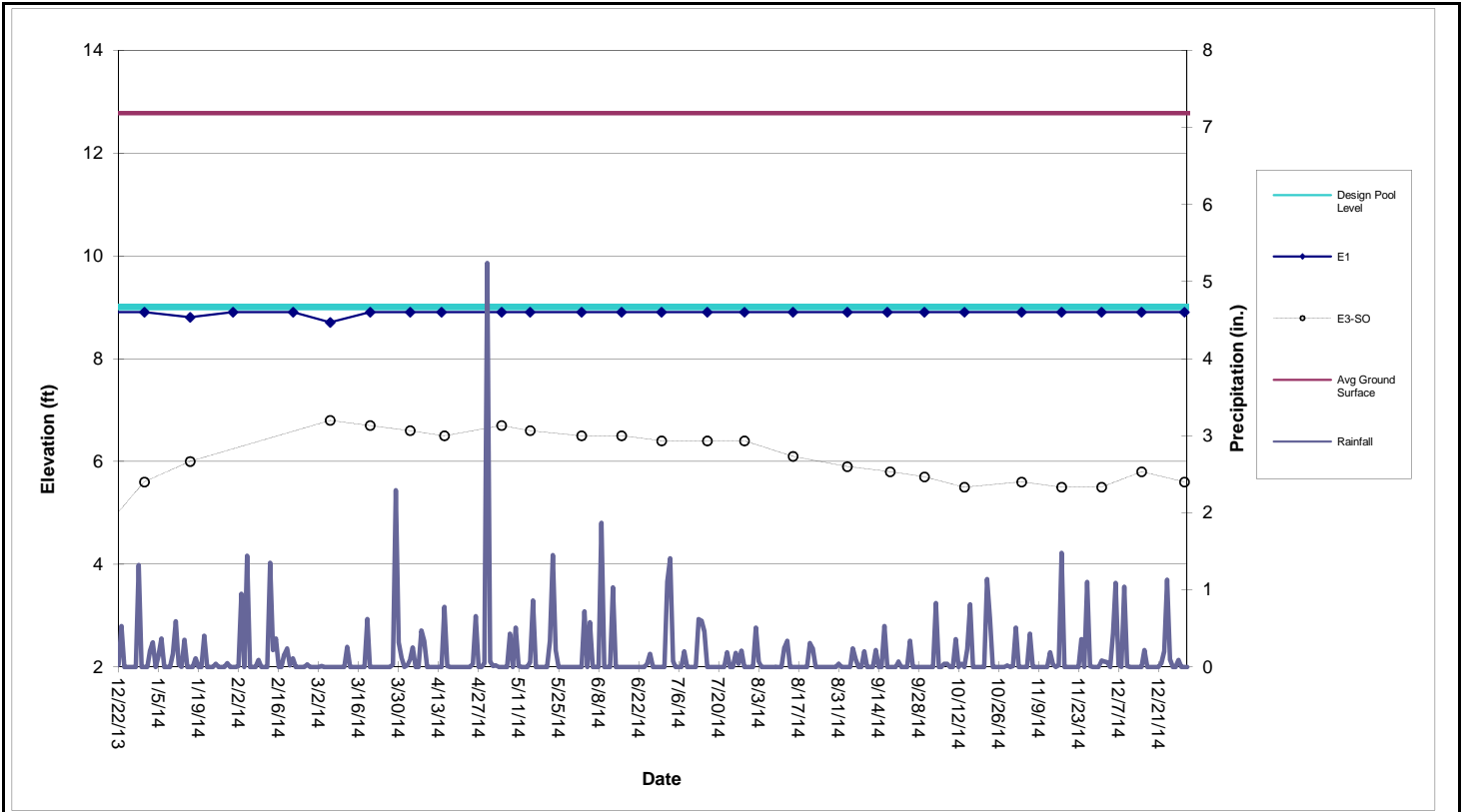


Perimeter Pool N3 (Sta. N6+80 to N10+23)

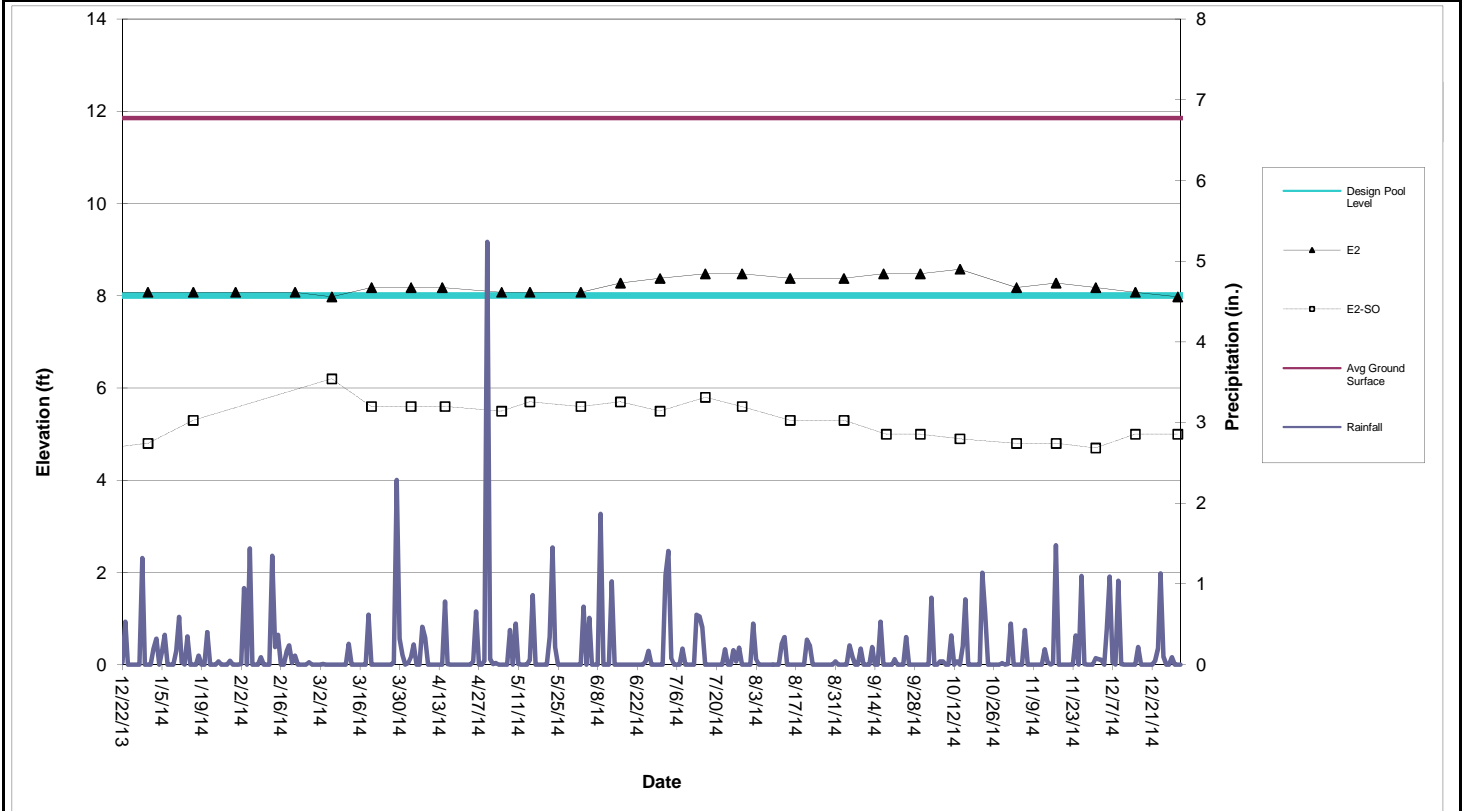


Perimeter Pool N4 (Sta. N6+80 to N10+23)

Attachment C: Perimeter Pools

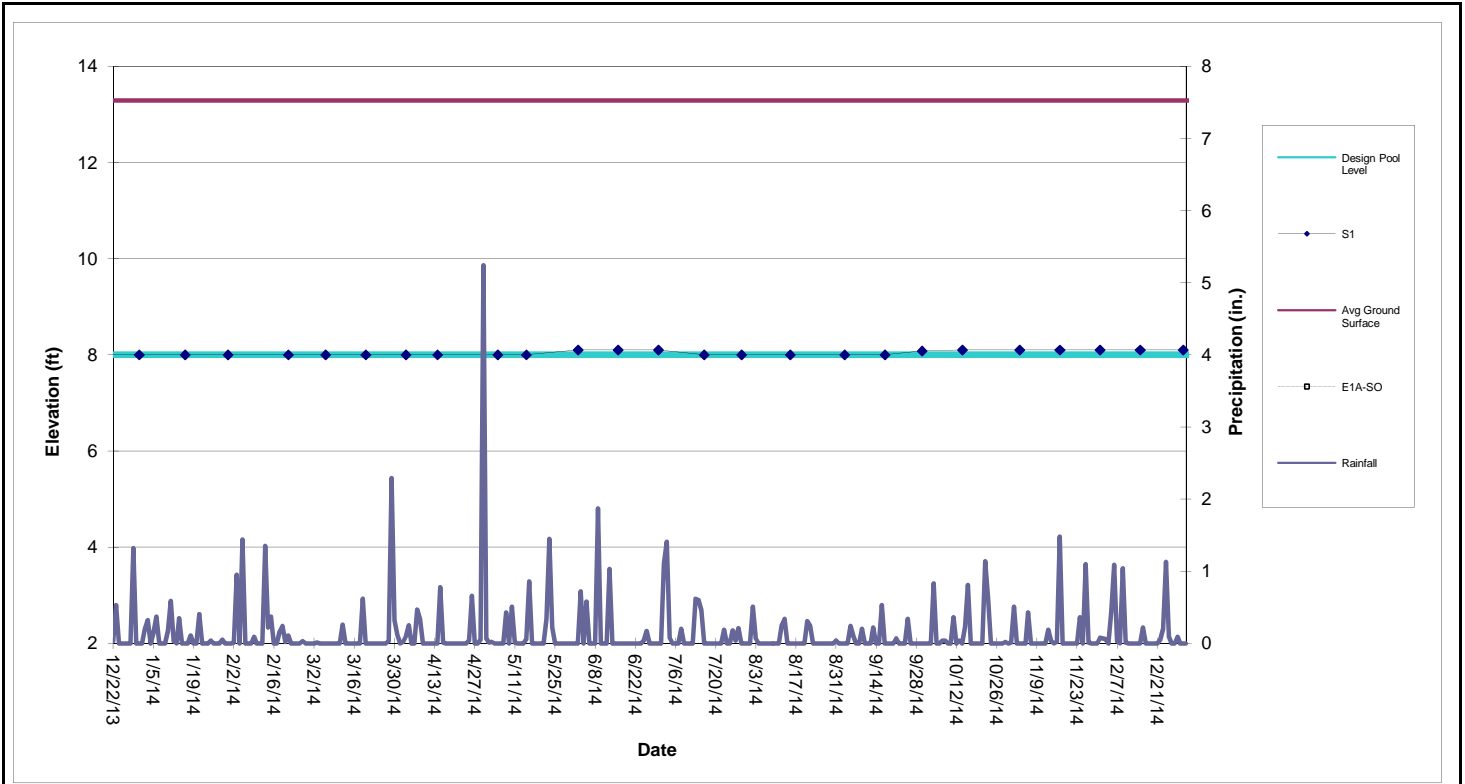


Perimeter Pool E1 (Sta. E0+50 to E3+75)

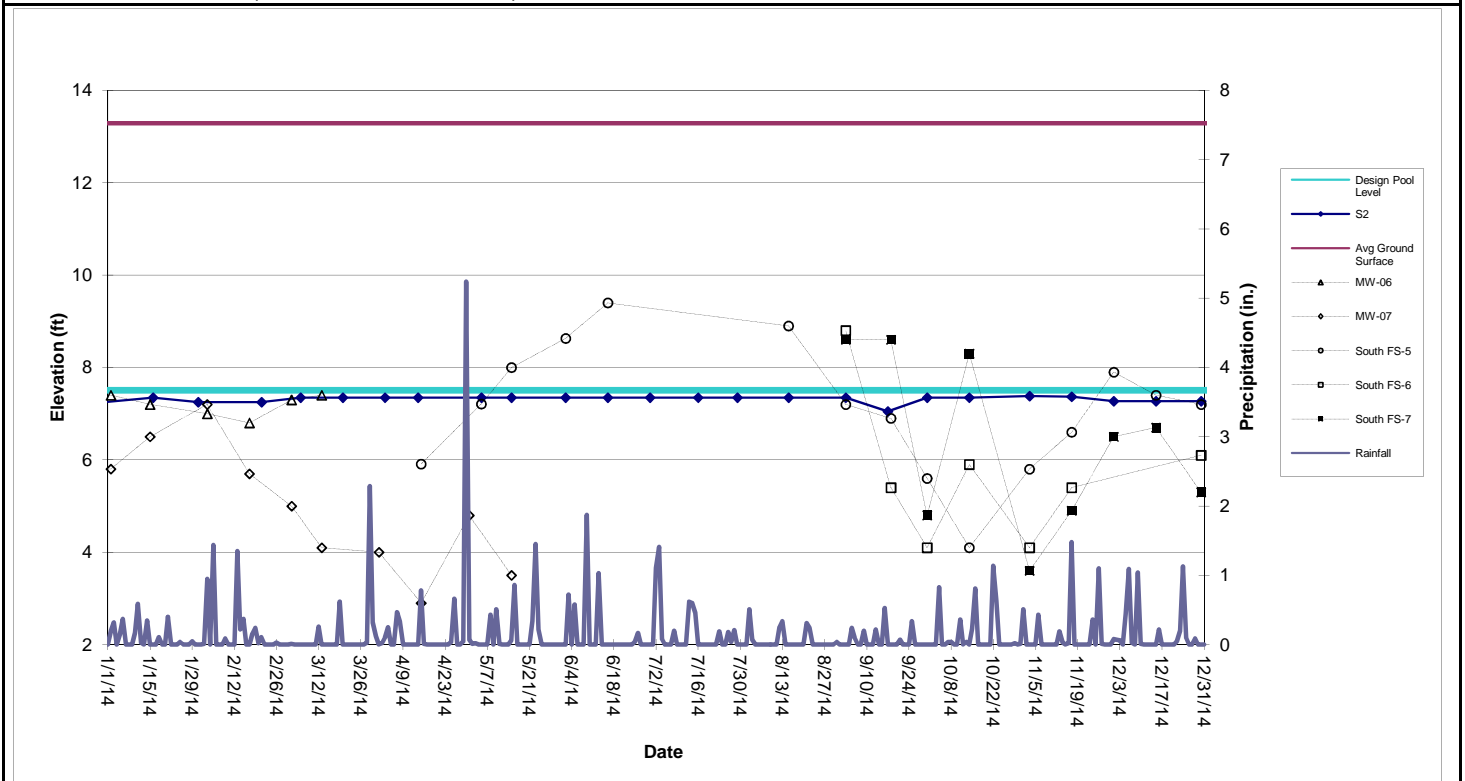


Perimeter Pool E2 (Sta. E4+50 to E7+25)

Attachment C: Perimeter Pools

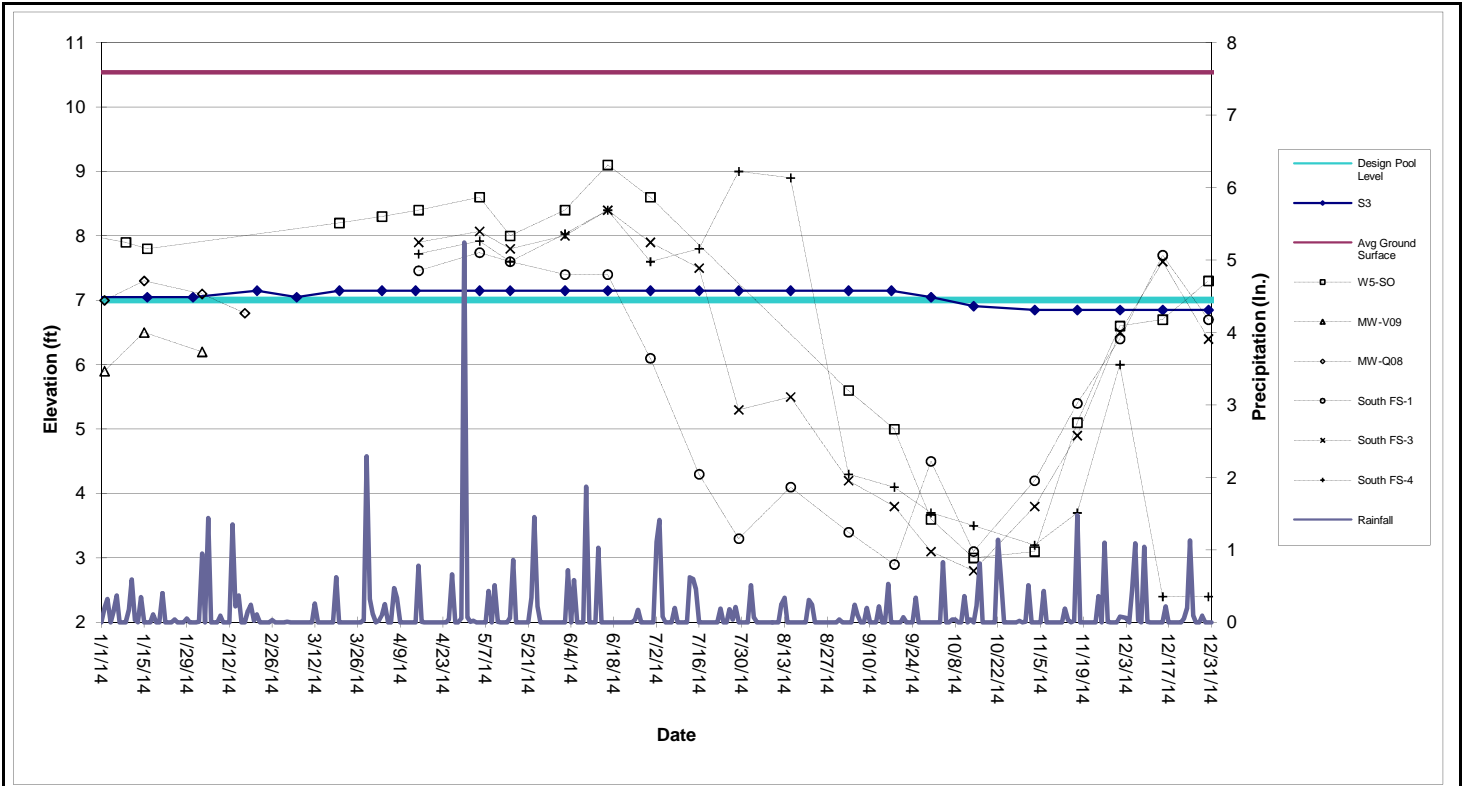


Perimeter Pool S1 (Sta. S0+50 to S3+88)

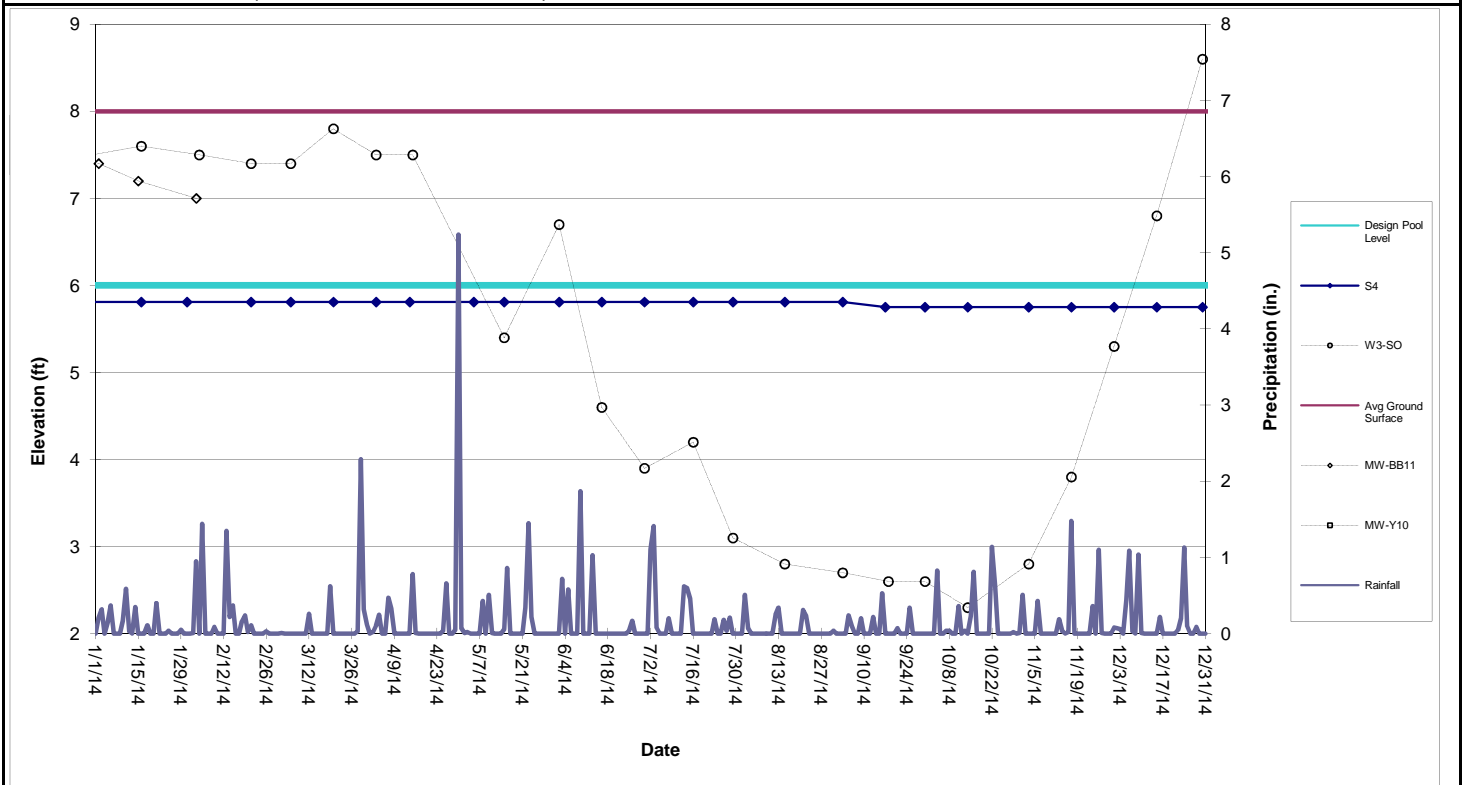


Perimeter Pool S2 (Sta. S4+38 to S10+60)

Attachment C: Perimeter Pools



Perimeter Pool S3 (Sta. S11+10 to S17+50)



Perimeter Pool S4 (Sta. S17+86 to S22+05)

