Annual Remedial Performance Report for Chromium and Perchlorate

Nevada Environmental Response Trust Site; Henderson, Nevada

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Prepared for:
Nevada Environmental Response Trust
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Prepared by:
ENVIRON International Corporation
Emeryville, California

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Persons responsible for preparing this report

Allan J. DeLorme, P.E.
Managing Principal

ENVIRON International Corporation
6001 Shellmound St, Suite 700
Emeryville, California

Other individuals who provided input to this report

Edward J. Krish, Edward J. Krish Consulting
Susan M. Crowley, Crowley Environmental, LLC

Responsible CEM for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

Wendy Seider, CEM 2102, Expires October 18, 2013
Manager

ENVIRON International Corporation
6001 Shellmound St, Suite 700
Emeryville, California

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1 Introduction

In accordance with the Section 2.1.1(iii) of the Nevada Environmental Response Trust Agreement and at the direction of the Nevada Department of Environmental Protection (NDEP) , ENVIRON International Corporation (ENVIRON) submits this remedial performance report to NDEP on behalf of the Nevada Environmental Response Trust (the Trust) for the Nevada Environmental Response Trust Site (the Site).

Tronox LLC (Tronox) formerly owned and operated the Site. In conjunction with the settlement of Tronox's bankruptcy proceeding, the Trust now owns the Site and the groundwater extraction and treatment system (GWETS). The effective date of the property transfer and assumption of responsibilities by the Trust was February 14, 2011. The Tronox facility remains on a portion of the Site leased from the Trust in order to continue manufacturing operations.

This report, covering the period July 2010 through June 2011, summarizes performance data for both the chromium and perchlorate remediation programs. Specifically, this report describes:

- Regional groundwater conditions based on May-June 2011 groundwater levels;
- The hexavalent chromium remediation system (consisting of the on-site Interceptor well field [IWF] and the off-site Athens Road well field [AWF]) and evaluates its performance in carrying out the chromium remediation program;
- The perchlorate remediation system (consisting of the on-site IWF, the off-site AWF, the off-site Seep well field [SWF], and the off-site Seep surface-flow capture sump) and evaluates its performance in carrying out the perchlorate remediation program;
- Extent and magnitude of other constituent loading (total dissolved solids, chlorate, nitrate); and
- Planned upcoming work to improve the GWETS.[1]

Previous annual reports included a capture zone evaluation for the GWETS, which is not included in this document. A separate draft Capture Zone Evaluation Report (CZER) was prepared by Northgate Environmental Management, Inc., (NGEM) on behalf of Tronox and was submitted to NDEP in December 2010.[2] The CZER incorporated the results of additional field investigations at the Site to assess current groundwater capture at the three groundwater recovery well fields. As part of this effort, Tronox installed numerous groundwater wells between April and July 2010. Where appropriate and relevant, these wells are identified and discussed herein. NDEP provided comments on the CZER on April 5, 2011 and the Trust is currently reviewing the CZER and NDEP's comments to evaluate its future use at the Site. The

[1] Herein "GWETS" will be used to refer to the entirety of all systems and components of the groundwater extraction and treatment systems owned and operated by the Trust, both on-site and off-site, including extraction well fields, treatment facilities, and groundwater conveyance systems.

[2] Northgate Environmental Management, Inc. 2010. Capture Zone Evaluation Report, Tronox LLC, Henderson, Nevada. December 10.

Trust is also evaluating various alternatives to optimize and increase the efficiency of the groundwater remediation and monitoring program.

It should be noted that the current soil remediation activities, which were initiated in 2010 to remove source areas and mitigate potential future exposures to contaminants, have dramatically altered the Site and required numerous groundwater wells to be decommissioned or otherwise plugged and abandoned. Some of the plugged and abandoned wells included those that were installed in 2010 for the capture zone evaluation. In addition, changes in Site topography may be expected to impact groundwater flow and contaminant migration in the short and long terms. Therefore, the Trust will be re-evaluating Site conditions, the performance of the GWETS, and the groundwater monitoring program (including replacement of groundwater wells) following the cessation of the major soil remediation efforts at the Site.

Annual groundwater sampling (completed in the second calendar quarter) is a coordinated sampling event with several neighboring companies participating. Data from groundwater samples collected by neighboring companies are incorporated into the potentiometric, total chromium, and perchlorate maps. Additionally, on an annual basis we have mapped the total dissolved solids (TDS), chlorate, and nitrate concentrations combining the available data provided by the other companies. For the 2011 Annual Remedial Performance Report, the Trust received information from American Pacific Corporation (AMPAC), Pioneer/Olin Chlor-Alkali/Stauffer/Syngenta/Montrose (POSSM), Southern Nevada Water Authority (SNWA), and Titanium Metals Corporation (TIMET); their data were integrated into the development of these maps.

This report is provided in both hard copy and electronic forms. Where electronic files are referenced or information is stated as provided on compact disc (CD), this information is contained on the CD attached to the hard copy report. Appendix A contains two tables (as hardcopy and on the report CD): Table A-1, which has five quarters of analytical data from the Site, and Table A-2, which has May through June 2011 data from AMPAC, POSSM, SNWA, and TIMET used to supplement the Plates in the report. An Access© compatible data file (on the report CD) contains the analytical results from the period January to June 2011. An Access© compatible data file (on the report CD) contains January to June 2011 water level monitoring data. Appendix B contains the field records from January to June 2011 (on the report CD). Appendix C contains the Data Validation Summary Report (DVSR) (on the report CD).

2 Area Groundwater Conditions

Figure 1, a location map covering the area between the Site and Las Vegas Wash, shows the components of the GWETS with an index for accompanying cross sections. The performance of each component of the GWETS will be discussed separately, starting with the on-site components and proceeding to the successively northward components. Plate 1 shows the locations of all former and current groundwater monitoring wells in the mapped area.

Plate 2, the *Potentiometric Surface Map: Shallow Water-Bearing Zone*, is based on groundwater elevation measurements taken in May-June 2011 by the Trust, AMPAC, POSSM, SNWA, and TIMET, and it shows a generally north-northeast groundwater flow direction, with an average gradient of 0.015 to 0.02 feet per foot south of the Athens Road well field, flattening to 0.007 to 0.010 feet per foot north of the well field.

On Plate 2, wells where the potentiometric surface is located in the shallow Upper Muddy Creek formation (UMCf) are indicated by a yellow highlight over the well identifier. Wells where the potentiometric surface is located in the Quaternary alluvium (Qal) overlying the UMCf are not highlighted. On the map's southern end, beneath the Site, the flow direction is generally north to north-northwesterly, whereas north of the facility the direction changes slightly to the north-northeast. This generally uniform flow pattern may be modified locally by subsurface alluvial channels cut into the underlying UMCf, the on-site bentonite-slurry groundwater barrier wall (barrier wall), on- and off-site artificial groundwater highs or "mounds" created around the on-site recharge trenches[3] and City of Henderson Water Reclamation Facility (COH WRF) Rapid Infiltration Basins[4] (RIBs), and by depressions created by the groundwater extraction wells at the three groundwater recovery well fields.

2.1 Interceptor Well Field Area

The location of the Interceptor well field (IWF) area is shown on Figure 1 and Plate 2. A bentonite-slurry wall was constructed as a physical barrier across the higher concentration portion of the perchlorate/chromium plume on the Site in 2001. The barrier wall is approximately 1,600 feet in length and 60 feet deep and constructed to tie into approximately 30 feet of UMCf. The Interceptor well field consists of a series of 23 groundwater extraction wells that are situated due south (upgradient) of the barrier wall. Seven additional extraction wells (I-W, I-X, I-Y, I-AA, I-AB, I-AC, and I-AD) have been installed and connected to the well field. Test runs of I-AA, I-AB, I-AC and I-AD were performed in May 2011 to assess performance and to evaluate impacts to nearby Interceptor wells. Drawdown in the wells caused excessive pump cycling, so the wells were turned off to protect the pumps. Test runs have not been performed using I-W, I-X, or I-Y, but based on well construction and current water levels, similar results are expected. ENVIRON is currently evaluating alternatives for effective operation of the new wells in order to address the excessive pump cycling and to enhance the performance of the IWF.

[3] Reinjection of stabilized Lake Mead water ceased in September 2010 as the recharge trenches were removed to accommodate soil excavation and remediation activities at the Site. They have not been replaced.

[4] Since the completion of the COH WRF in 2008 discharge of treated effluent to the Pabco Road RIBs has ceased.

The monthly average discharge rate for each IWF well, active during June 2011 is shown on Table 1, along with the June discharge rates from the five previous years of operation. The combined discharge of the IWF averaged 66.2 gallons per minute (gpm) in June 2011. In June 2001, prior to the installation of the barrier wall, the 22 wells comprising the IWF at that time averaged a combined discharge of 24.7 gpm.

Groundwater recharge trenches located downgradient (north) of the barrier wall were originally installed to receive extracted and treated groundwater, but have been used in the recent past to inject stabilized Lake Mead water into the subsurface to replace water extracted by the IWF. Reinjection ceased in September 2010 as the recharge trenches were removed to accommodate soil excavation and remediation activities at the Site, and there is currently no timeframe for repair of the trenches and resumption of recharge. The Trust will continue to evaluate water level and chemical concentration data from wells to determine if there is a significant benefit from operating a recharge system.

Plate 3, the *West-East Hydrogeologic Cross Section A-A' – Interceptor Well Field, May 2011,* shows the current water levels in the pumping Interceptor wells, adjacent monitor wells, and the relationships between the pre-pumping and current groundwater level in the vicinity of the IWF. The cross section also shows the series of narrow subparallel alluvial channels separated by Muddy Creek ridges, some of which are above the current groundwater level. In general, water elevations in the IWF in May 2011 are slightly lower than in May 2010. Water levels in the pumping wells indicate that the IWF is dewatering the Qal and the upper portion of the UMCf in the vicinity of the pumping wells. However, the goal of the IWF is not necessarily to dewater the alluvium at each well, but to capture groundwater in the shallow saturated intervals between the Interceptor wells, and remove contaminant mass.

Figures 2A through 2D present historic (May 2006 to June 2011) water elevations for selected pairs of monitoring wells located on opposite sides of the barrier wall. As shown on the figures, water levels in wells directly downgradient (north) of the barrier wall (wells M-69 through M-72) were generally six to eight feet lower than water elevations in corresponding wells upgradient (south) of the wall. The large drop in measured groundwater elevations across the barrier wall indicates that the wall is an effective barrier to groundwater flow. Water levels in downgradient wells showed a continual decline until February 2008 when refurbishment of the recharge trench was completed allowing increased recharge rates. Increases in water levels in downgradient wells around July 2008 and May 2010 observed in Figures 2A through 2C (and to a lesser extent in Figure 2D) are responses to increased recharge rates during those times. These figures also show a significant decline in water elevations in the downgradient wells beginning around September 2010, when the recharge trenches were shut down and groundwater mounding associated with the recharge began to dissipate.

2.2 Athens Road Field Area

Figure 1 and Plate 2 show the location of the Athens Road well field (AWF), which is approximately 8,200 feet north (downgradient) of the barrier wall and the IWF. Although Athens Road has been renamed Galleria Drive, the Athens Road designation has been retained for the well field to maintain consistency with past reports. The AWF was constructed as a series of 14 groundwater extraction wells screened in the Qal at seven paired well locations that span

approximately 1,200 feet across two alluvial paleochannels located on either side of an UMCf ridge. The AWF was completed in March 2002 and continuous pumping began in mid-October of that year. The well pairs act as "buddy" wells with one well pumping while the adjacent "buddy" well is used to measure water levels adjacent to the well and monitor the effect of pumping on the aquifer. In September 2006, a 15th standalone well, ART-9, began full-time operation replacing ART-6A after groundwater elevations at the AWF dropped below a level where ART-6/6A could be effective. The monthly average discharge rate for each AWF pumping well during June 2011 is shown on Table 2, along with the discharge rates in June of the five previous years. The combined discharge rate of the AWF averaged 284.6 gpm in June 2011, the highest combined discharge rate recorded in recent years.

Potentiometric contours for the AWF area, inferred from groundwater elevations measured in May 2011, are shown on Plate 2, the *Potentiometric Surface Map: Shallow Water-Bearing Zone*. Plate 4, *West-East Hydrogeologic Cross Section B-B' – Athens Road Well Field*, shows the current water levels in the pumping wells, adjacent monitor wells, and the relationships between the pre-pumping and current groundwater levels in the vicinity of the AWF. As shown on Plate 4, the extraction wells in the AWF target two alluvial sub-channels separated by a ridge of UMCf.

In June through July 2010 NGEM installed additional groundwater wells in the AWF including monitoring wells and four large diameter wells (ART-7B, PC-148, PC-149, and PC-150) that could be used as additional extraction wells. The wells installed in 2010 are included in Plate 2 and Plate 4 and were sampled in May 2011. A new eight-inch diameter well, ART-7B, is coincident with the ART-7/ART-7A extraction well pair, but with a screen interval extending deeper down to the Qal/UMCf interface to the reported bottom of the eastern alluvial channel. Two new six-inch diameter wells, PC-148 and PC-149, are standalone wells that are situated across the top of the UMCf ridge with screened intervals almost entirely within the UMCf. Another new six-inch diameter well, PC-150, is a standalone well located west of the UMCf ridge in the western channel and is screened entirely within the Qal. The recently installed monitoring well, PC-141, indicates that the deepest part of the western channel may not be as wide as previously thought.

Groundwater levels are currently much lower than they were in 2002 before pumping began, and the Qal overlying the UMCf high has been partially dewatered. In general, the water elevations in the AWF are similar to the water elevations from one year ago. Historical groundwater level trends for selected wells are shown in Figure 3, *Athens Road Well Field Drawdown*.

In order to monitor subsidence due to dewatering of the aquifer, systematic surveys of several wells in the AWF have occurred since before pumping began in 2002. Currently, the surveys of the well elevations are performed every two years. The last survey was performed in 2010; therefore, the next scheduled survey will be in 2012. These surveys have demonstrated that there has been no significant subsidence in the AWF since pumping began.

2.3 Seep Well Field Area

The seep well field (SWF) and the seep surface-flow capture sump, located approximately 4,500 feet north (downgradient) of the AWF near the Las Vegas Wash, are shown on Figure 1 and Plate 2. When pumping began in July 2002, the SWF consisted of three recovery wells situated over the deepest part of the alluvial channel and a surface-capture pump for an intermittent surface stream. In February 2003, five additional wells (PC-117 to PC-121) and in December 2004 one additional well (PC-133) were completed in the SWF area. Presently, the SWF consists of 10 extraction wells—two of which (PC-99R2 and 99R3) are connected and operate as one combined well. The seep stream has not flowed since April 2007. The wells comprising the SWF are screened across the full thickness of the Qal across the deepest portion of an alluvial channel. The monthly average discharge rate for each pumping well during June 2011 at the SWF is shown on Table 3, along with the discharge rates in June of the five previous years. The combined discharge rate of the SWF averaged 500.0 gpm in June 2011, which is the lowest combined discharge in recent years.

Plate 2 shows that south of the SWF (north of the AWF) the gradient of the north-northeast sloping potentiometric surface decreases to about 0.007 feet per foot. Recent depth to water measurements north of the COH WRF show that water elevations are up to 17 feet lower now than they were in May 2008, particularly to the south-southeast of the SWF (wells HM-2, HSW-1). This water elevation decrease is believed to be due to cessation of the discharge of treated effluent to the Pabco Road RIBs since the completion of the COH WRF in 2008.

Plate 5, the *West-East Hydrogeologic Cross Section C-C' – Seep Well Field*, shows that the alluvial channel is much less incised into the underlying UMCf than at the AWF, and that the configuration of the alluvial channel is a broad shallow feature about 800 feet wide and averaging about 45 feet thick. In May 2001, before pumping began, the groundwater level in the area was very shallow and would surface every winter. Based on water level measurements collected in May 2011, water levels in the SWF are generally four to eight feet lower than pre-pumping levels.

3 Chromium Mitigation Program

The four components of the chromium capture system consist of the IWF, the barrier wall, the former recharge trenches, and the AWF. The locations of these components are shown on Figure 1. For the 12-month period from July 2010 to June 2011, a total of approximately 3,476 pounds of chromium[5] was captured and removed from groundwater. The treatment of chromium-contaminated groundwater is discussed in Section 3.2. A simplified process flow diagram is presented on Figure 4, *Groundwater Extraction and Treatment System (GWETS) Flow Diagram*.

3.1 Chromium Plume Configuration

Plate 6, *Total Chromium in Groundwater Map: Shallow Water-Bearing Zone,* presents an isoconcentration map of the chromium plume from its on-site source northward to the Las Vegas Wash. In general, the current isoconcentration map is generally similar to 2010 with some local variances. ENVIRON notes that soil remediation activities in the vicinity of the former recharge trenches have resulted in the plugging and abandonment of groundwater monitoring wells in this area including M-84, M-85, M-86A, M-87, and M-88. The Trust is currently evaluating the replacement of wells in this area, but any proposed installation of wells would not commence until soil remediation activities are completed.

The portion of the chromium plume with the highest concentrations remains south of the barrier wall where it is captured by the IWF. In this area, the highest total chromium concentration occurred in M-36 (30 mg/L). North of the barrier wall the highest total chromium concentration was 9.1 mg/L in well M-73, located north of I-I/I-Z. North of the former recharge trenches the highest total chromium concentration detected was 2.1 mg/L in well PC-136, located in the AWF. This concentration is at the leading edge of a thin lobe of the chromium plume that extends in the alluvial sub-channel east of the UMCf ridge in this area. Concentrations in well M-12A, located on the trailing edge of the main plume, have generally been slowly declining. In May 2011, the concentration in M-12A was 11 mg/L compared with 25 mg/L in May 2002. Total chromium concentrations downgradient of the barrier wall and former recharge trenches also continue to decline, indicating that the IWF and barrier wall are an effective barrier to migration of the main portion of the chromium plume. Appendix A contains total chromium data for the last five quarters along with groundwater elevations for these wells.

3.1.1 On-Site Interceptor Well Field Area

The IWF captures the highest concentrations and the main portion of the groundwater plume located downgradient of the on-Site source area. Plate 3, *West-East Hydrogeologic Cross Section A – A' Interceptor Well Field*, shows the current total chromium concentration in each well. Figure 5, *Interceptor Well Field Total Chromium Concentration Section Graph*, shows the concentrations of total chromium in the 23 IWF pumping wells over the last five quarters.

Chromium concentration data from the five Consent Order Appendix J wells (M-11, -23, -36, -72, and -86) are presented in graph form in Figure 6, *Consent Order Appendix J Wells Total*

[5] Total chromium is conservatively considered to be entirely hexavalent chromium in groundwater.

Chromium Concentration Trend Graph. In monitoring well M-11, immediately downgradient from the former primary source area (Units 4 and 5), concentrations have remained relatively stable over the last five years with a concentration of 2.4 mg/L reported in May 2011. Total chromium concentrations measured in well M-36, located upgradient of the IWF, declined over the reporting period, a continuation of a trend dating back to February 2004. Concentrations in monitoring well M-23, downgradient of the IWF near Warm Springs Road, have been relatively stable over the last five years. Concentrations in M-72, located in the so-called "dead zone" between the barrier wall and former recharge trenches, have increased slightly during the reporting period to a concentration of 5.0 mg/L in the May 2011 sampling event. Since August 2007 concentrations have been increasing slightly in M-86, located just northeast of the recharge trenches. It should be noted that there is only one data point from well M-86 after May 2008, which was previously damaged during recharge trench refurbishment activities in 2008, and was again abandoned to accommodate soil excavation and remediation activities during the third quarter of 2010. The Trust is currently evaluating the replacement of wells in the vicinity of M-86, but any proposed installation of wells would not commence until soil remediation activities are completed.

3.1.2 Athens Road / Seep Well Fields Area

Groundwater capture at the AWF has a positive effect on the total chromium concentrations north of the well field, intercepting a residual groundwater plume containing greater than 1 mg/L total chromium. In this area, groundwater flows around both sides of a Muddy Creek formation basement ridge. As shown on Plate 6, the 1 mg/L chromium isoconcentration contour terminates at the AWF indicating effective capture of this portion of the chromium plume. Downgradient of the AWF, the highest measured concentration of total chromium during the second quarter 2011 sampling event was 0.23 mg/L in well MW-K4.

Plate 4, *West-East Hydrogeologic Cross Section B - B' Athens Road Well Field*, shows the current total chromium concentration in each well including wells PC-148, PC-149, and PC-150, which were installed by NGEM in June 2010. Figure 7, the *Athens Road Well Field Total Chromium Concentration Section Graph* shows the concentrations of total chromium across the eight pumping wells in addition to monitoring wells PC-18, PC-55, and PC-122 over the last five quarters. As shown in the figure, chromium concentrations in the western sub-channel (represented by wells west of ART-4) have been low relative to those in the eastern sub-channel (represented by wells east of ART-4). This narrow lobe of the chromium plume in the eastern sub-channel can be seen also on Plate 4. An additional recovery well, ART-9, was installed in this area in 2006 to capture this narrow channel of chromium-impacted groundwater. Consequently, a dramatic decline in chromium concentration occurred in well PC-122 where chromium concentrations declined from 1.5 to 0.10 mg/L between November 2006 and February 2007. Well PC-122 contained a total chromium concentration of 0.13 mg/L in May 2011. Total chromium present in groundwater collected in this area continues to be treated at Lift Station #3 with metered ferrous sulfate additions to reduce the hexavalent chromium to insoluble trivalent chromium before the water is sent to the on-site perchlorate treatment system.

Wells in the SWF continue to contain generally less than 0.01 mg/L total chromium. East of the well field, concentrations of total chromium in monitoring well PC-94 were measured at 0.04

mg/L in May 2011. In May 2010, total chromium was measured at a concentration of 0.054 mg/L in PC-94. As mapped on Plate 6, chromium-impacted groundwater flowing from the Upper BMI Ponds east of Pabco Road appears to be mingling with the residual chromium plume north of the AWF. This has been presented in previous annual reports. As discussed in Section 2.3, water elevations in this area dropped between three and 17 feet between 2008 and 2009 due to cessation of discharge of treated effluent in the Pabco Road RIBs. It may be possible that past infiltration acted to dilute a previously existing chromium plume, and without this dilution, chromium is now being detected.

3.2 On-Site Chromium Treatment System

The operation and maintenance of the chromium mitigation program as well as the rest of the GWETS was contracted to Veolia Water North America (formerly US Filter Operating Services) in 2003. The Trust has assumed responsibility for operation of the GWETS in compliance with the terms of the 1986 Consent Order and the subsequent Underground Injection Control (UIC) Permit NEV94218. Table 4 contains the July 2010 to June 2011 process treatment data from the on-site Groundwater Treatment Plant (GWTP[6]). The treated groundwater from the GWTP, which includes about 25 gpm from GW-11, is pumped to two 150,000-gallon tanks (BT-40 and BT-45 in series), then to the equalization tanks where it is combined with water from the off-site groundwater collection systems. From the equalization tanks, most of the blended water flows through activated carbon beds before being filtered and pumped to the Fluidized Bed Reactors (FBRs) for treatment to remove perchlorate, chlorate, and nitrate. A small portion of the blended GWTP flow (1-3 gpm) is not pumped to the FBRs but instead is returned to the GW-11 pond in order to avoid running the underflow pump dry.

As shown in Table 4, since July 2010 the total chromium inflow concentration to the GWTP has been relatively stable in the range of 9.4 to 11.6 mg/L, which is slightly lower than the range of 10.6 to 13.3 mg/L one year ago. The chemical reduction of hexavalent chromium and removal of total chromium via the GWTP during the reporting period has been consistently effective. Total chromium outflow concentrations for the last 12 months ranged from 0.130 to 0.318 mg/L – well below the required level of 1.7 mg/L established in the 1986 Consent Order. The hexavalent chromium outflow concentration during the reporting period ranged from non-detectable to 0.024 mg/L – well below the required level of 0.05 mg/L, established in the 1986 Consent Order. For the period between July 2010 and June 2011, approximately 3,197 pounds of chromium were removed from the groundwater by the GWTP.

A lesser amount of chromium is also removed in the FBRs. Results of total chromium analysis from weekly FBR influent and effluent samples are presented in Table 5. These data, between July 2010 and June 2011, show that the FBR's influent total chromium concentrations varied from 0.0069J[7] to 0.6 mg/L. Based on an average concentration of approximately 0.075 mg/L total chromium with an average flow rate of 938 gpm, the FBRs were receiving about 0.84

[6] By convention, the "GWTP" consists of only the on-site hexavalent chromium treatment plant. The name pre-dates the installation of any of the perchlorate treatment systems and related components.

[7] Result was "J"-flagged by the laboratory. A J flag indicates results that are an estimate because they were detected above the Sample Quantification Limit (SQL), but below the Method Reporting Limit (MRL).

pounds of chromium per day from the equalization tanks. This includes chromium captured in the AWF and reductively treated with ferrous sulfate drip at Lift Station #3.

The FBRs discharge treated water to the Las Vegas Wash just upgradient of the Pabco Road erosion control structure under authority of NPDES Permit NV0023060. Analyses of this water performed between July 2010 and June 2011 appear in Table 5. The table shows that effluent hexavalent chromium concentrations have been non-detectable (<0.000009 to <0.0001mg/L[8]) with the lone exception of the sample collected on February 22, 2011 which had a reported concentration of 0.00021 mg/L – well below the effluent discharge limitation of 0.01 mg/L (7-day average). Total chromium was detected in effluent samples at concentrations ranging from 0.005 to 0.025 mg/L and at an average concentration of 0.012 mg/L – well below the effluent discharge limitation of 0.1 mg/L (7-day average).

At an influent concentration of approximately 0.84 pounds per day the FBR system removed an additional 279 pounds of chromium over the 12-month period. The sum of the chromium captured and removed from the groundwater between July 2010 and June 2011 by the GWTP and by the FBRs totals approximately 3,476 pounds.

[8] The SQLs reported by the analytical laboratory in 2011 are one to two orders-of-magnitude lower that in 2010.

4 Perchlorate Recovery Program

The four components of the perchlorate capture system consist of the IWF and barrier wall, the AWF, the SWF, and the seep surface-flow capture sump. The locations of these components are shown on Figure 1. Figure 8, *Perchlorate Removed from the Environment July 2010 – June 2011*, charts the monthly perchlorate recovery totals and the relative significance of each of the four components whereas Table 6 shows the average pounds of perchlorate removed per day by each component.

In the last 12 months, since July 2010, a total of approximately 535,023 pounds of perchlorate (approximately 1,466 pounds per day) have been captured and removed from groundwater by the GWETS. Of this total, approximately 286,033 pounds (approximately 784 pounds per day) were captured on-site in the IWF, approximately 232,591 pounds (approximately 637 pounds per day) were captured off-site in the AWF, approximately 16,399 pounds (45 pounds per day) were captured off-site in the SWF, and zero pounds came from the seep surface-flow capture sump.

4.1 Perchlorate Plume Configuration

Plate 7, *Groundwater Perchlorate Map: Shallow Water-Bearing Zone – Second Quarter 2011*, shows the contoured perchlorate plume from the south end of the Site to the Las Vegas Wash based on data collected in May and June 2011. Based on this sampling, the highest perchlorate concentration south of the IWF occurred in well I-A-R (2,300 mg/L). North of the IWF the highest perchlorate concentration detected was 510 mg/L in well PC-130 near the midpoint of the Sunset Road well transect. In general, the current isoconcentration map is generally similar to 2010 with some local variances. ENVIRON notes a difference at the AWF, where the 25 mg/L contour line on the east side of the UMCf ridge now terminates within the AWF rather than protruding north as observed in the 2010 Plate. Furthermore, north of the AWF, the tail of the 10 mg/L contour line now trends northeast to the east end of the SWF rather than turning northward as observed in the 2010 Plate. Appendix A contains the results of the last five quarters of sampling.

Comparing Plate 7 with Plate 7A, *Groundwater Perchlorate Map: Shallow Water-Bearing Zone – Second Quarter 2002*, it is clear that significant changes in the perchlorate plume have occurred over nine years. In 2002, the highest perchlorate concentration (M-37, adjacent to I-A-R) contained 5,300 mg/L, whereas in 2011 the perchlorate concentration decreased to 1,500 mg/L. As shown on Plate 7A, a large area downgradient of the barrier wall contained perchlorate in excess of 1,000 mg/L, including M-23 and M-44 with concentrations of 1,430 mg/L and 1,400 mg/L. Concentrations at the downgradient edge of the plume in 2002 were as high as 160 mg/L (PC-115R, -116R, -99R2/R3) adjacent to the Las Vegas Wash. In 2011, M-23 and M-44 had perchlorate concentrations of 380 mg/L and 480 mg/L, respectively, and the highest perchlorate concentration reported in the SWF was 13 mg/L in wells PC-99R2/R3, PC-115R, and PC-116R.

4.1.1 Interceptor Well Field Area

The IWF targets the highest concentrations of perchlorate at the Site (greater than 2,000 mg/L) and significantly reduces the amount of perchlorate in downgradient groundwater (reducing

concentrations to significantly less than 1,000 mg/L). Plate 3, *West-East Hydrogeologic Cross Section A – A' Interceptor Well Field*, shows the IWF in cross-section with the current perchlorate concentration for each well. Figure 9, *Interceptor Well Field Perchlorate Concentration Section Graph*, charts the perchlorate concentrations for the 23 pumping wells in May 2002 compared to the last four quarters. Figure 9 clearly shows that there are two sub-lobes of the perchlorate plume that impact the IWF; a western sub-lobe centered on wells I-R and I-L, and a wider eastern sub-lobe located east of well I-E. Figure 9 further shows that the perchlorate concentrations in both of these sub-lobes have significantly decreased since May 2002. Figures 10 and 10A, *Interceptor Well Field Perchlorate Concentration Trend Graphs,* show in greater detail how the overall perchlorate loading at the IWF is declining over time.

Since high perchlorate concentrations are often associated with high TDS concentrations, a TDS section graph was constructed across the IWF. A comparison of Figures 9 and Figure 11, *Interceptor Well Field Total Dissolved Solids Concentration Section Graph*, shows that the broad zone of high TDS in the central part of the IWF continues in the most recent sampling and coincides with the eastern perchlorate sub-lobe. Contrastingly, the high perchlorate sub-lobe on the west side of the IWF is not associated with high TDS. It is thought that the western sub-lobe of perchlorate, having comparatively low concentrations of TDS, represents a separate perchlorate source from the eastern sub-lobe.

As shown in Figure 12, *Interceptor Well Field Average Perchlorate Concentration and Mass Removed*, the monthly average perchlorate concentration captured at the IWF generally decreased, with relatively short-lived increases, from a high of about 1,900 mg/L in 2002 to 849 mg/L in December 2010, the lowest recorded average concentration. The calculated perchlorate mass removal has generally followed a similar trend. Since December 2010, the average perchlorate concentration and the monthly average mass of perchlorate removed from the groundwater by the IWF have generally been increasing. Approximately 23,455 pounds of perchlorate were removed by the IWF in June 2011.

Figure 13, *Well M-100 Perchlorate vs. Water Elevation Trend Graph*, charts perchlorate concentration and water elevation trends in monitoring well M-100 located 700 feet north of the former recharge trenches. Figure 13 shows a sharp decrease in perchlorate concentrations beginning in early 2002, shortly after the barrier wall was installed at the IWF. Water level trends reflect infiltration and mounding of water recharged to the subsurface through the former recharge trenches. Clogging of the trenches and reduced infiltration are reflected in the decreasing water levels beginning about May 2007. The trenches were subsequently refurbished in July 2009 with water levels in M-100 quickly rebounding. Perchlorate concentrations in well M-100 have remained relatively stable since about 2008. Due to conflicts with excavation and remediation of soil at the Site, operation of the trenches was again suspended in September, 2010. The recharge trenches are not currently operational. Well M-100 was dry in May and June 2011.

4.1.2 Athens Road Well Field Area

The AWF captures perchlorate in groundwater at concentration generally less than 500 mg/L, but significantly contributes to the overall mass of perchlorate removed from groundwater. Plate 4, *West-East Hydrogeologic Cross Section B - B' Athens Road Well Field*, shows the AWF

in cross-section with the current perchlorate concentration for each well including wells PC-148, PC-149, and PC-150, installed by NGEM in June 2010. Figure 14, *Athens Road Well Field Perchlorate Concentration Section Graph*, an east-west section graph through the AWF, charts perchlorate concentrations in the eight pumping wells in addition to monitoring wells PC-18, PC-55, and PC-122 in May 2011 compared to the previous four quarters. As shown on the Figure, the plume is stable with data from November 2010 at or near the lowest concentrations measured for the year, and perchlorate concentrations on the western (PC-55 and ART-1) and eastern (PC-122) edges of the well field continue to remain low.

The perchlorate concentration trends of the pumping wells in the AWF are shown in Figures 15 and 15A, *Athens Road Well Field Perchlorate Concentration Trend Graphs*. Figure 15 shows that overall perchlorate concentrations in the AWF have generally been slowly declining since 2002. Concentrations in individual wells fluctuate with each sampling event, but for most wells these fluctuations have moderated with time. An exception to this is ART-6, which has fluctuated significantly since about 2007. Figure 15A, an expanded view of the last five quarters of Figure 15, indicates that recent concentrations in the AWF pumping wells have remained relatively stable, even ART-6, which appears to have stabilized somewhat since July 2010. The perchlorate concentration measured in ART-8 in May 2011, as shown on Figure 16, *Athens Road Well Field Average Perchlorate Concentration in ART-8 and Mass Removed*, was 210 mg/L – near the bottom of its range. Also shown on this graph is the monthly average perchlorate mass removed from the AWF which was approximately 19,162 pounds in June 2011.

Starting in August 2006, TDS data have been collected from the AWF. A section graph, Figure 17, *Athens Road Well Field Total Dissolved Solids Concentration Section Graph*, shows that two zones of higher TDS exist at the AWF, centered on PC-18 on the west (9,600 mg/L in May 2011) and highest at PC-122 on the east (9,000 mg/L in May 2011). The trough in the TDS concentrations generally corresponds with the peak of the perchlorate concentrations as shown in the perchlorate concentration section graph (Figure 14).

Approximately 250 feet north of the AWF, seven ARP-series wells (named for Athens Road Piezometers) and MW-K4 comprise the Athens Road Piezometer or “ARP” well line. A section graph of perchlorate in the ARP well line is presented in Figure 18, and perchlorate concentrations of these wells over time are shown on Figures 19 and 19A, the *Athens Road Piezometer Wells Perchlorate Concentration Trend Graphs*. Figure 19 contains concentration-time plots beginning in late 2001, and Figure 19A shows an expanded view of the last five quarters.

In December 2007 ARP-4A, -5A and -6B replaced ARP-4, -5 and -6A, which were plugged and abandoned in anticipation of the COH area development and drainage ditch construction. Former wells ARP-2 and ARP-3, which were buried/destroyed by construction activity north of the AWF in 2008, were replaced with wells ARP-2A and ARP-3A, located slightly north of the former locations and have been sampled monthly with the rest of the ARP well line beginning in July 2010.

As shown in Figure 18, perchlorate concentrations in the western side of the well line (represented by ARP-1, ARP-2/2A, and ARP-3/3A) and the eastern side of the well line (represented by ARP-4/4A, ARP-5/5A, ARP-6/6A/6B and ARP-7) have significantly decreased since 2002. This indicates that the groundwater capture in the AWF has effectively narrowed the perchlorate plume in this area. However, perchlorate concentrations in the center of the ARP well line at MW-K4, though significantly lower than in 2002, have remained elevated. As shown in Figures 19 and 19A, with the exception of well MW-K4, concentration trends in the ARP well line appear relatively stable. Concentrations in well MW-K4 initially declined with the operation of the AWF and dropped further when ART-9 began pumping in September 2009, but concentrations trended generally upwards from mid-2008 to the beginning of 2010. Concentrations in MW-K4 rose sharply from 57.8 mg/L to 300 mg/L between June 2008 and January 2010, indicating that some portion of the perchlorate plume was evading capture by the AWF. Since the high in January 2010, perchlorate concentrations in MW-K4 have fluctuated between 220 and 280 mg/L. The perchlorate concentration in MW-K4 in June 2011 was 240 mg/L.

Intermediate between the ARP well line and the SWF are the COH WRF and the Lower Ponds monitor well lines. Figures 20, 21, and 21A present perchlorate concentrations in the COH WRF well lines on section and trend graphs. As shown in the figures, current perchlorate concentrations are well below levels measured in the same wells in May 2002 especially in the center of the well line. As shown in Figure 21A, concentrations in wells PC-98R and MW-K5 are somewhat erratic, but overall have been relatively stable since about 2007. Downward spikes in well concentrations may be related to COH WRF surface water infiltration. Figure 22, the *PC-98R Perchlorate vs. Water Elevation Trend Graph*, indicates that many of the low-concentration events in the wells can be associated with a rapid increase in the water levels, inferred to be the result of increased infiltration from the COH WRF surface ponds. These significant groundwater "mounding events" due to COH WRF surface water infiltration continue to occur sporadically.

The Lower Ponds well line is approximately 2,200 feet north of the COH WRF well line. Figures 23, 24, and 24A, the perchlorate section and trend graphs for the Lower Ponds Well Line, show that perchlorate concentrations are well below levels measured in the same wells in May 2002 especially at well PC-56. Figure 24 shows that perchlorate concentrations present in the Lower Ponds well line are generally low and relatively stable. The last five quarters of data shown on Figure 24A show that the perchlorate concentration in well PC-56 spiked to 16 mg/L in November 2010, but was only 7.0 mg/L in June 2011. Concentrations in PC-56 historically are more variable than other wells on the Lower Ponds well line.

4.1.3 Seep Well Field Area

The SWF contributes the highest flows (500 gpm as of June 2011) compared with the IWF (66.2 gpm in June 2011) and the AWF (284.6 gpm in June 2011) to the GWETS, but captures significantly lower concentrations of perchlorate (less than 20 mg/L). Because of the low concentrations captured at the SWF, the perchlorate mass removed from the environment via the SWF is substantially less than that removed via the IWF or AWF (see Figure 8 and Table 6).

The original three recovery wells in the SWF went on-line in August 2002. In February 2003, five additional wells (PC117, -118, -119, -120, -121), and in December 2004, one additional well

(PC-133), were completed in the SWF. At present, the SWF consists of ten extraction wells – two of which (PC-99R2 and -99R3) are connected and operate as one – positioned over the deepest part of the alluvium channel that contains the highest concentrations of perchlorate. The well field is located approximately 600 feet upgradient of the seep surface flow capture sump; however, the seep stream has not flowed since April 2007.

Plate 5, the *West-East Hydrogeologic Cross Section C - C' Seep Well Field*, shows the perchlorate concentrations in individual wells in the SWF as of May 2011. Tronox previously proposed to install three additional wells at the SWF (identified as PC-138, PC-139, and PC-140); however, these wells were never installed by Tronox due to problems negotiating an access agreement with BMI, the property owner. The location and screen intervals of these proposed wells are shown in blue on Plate 5. The Trust will be evaluating in the near future the need for these additional wells within the context of its evaluation of the overall effectiveness of the GWETS.

Figures 25, *Seep Well Field Perchlorate Concentration Section Graph*, shows perchlorate concentrations for the last five quarters along with concentrations in the original pumping wells in May 2002. Figure 25 shows that perchlorate concentrations have significantly decreased in the original pumping wells since 2002. Figure 26 and 26A present the perchlorate trend graphs for the SWF. Figure 26 shows the steep decreases in perchlorate concentrations that occurred after pumping began. As shown on Figure 26A, perchlorate concentrations in the SWF appear to have been relatively stable over the last year. TDS concentrations for the last five quarters are plotted on Figure 27, *Seep Well Field Total Dissolved Solids Section Graph*. This figure shows that the highest TDS concentration (4,900 mg/L) is currently measured in well PC-99R2/R3, which corresponds with the highest perchlorate concentration for the SWF (13 mg/L in May 2010). The TDS concentrations in the SWF wells are stable over the same period, and appear to be associated with the perchlorate plume.

The monthly average perchlorate concentration, as shown on Figure 28, *Seep Area Average Perchlorate Concentration and Mass Removed*, was 7.7 mg/L in June 2011 and has ranged from 5.0 to 9.5 mg/L over the last year. Also shown on this graph is the monthly average perchlorate mass removed, which was approximately 1,377 pounds in June 2011.

Data provided by the SNWA for the irrigation wells, WMW-6.15S and WMW-5.7N (shown on Plate 7), completed in the Las Vegas Wash provide further evidence that the GWETS is effective in reducing concentrations of perchlorate in the Las Vegas Wash. Well WMW-6.15S, which contained 45.6 mg/L in June 2002, had a reported perchlorate concentration of only 1.3 mg/L in May 2011, which represents a 97% decrease. Well WMW-5.7N further to the east had a reported concentration of 0.02 mg/L in May 2011.

4.2 On-Site Perchlorate Groundwater Treatment System and Remediation

Throughout the reporting period, groundwater was captured both on-site and off-site, conveyed to the on-site treatment facilities and treated biologically in the FBRs to remove nitrate, chlorate and perchlorate. Effluent from the FBRs has been discharged into Las Vegas Wash consistently within the limits specified in the NPDES NV0023060 discharge permit. As shown on Table 7, since July 2010 the perchlorate influent to the FBRs has ranged from 120 mg/L to

200 mg/L. Perchlorate was not detected at concentrations exceeding the laboratory SQL (ranging from 0.0025 to 0.0005) in effluent discharged to Las Vegas Wash during this time. Routine maintenance is completed as needed at the GWTP and FBRs.

5 Other Mapped Analytes

5.1 Total Dissolved Solids

Plate 8, the *Total Dissolved Solids (TDS) in Groundwater Map: Shallow Water-Bearing Zone*, shows the isoconcentration contours for TDS from the southern end of the Site to the Las Vegas Wash based on data collected in May through June 2011 by the Trust, AMPAC, POSSM, SNWA, and TIMET. The 2011 TDS map does not differ significantly from the 2010 map. As shown previously, TDS mapping shows that the Site is located between two high TDS zones originating from off-site sources to the west and east. The highest TDS concentration occurred at the Site (19,000 mg/L) in well MC-29, located on the west side of the Site south of Warm Springs Road downgradient of the off-site TDS source on the Pioneer property. Figures 11, 17, and 27 show in section graph format the distribution of TDS across the IWF, AWF and SWF, respectively.

5.2 Chlorate

Plate 9, the *Chlorate in Groundwater Map: Shallow Water-Bearing Zone*, shows the isoconcentration contours for chlorate from the southern end of the Site to the Las Vegas Wash based on data collected in May through June 2011 by the Trust, AMPAC, POSSM, SNWA, and TIMET. The map shows that upgradient of the barrier wall, well M-36 contained the highest measured chlorate concentration at 7,900 mg/L. Between the barrier wall and the Las Vegas Wash, the maximum chlorate concentration is 780 mg/L (PC-130) along Sunset Road. Concentrations continue to decrease northward toward the Las Vegas Wash. North of the COH WRF, PC-4 contains 93 mg/L chlorate. In addition to perchlorate, the FBRs also remove chlorate from captured groundwater.

5.3 Nitrate

Plate 10, the *Nitrate in Groundwater Map: Shallow Water-Bearing Zone*, shows the isoconcentration contours for chlorate from the southern end of the Site to the Las Vegas Wash based on data collected in May through June 2011 by the Trust, AMPAC, POSSM, SNWA, and TIMET. The map shows that upgradient of the barrier wall, well M-37 contains the highest nitrate concentration at 120 mg/L. Between the barrier wall and the AWF, wells BHE1-10, PC-64, and PC-28 contain 100 mg/L, 42 mg/L, and 33 mg/L, respectively. Concentrations continue to decline closer to the Las Vegas Wash, with the highest concentration in the SWF measured at 6.3 mg/L in PC-90. In addition to perchlorate, the FBRs also remove nitrate from captured groundwater.

6 Conclusions

The GWETS continues to effectively capture and treat perchlorate and chromium contaminated groundwater and significantly reduces perchlorate loading to the Las Vegas Wash.

Annual groundwater sampling (completed in the second calendar quarter) is a coordinated sampling event with several neighboring companies participating. In addition to the monthly, quarterly, and annual groundwater sampling performed by the Trust, data from groundwater samples collected by neighboring companies are incorporated into the maps contained herein. For the 2011 Annual Remedial Performance Report, the Trust received information from AMPAC, POSSM, SNWA, and TIMET. The groundwater data presented in this report supports the effectiveness of the GWETS.

The GWETS consists of three groundwater capture well fields: the IWF, the AWF, and the SWF. The IWF coupled with the barrier wall provides capture of the highest concentrations of perchlorate and chromium at the Site and significantly reduces the amount of perchlorate in downgradient groundwater. The off-site AWF, located approximately 8,200 feet downgradient of the IWF has been in continuous operation since October 2002. The AWF captures significantly lower concentrations of both perchlorate and chromium, but because of its higher extraction rates compared with the IWF, it significantly contributes to the overall mass of perchlorate removed from the environment and mitigates its impact in downgradient groundwater. The SWF, advantageously located over the main part of the alluvium channel in close proximity to Las Vegas Wash, contributes the highest flows (500 gpm as of June 2011) compared with the IWF (66.2 gpm in June 2011) and the AWF (284.6 gpm in June 2011), but captures significantly lower concentrations than the other well fields. The seep stream has not flowed since April 2007.

Treatment of chromium-contaminated groundwater (primarily from the IWF) occurs via the on-site GWTP, which chemically reduces hexavalent chromium and removes total chromium. A small ferrous sulfate drip system also treats lower concentrations of chromium from the AWF. Treatment of perchlorate-contaminated groundwater from all well fields occurs via the on-site FBRs, which biologically remove perchlorate as well as chlorate, nitrate, and residual chromium. Routine maintenance is completed as needed at the GWTP and FBRs.

For the 12-month period ending in June 2011, the capture of chromium-contaminated groundwater at the IWF and AWF, and treatment at the on-site GWTP, has removed approximately 3,197 pounds of chromium. Adding the 279 pounds of chromium removed by the FBRs for the same period, a total of 3,476 pounds of chromium were removed from the groundwater between July 2010 and June 2011.

For the same 12-month period, the capture of perchlorate-contaminated groundwater from all three well fields, and biological treatment in the on-site FBRs, has removed a total of approximately 535,023 pounds of perchlorate from the environment.

The GWETS has been effective in decreasing perchlorate loading to the Las Vegas Wash since 1999. In May 1999 the perchlorate loading to the Las Vegas Wash was approximately 1,104

pounds per day compared with 58 pounds per day in May 2011. This corresponds to a decrease of 94.7 percent.

Finally, ongoing soil remediation at the Site, initiated in 2010 to remove source areas and mitigate potential future exposures to contaminants, has dramatically altered the Site and required numerous groundwater monitoring wells to be decommissioned or otherwise plugged and abandoned. Also, soil remediation activities necessitated removal of the recharge trenches north of the barrier wall and the IWF. Furthermore, changes in Site topography may be expected to impact groundwater flow and contaminant migration in the short and long terms. Therefore, the Trust will be re-evaluating Site conditions, the performance of the GWETS, and the groundwater monitoring program (including replacement of groundwater wells) following the cessation of the major soil remediation efforts at the Site.

7 Proposed Future Activities

A significant and wide-ranging effort to remediate source soils, including some that may be contributing to the groundwater contamination plumes is being completed at the Site. Several hundred thousand cubic yards of soil have been excavated and disposed off-site. In addition, the Trust is evaluating alternative strategies to remediate potential source soils and/or residual groundwater contamination at the Site in order to support the existing GWETS.

Finally, other contaminants present in groundwater that have been identified as potential concerns based on the 2009 Phase B groundwater sampling and a recent soil leaching evaluation are being evaluated to determine the likely effects of these constituents on the long-term remediation of groundwater, as well as to develop alternative strategies for addressing these constituents, if appropriate.

Tables

TABLE 1: INTERCEPTOR WELL FIELD DISCHARGE RATES
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	June 2006 (GPM)	June 2007 (GPM)	June 2008 (GPM)	June 2009 (GPM)	June 2010 (GPM)	June 2011 (GPM)	Well Screened In
I-AR	0.07	1.2	1.2	1.2	1.0	1.0	Qal/UMCf
I-B	1.2	1.3	1.4	1.8	2.5	2.2	Qal/UMCf
I-C	1.9	4.2	3.4	6.4	4.4	5.9	Qal/UMCf
I-D	5.2	1.6	0.4	1.6	5.3	1.4	Qal/UMCf
I-E	1.6	1.8	1.3	1.3	1.8	1.2	Qal/UMCf
I-F	4.3	3.9	5.0	6.0	4.5	5.0	Qal/UMCf
I-G	OFF	OFF	OFF	0.1	0.5	0.1	Qal/UMCf
I-H	1.3	0.9	0.7	1.0	0.9	1.2	Qal/UMCf
I-I	4.2	5.2	5.1	4.5	5.2	5.1	Qal/UMCf
I-J	5.6	7.5	7.9	7.6	7.1	8.2	Qal/UMCf
I-K	4.6	2.7	3.8	4.7	3.2	3.4	Qal/UMCf
I-L	1	1.4	1.6	2.0	1.4	1.9	Qal/UMCf
I-M	3.6	5.1	3.0	2.6	2.9	2.6	Qal/UMCf
I-N	2.1	2.1	3.7	3.7	3.4	3.6	Qal/UMCf
I-O	3.2	2.7	1.6	2.2	2.9	2.6	Qal/UMCf
I-P	4.3	3.5	2.3	3.3	4.0	2.7	Qal/UMCf
I-Q	1	0.9	0.3	0.2	0.4	0.4	Qal/UMCf
I-R	1.9	1.8	2.5	1.9	1.1	1.7	Qal/UMCf
I-S	1.9	4.5	3.6	3.7	8.6	5.2	Qal/UMCf
I-T	0.2	0.5	0.3	0.4	0.4	0.4	Qal/UMCf
I-U	1.1	1.1	0.7	1.3	1.0	0.8	Qal/UMCf
I-V	3.7	3.8	4.8	4.7	4.0	4.2	Qal/UMCf
I-Z	8	6.5	6.5	7.1	7.3	5.5	Qal/UMCf
TOTAL	**61.9**	**64.2**	**61.1**	**69.3**	**73.8**	**66.2**	

Notes:
GPM = gallons per minute
OFF = well was turned off
Qal = Quaternary alluvium
UMCf = Upper Muddy Creek Fm. (first fine-grained unit)

TABLE 2: ATHENS ROAD WELL FIELD DISCHARGE RATES
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	June 2006 (GPM)	June 2007 (GPM)	June 2008 (GPM)	June 2009 (GPM)	June 2010 (GPM)	June 2011 (GPM)	Well Screened In
ART-1	13.8	OFF	OFF	1.4	11.7	27.3	Qal
ART-2	77.0	78.1	78.1	74.4	62.5	61.2	Qal
ART-3	34.6	39.0	39.0	33.5	46.9	46.8	Qal
ART-4	14.9	11.3	2.0	7.1	8.1	8.5	Qal
ART-6	11.2	NO*	NO*	NO*	NO*	NO*	Qal
ART-7	30.5	31.1	31.2	28.6	29.4	31.2	Qal
ART-8	62.2	62.5	78.1	69.7	62.5	62.9	Qal
ART-9	NO	36.5	43.0	43.9	46.5	46.8	Qal
TOTAL	**244.1**	**258.5**	**271.4**	**258.6**	**267.3**	**284.6**	

Notes:
GPM = gallons per minute
NO = not operational (* ART-6 is the “Buddy Well” for ART-9. The electrical and plumbing system from ART-6A was removed and is being used in ART-9)
ART-1, 2, 3, 4, 7 and 8 have adjacent recovery wells - “Buddy Wells” - designated by the letter “A”
Pumping Wells on 6/6/11: ART-1, 2, 3A, 4A, 7A, 8 and 9
Qal = Quaternary Alluvium

TABLE 3: SEEP WELL FIELD DISCHARGE RATES
Nevada Environmental Response Trust Site
Henderson, Nevada

Well ID	June 2006 (GPM)	June 2007 (GPM)	June 2008 (GPM)	June 2009 (GPM)	June 2010 (GPM)	June 2011 (GPM)	Well Screened In
PC-99R2/R3	144.7	125	114.7	105.5	77.2	62.3	Qal
PC-115R	61.9	88.4	84.1	78.3	75.4	84.8	Qal
PC-116R	176.5	185.7	187.3	167.0	183.5	124.6	Qal
PC-117	91.6	89.2	93.7	105.1	61.4	93.7	Qal
PC-118	78	82.1	62.5	52.5	65.7	70.7	Qal
PC-119	62.2	0.1	64.1	52.9	60.3	62.4	Qal
PC-120	41.5	89.8	8.9	6.3	1.0	0.0	Qal
PC-121	6.9	0.1	13.1	4.4	0.0	0.0	Qal
PC-133	6.6	13.4	2.1	5.9	5.9	1.5	Qal
TOTAL	**669.8**	**673.7**	**630.5**	**577.9**	**530.3**	**500.0**	

Notes:
GPM = gallons per minute
OFF = Well was turned off
NO = not operational
Qal = Quaternary Alluvium

TABLE 4: CHROMIUM TREATMENT DATA
Nevada Environmental Response Trust Site
Henderson, Nevada

Month	Ave. Flow To Cr Treatment (MM Gals)	Ave. Total Cr Inflow (mg/L)	Ave. Cr VI Treated Outflow* (mg/L)	Ave. Total Cr Treated Outflow* (mg/L)
July	3.26	11.10	0.002	0.148
August	3.17	11.30	ND	0.165
September	3.19	11.50	ND	0.180
October	3.16	10.60	0.001	0.146
November	3.02	11.00	0.002	0.138
December	3.02	11.20	0.002	0.238
January	3.09	10.70	0.013	0.318
February	2.72	10.00	0.002	0.130
March	2.90	10.40	0.002	0.148
April	2.90	9.40	0.001	0.147
May	2.91	10.00	0.001	0.200
June	2.86	10.00	0.017	0.149

Notes:
* Treated Outflow is directed to two 150,000 gallon tanks (BT-40 and BT-45) for equalization before being fed to the Fluidized Bed Reactors (FBRs).
mg/L = milligrams per liter
ND = Not detected above sample quantitation limit

TABLE 5: WEEKLY CHROMIUM IN FBR INFLUENT AND EFFLUENT
Nevada Environmental Response Trust Site
Henderson, Nevada

SAMPLE DATE	INFLUENT/ EFFLUENT	TOTAL CHROMIUM mg/L ML/EPA 200.7	TOTAL CHROMIUM SQL mg/L	HEXAVALENT CHROMIUM mg/L EPA 218.6	HEXAVALENT CHROMIUM SQL mg/L
07/06/2010	INFLUENT	0.076	0.0004	0.031	0.000066
07/06/2010	EFFLUENT	0.019	0.0004	<0.000033	0.000033
07/12/2010	INFLUENT	0.09	0.0004	0.019	0.000066
07/12/2010	EFFLUENT	0.023	0.0004	<0.000033	0.000033
07/19/2010	INFLUENT	0.06	0.0004	0.015	0.000066
07/19/2010	EFFLUENT	0.013	0.0004	<0.000033	0.000033
08/05/2010	INFLUENT	0.089	0.0004	0.06	0.000066
08/05/2010	EFFLUENT	0.012	0.0004	<0.000033	0.000033
08/09/2010	INFLUENT	0.18	0.0004	0.18	0.00033
08/09/2010	EFFLUENT	0.023	0.0004	<0.000033	0.000033
08/16/2010	INFLUENT	0.058	0.0004	0.037	0.000066
08/16/2010	EFFLUENT	0.016	0.0004	<0.000033	0.000033
08/23/2010	INFLUENT	0.079	0.0004	0.051	0.000066
08/23/2010	EFFLUENT	0.019	0.0004	<0.000033	0.000033
08/30/2010	INFLUENT	0.064	0.0004	0.025	0.000066
08/30/2010	EFFLUENT	0.011	0.0004	<0.000033	0.000033
09/07/2010	INFLUENT	0.082	0.0004	0.07	0.000066
09/07/2010	EFFLUENT	0.012	0.0004	<0.000033	0.000033
09/13/2010	INFLUENT	0.0062J	0.0004	0.0012	0.000066
09/13/2010	EFFLUENT	0.009J	0.0004	<0.000033	0.000033
09/20/2010	INFLUENT	0.013	0.0004	0.002	0.000066
09/20/2010	EFFLUENT	0.007J	0.0004	<0.000033	0.000033
09/27/2010	INFLUENT	0.07	0.0004	0.025	0.000066
09/27/2010	EFFLUENT	0.0059J	0.0004	<0.000033	0.000033
10/04/2010	INFLUENT	0.039	0.0004	0.00034	0.000033
10/04/2010	EFFLUENT	0.008J	0.0004	<0.000033	0.000033
10/11/2010	INFLUENT	0.6	0.0004	0.56	0.000066
10/11/2010	EFFLUENT	0.021	0.0004	<0.000033	0.000033
10/18/2010	INFLUENT	0.094	0.0004	0.051	0.000066
10/18/2010	EFFLUENT	0.015	0.0004	<0.000033	0.000033
10/26/2010	INFLUENT	0.12	0.0004	0.1	0.00017
10/26/2010	EFFLUENT	0.009J	0.0004	<0.000033	0.000033
11/01/2010	INFLUENT	0.052	0.0004	0.00055	0.000033
11/01/2010	EFFLUENT	0.006J	0.0004	<0.000033	0.000033
11/08/2010	INFLUENT	0.07	0.0004	0.00042	0.000033
11/08/2010	EFFLUENT	0.008J	0.0004	<0.000033	0.000033
11/15/2010	INFLUENT	0.084	0.0004	0.036	0.000066
11/15/2010	EFFLUENT	0.013	0.0004	<0.000033	0.000033
11/22/2010	INFLUENT	0.084	0.0004	<0.000033	0.000033
11/22/2010	EFFLUENT	0.0082J	0.0004	<0.000033	0.000033
11/29/2010	INFLUENT	0.077	0.0004	0.026	0.000066
11/29/2010	EFFLUENT	0.011	0.0004	<0.000033	0.000033
12/06/2010	INFLUENT	0.023	0.0004	<0.000033	0.000033
12/06/2010	EFFLUENT	0.009J	0.0004	<0.000018	0.000018

TABLE 5: WEEKLY CHROMIUM IN FBR INFLUENT AND EFFLUENT
Nevada Environmental Response Trust Site
Henderson, Nevada

SAMPLE DATE	INFLUENT/ EFFLUENT	TOTAL CHROMIUM mg/L ML/EPA 200.7	TOTAL CHROMIUM SQL mg/L	HEXAVALENT CHROMIUM mg/L EPA 218.6	HEXAVALENT CHROMIUM SQL mg/L
12/13/2010	INFLUENT	0.036	0.0004	<0.000033	0.000024
12/13/2010	EFFLUENT	0.0084J	0.0004	<0.000024	0.000024
12/20/2010	INFLUENT	0.049	0.0004	0.011	0.000066
12/20/2010	EFFLUENT	0.017	0.0004	<0.000033	0.000033
12/27/2010	INFLUENT	0.088	0.0004	0.048	0.000048
12/27/2010	EFFLUENT	0.019	0.0004	<0.000024	0.000024
01/03/2011	INFLUENT	0.099	0.0004	0.061	0.0001
01/03/2011	EFFLUENT	0.013	0.0004	<0.00002	0.00002
01/10/2011	INFLUENT	0.076	0.0004	0.037	0.00004
01/10/2011	EFFLUENT	0.016	0.0004	<0.00002	0.00002
01/18/2011	INFLUENT	0.093	0.0004	0.082	0.00004
01/18/2011	EFFLUENT	0.011	0.0004	<0.00002	0.00002
01/24/2011	INFLUENT	0.074	0.0004	0.043	0.00004
01/24/2011	EFFLUENT	0.0094J	0.0004	<0.00002	0.00002
01/31/2011	INFLUENT	0.032	0.0004	0.028	0.00004
01/31/2011	EFFLUENT	0.0091J	0.0004	<0.00002	0.00002
02/07/2011	INFLUENT	0.085	0.0004	0.032	0.00004
02/07/2011	EFFLUENT	0.025	0.0004	<0.00002	0.00002
2/14/11	INFLUENT	0.0069J	0.0004	0.00053	0.00002
2/14/11	EFFLUENT	0.009J	0.0004	<0.00002	0.00002
2/22/11	INFLUENT	0.037	0.0004	0.00067	0.00002
2/22/11	EFFLUENT	0.011	0.0004	0.21	0.00002
2/28/11	INFLUENT	0.035	0.0004	0.00047	0.00002
2/28/11	EFFLUENT	0.013	0.0004	<0.00002	0.00002
3/7/11	INFLUENT	0.028	0.0004	0.00051	0.00002
3/7/11	EFFLUENT	0.016	0.0004	<0.00002	0.00002
3/14/11	INFLUENT	0.053	0.0004	0.014	0.00002
3/14/11	EFFLUENT	0.0075J	0.0004	<0.00002	0.00002
3/21/11	INFLUENT	0.044	0.0004	0.0071	0.00002
3/21/11	EFFLUENT	0.01	0.0004	<0.00002	0.00002
3/28/11	INFLUENT	0.044	0.0004	0.011	0.00004
3/28/11	EFFLUENT	0.0058J	0.0004	<0.00002	0.00002
4/4/11	INFLUENT	0.049	0.0004	0.0019	0.00002
4/4/11	EFFLUENT	0.005J	0.0004	<0.00002	0.00002
4/11/11	INFLUENT	0.021	0.0004	0.00026	0.00004
4/11/11	EFFLUENT	0.0053J	0.0004	<0.00002	0.00002
4/18/11	INFLUENT	0.031	0.0004	<0.00002	0.00002
4/18/11	EFFLUENT	0.006J	0.0004	<0.00002	0.00002
4/25/11	INFLUENT	0.089	0.0004	0.003	0.00002
4/25/11	EFFLUENT	0.006J	0.0004	<0.00002	0.00002
5/2/11	INFLUENT	0.033	0.0004	0.00039	0.000009
5/2/11	EFFLUENT	0.0062J	0.0004	<0.000009	0.000009
5/9/11	INFLUENT	0.084	0.0004	0.000074	0.000009
5/9/11	EFFLUENT	0.01J	0.0022	<0.000009	0.000009

TABLE 5: WEEKLY CHROMIUM IN FBR INFLUENT AND EFFLUENT

Nevada Environmental Response Trust Site
Henderson, Nevada

SAMPLE DATE	INFLUENT/ EFFLUENT	TOTAL CHROMIUM mg/L ML/EPA 200.7	TOTAL CHROMIUM SQL mg/L	HEXAVALENT CHROMIUM mg/L EPA 218.6	HEXAVALENT CHROMIUM SQL mg/L
5/16/11	INFLUENT	0.28	0.0004	<0.000009	0.000009
5/16/11	EFFLUENT	0.01J	0.0009	<0.000009	0.000009
5/23/11	INFLUENT	0.066	0.0004	0.0037	0.000009
5/23/11	EFFLUENT	0.027	0.0004	<0.000009	0.000009
5/31/11	INFLUENT	0.027	0.0004	0.0043	0.000009
5/31/11	EFFLUENT	0.0054J	0.0004	<0.000009	0.000009
6/6/11	INFLUENT	0.079	0.0004	0.072	0.000009
6/6/11	EFFLUENT	0.007J	0.0004	<0.000009	0.000009
6/13/11	INFLUENT	0.017	0.0004	0.0032	0.000009
6/13/11	EFFLUENT	0.0073J	0.0004	<0.000009	0.000009
06/20/2011	INFLUENT	0.035	0.0004	0.0077	0.000009
06/20/2011	EFFLUENT	0.007J	0.0004	<0.000009	0.000009
06/27/2011	INFLUENT	0.04	0.0004	0.0041	0.000009
06/27/2011	EFFLUENT	0.0062J	0.0004	<0.000009	0.000009

Notes:
FBR = Fluidized Bed Reactor
J = Estimated Concentration
SQL = Sample Quantitation Limit

TABLE 6: PERCHLORATE REMOVED FROM THE ENVIRONMENT
Nevada Environmental Response Trust Site
Henderson, Nevada

DATE	SEEP WELLS AND SEEP (lbs/day)	ATHENS RD WELL FIELD (lbs/day)	INTERCEPTOR WELL FIELD (lbs/day)	TOTAL (lbs/day)	TOTAL TONS REMOVED (per month)
OCT 2002*	495	331	1402	2228	34.5
NOV 2002	422	1001	1146	2569	38.5
DEC 2002	208	1164	1292	2664	41.3
JAN 2003	335	1074	1467	2876	44.6
FEB 2003	570	783	1060	2413	33.8
MAR 2003**	485	806	1067	2358	36.5
APR 2003	713	713	1033	2460	36.9
MAY 2003	703	729	1148	2581	40.0
JUN 2003	686	907	1098	2691	40.4
JUL 2003	594	755	1034	2383	36.9
AUG 2003	452	741	999	2192	34.0
SEP 2003	417	770	937	2124	31.9
OCT 2003	370	769	1003	2142	33.2
NOV 2003	337	713	949	1999	30.0
DEC 2003	321	751	932	2005	31.1
JAN 2004	305	689	953	1947	30.2
FEB 2004	311	630	895	1836	26.6
MAR 2004	221	743	931	1895	29.4
APR 2004	151	733	849	1733	26.0
MAY 2004	126	765	904	1795	27.8
JUN 2004	157	754	994	1905	28.6
JUL 2004	195	757	968	1920	29.8
AUG 2004	201	805	914	1920	29.8
SEP 2004	169	835	981	1985	29.8
OCT 2004	262	799	1020	2081	32.3
NOV 2004	168	814	1032	2014	30.2
DEC 2004	122	816	1002	1940	30.1
JAN 2005	122	811	1008	1941	30.1
FEB 2005	157	859	991	2007	28.1
MAR 2005	158	781	980	1919	29.7
APR 2005	145	787	987	1919	28.8
MAY 2005	153	759	982	1894	29.4
JUN 2005***	150	794	985	1929	28.9
JUL 2005	154	770	1077	2001	31.0
AUG 2005	135	800	1109	2044	31.7
SEP 2005	84	821	1140	2045	30.7
OCT 2005	99	797	1077	1973	30.6
NOV 2005	111	773	1103	1987	29.8
DEC 2005	121	726	1141	1988	30.8
JAN 2006	141	750	999	1890	29.3
FEB 2006	136	752	993	1881	26.3
MAR 2006	107	736	983	1826	28.3
APR 2006	129	755	1027	1911	28.7
MAY 2006	131	712	960	1803	27.9
JUN 2006	135	753	887	1775	26.6
JUL 2006	123	647	935	1705	26.4
AUG 2006	141	652	932	1725	26.7
SEP 2006****	142	762	1062	1966	29.5

TABLE 6: PERCHLORATE REMOVED FROM THE ENVIRONMENT
Nevada Environmental Response Trust Site
Henderson, Nevada

DATE	SEEP WELLS AND SEEP (lbs/day)	ATHENS RD WELL FIELD (lbs/day)	INTERCEPTOR WELL FIELD (lbs/day)	TOTAL (lbs/day)	TOTAL TONS REMOVED (per month)
OCT 2006	134	778	1034	1946	30.2
NOV 2006	101	714	881	1696	25.4
DEC 2006	121	745	884	1750	27.1
JAN 2007	100	804	963	1867	28.9
FEB 2007	89	716	884	1689	23.6
MAR 2007	88	689	930	1707	26.5
APR 2007	89	689	911	1689	25.3
MAY 2007	102	699	904	1705	26.4
JUN 2007	91	642	846	1579	23.7
JUL 2007	67	659	927	1653	25.6
AUG 2007	55	632	853	1540	23.9
SEP 2007	53	631	856	1540	23.1
OCT 2007	53	686	854	1593	24.7
NOV 2007	55	674	775	1504	22.6
DEC 2007	60	656	820	1536	23.8
JAN 2008	58	633	888	1579	24.5
FEB 2008	61	633	844	1537	22.3
MAR 2008	60	666	879	1605	24.9
APR 2008	54	656	865	1575	23.6
MAY 2008	46	627	732	1405	21.8
JUN 2008	44	637	744	1418	21.3
JUL 2008	54	673	830	1557	24.1
AUG 2008	59	691	960	1710	26.5
SEP 2008	56	639	811	1506	22.6
OCT 2008	51	626	814	1491	23.1
NOV 2008	48	643	847	1538	23.1
DEC 2008	58	678	824	1560	24.2
JAN 2009	44	659	876	1579	24.5
FEB 2009	33	644	838	1515	21.2
MAR 2009	36	723	878	1637	25.4
APR 2009	32	685	846	1563	23.4
MAY 2009	35	655	849	1539	23.9
JUN 2009	36	591	868	1495	22.4
JUL 2009	40	571	846	1457	22.6
AUG 2009	43	652	873	1568	24.3
SEP 2009	48	671	942	1661	24.9
OCT 2009	44	625	860	1529	23.7
NOV 2009	47	613	908	1568	23.5
DEC 2009	49	635	872	1556	24.1
JAN 2010	55	671e	927	1653e	25.6e
FEB 2010	53	684e	867	1604e	22.5e
MAR 2010	49	635e	961	1644e	25.5e
APR 2010	50	631	941	1622	24.3
MAY 2010	53	758	1001	1812	28.1
JUN 2010	53	733	957	1743	26.1
JUL 2010	46	652	851	1549	24.0
AUG 2010	44	658	858	1560	24.2
SEP 2010	42	723	846	1611	24.2

TABLE 6: PERCHLORATE REMOVED FROM THE ENVIRONMENT
Nevada Environmental Response Trust Site
Henderson, Nevada

DATE	SEEP WELLS AND SEEP (lbs/day)	ATHENS RD WELL FIELD (lbs/day)	INTERCEPTOR WELL FIELD (lbs/day)	TOTAL (lbs/day)	TOTAL TONS REMOVED (per month)
OCT 2010	50	634	806	1490	23.1
NOV 2010	50	635	799	1484	22.3
DEC 2010	42	636	718	1396	21.6
JAN 2011	32	598	747	1376	21.3
FEB 2011	40	588	720	1347	18.9
MAR 2011	43	634	745	1421	22.0
APR 2011	48	596	803	1447	21.7
MAY 2011	57	632	746	1434	22.2
JUN 2011	46	639	782	1467	22.7

Notes:
* Athens Rd recovery wells begin full time operation on 10/22/02
** Five new Seep Area recovery wells began operation on 3/24/03
*** One new Seep Area recovery well began operation on 6/21/05
**** One new Athens Rd recovery well began full time operation on 9/8/06
e = estimate

TABLE 7: WEEKLY PERCHLORATE IN FBR INFLUENT AND EFFLUENT
Nevada Environmental Response Trust Site
Henderson, Nevada

SAMPLE DATE	SAMPLE TYPE	PERCHLORATE mg/L EPA 314	PERCHLORATE SQL mg/L
07/03/2010	INFLUENT-COMP	190	1.25
07/03/2010	EFFLUENT-COMP	<0.001	0.001
07/10/2010	INFLUENT-COMP	190	1.25
07/10/2010	EFFLUENT-COMP	<0.001	0.001
07/17/2010	INFLUENT-COMP	180	1.25
07/17/2010	EFFLUENT-COMP	<0.001	0.001
07/24/2010	INFLUENT-COMP	170	1.25
07/24/2010	EFFLUENT-COMP	<0.001	0.001
08/07/2010	INFLUENT-COMP	140	1.25
08/07/2010	EFFLUENT-COMP	<0.001	0.001
08/14/2010	INFLUENT-COMP	170	1.25
08/14/2010	EFFLUENT-COMP	<0.001	0.001
08/21/2010	INFLUENT-COMP	190	1.25
08/21/2010	EFFLUENT-COMP	<0.001	0.001
08/28/2010	INFLUENT-COMP	180	1.25
08/28/2010	EFFLUENT-COMP	<0.001	0.001
09/04/2010	INFLUENT-COMP	190	1.25
09/04/2010	EFFLUENT-COMP	<0.001	0.001
09/11/2010	INFLUENT-COMP	190	1.25
09/11/2010	EFFLUENT-COMP	<0.001	0.001
09/18/2010	INFLUENT-COMP	170	1.25
09/18/2010	EFFLUENT-COMP	<0.001	0.001
09/25/2010	INFLUENT-COMP	190	1.25
09/25/2010	EFFLUENT-COMP	<0.001	0.001
10/02/2010	INFLUENT-COMP	190	1.25
10/02/2010	EFFLUENT-COMP	<0.001	0.001
10/09/2010	INFLUENT-COMP	200	1.25
10/09/2010	EFFLUENT-COMP	<0.001	0.001
10/16/2010	INFLUENT-COMP	160	1.25
10/16/2010	EFFLUENT-COMP	<0.001	0.001
10/23/2010	INFLUENT-COMP	160	1.25
10/23/2010	EFFLUENT-COMP	<0.001	0.001
10/30/2010	INFLUENT-COMP	160	1.25
10/30/2010	EFFLUENT-COMP	<0.001	0.001
11/06/2010	INFLUENT-COMP	160	1.25
11/06/2010	EFFLUENT-COMP	<0.001	0.001
11/13/2010	INFLUENT-COMP	150	1.25
11/13/2010	EFFLUENT-COMP	<0.001	0.001
11/20/2010	INFLUENT-COMP	150	1.25
11/20/2010	EFFLUENT-COMP	<0.001	0.001
11/27/2010	INFLUENT-COMP	140	1.25
11/27/2010	EFFLUENT-COMP	<0.001	0.001
12/04/2010	INFLUENT-COMP	140	1.25
12/04/2010	EFFLUENT-COMP	<0.001	0.001
12/11/2010	INFLUENT-COMP	130	1.25

TABLE 7: WEEKLY PERCHLORATE IN FBR INFLUENT AND EFFLUENT
Nevada Environmental Response Trust Site
Henderson, Nevada

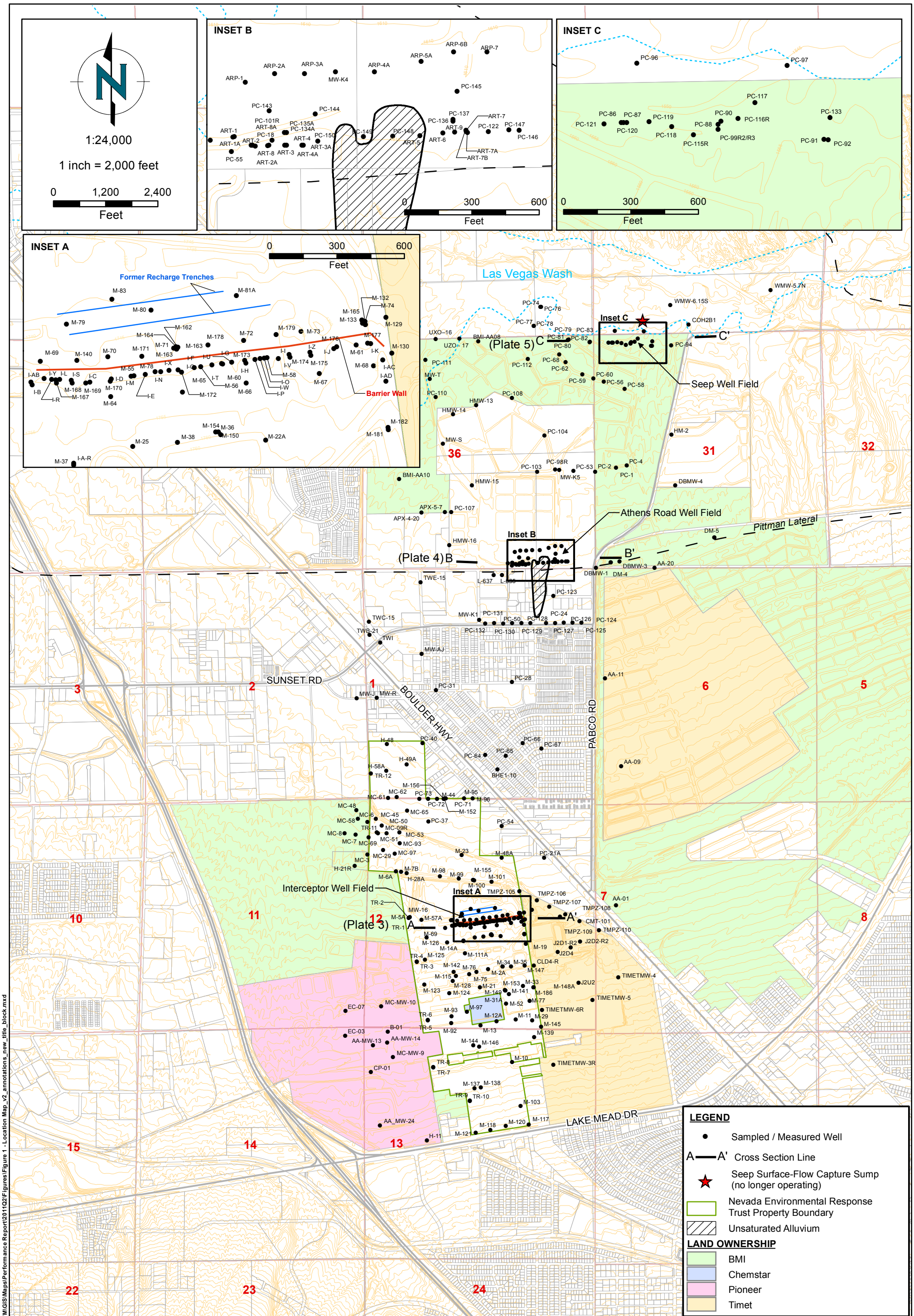
SAMPLE DATE	SAMPLE TYPE	PERCHLORATE mg/L EPA 314	PERCHLORATE SQL mg/L
12/11/2010	EFFLUENT-COMP	<0.001	0.001
12/18/2010	INFLUENT-COMP	120	1.25
12/18/2010	EFFLUENT-COMP	<0.001	0.001
12/25/2010	INFLUENT-COMP	130	1.25
12/25/2010	EFFLUENT-COMP	<0.001	0.001
01/01/2011	INFLUENT-COMP	170	1.25
01/01/2011	EFFLUENT-COMP	<0.001	0.001
01/08/2011	INFLUENT-COMP	170	1.25
01/08/2011	EFFLUENT-COMP	<0.001	0.001
01/15/2011	INFLUENT-COMP	180	1.25
01/15/2011	EFFLUENT-COMP	<0.001	0.001
01/22/2011	INFLUENT-COMP	170	1.25
01/22/2011	EFFLUENT-COMP	<0.001	0.001
01/29/2011	INFLUENT-COMP	160	1.25
01/29/2011	EFFLUENT-COMP	<0.001	0.001
02/05/2011	INFLUENT-COMP	130	1.25
02/05/2011	EFFLUENT-COMP	<0.001	0.001
02/12/2011	INFLUENT-COMP	150	1.25
02/12/2011	EFFLUENT-COMP	<0.001	0.001
02/19/2011	INFLUENT-COMP	140	1.25
02/19/2011	EFFLUENT-COMP	<0.001	0.001
02/26/2011	INFLUENT-COMP	140	1.25
02/26/2011	EFFLUENT-COMP	<0.001	0.001
03/05/2011	INFLUENT-COMP	140	1.25
03/05/2011	EFFLUENT-COMP	<0.001	0.001
03/12/2011	INFLUENT-COMP	150	2.5
03/12/2011	EFFLUENT-COMP	<0.0025	0.0025
03/19/2011	INFLUENT-COMP	140	2.5
03/19/2011	EFFLUENT-COMP	<0.0025	0.0025
03/26/2011	INFLUENT-COMP	140	2.5
03/26/2011	EFFLUENT-COMP	<0.0025	0.0025
04/02/2011	INFLUENT-COMP	140	2.5
04/02/2011	EFFLUENT-COMP	<0.0025	0.0025
04/09/2011	INFLUENT-COMP	140	1.25
04/09/2011	EFFLUENT-COMP	<0.0005	0.0005
04/16/2011	INFLUENT-COMP	130	1.25
04/16/2011	EFFLUENT-COMP	<0.0005	0.0005
04/23/2011	INFLUENT-COMP	160	1.25
04/23/2011	EFFLUENT-COMP	<0.0005	0.0005
04/30/2011	INFLUENT-COMP	170	1.25
04/30/2011	EFFLUENT-COMP	<0.0005	0.0005
05/07/2011	INFLUENT-COMP	160	1.25
05/07/2011	EFFLUENT-COMP	<0.0005	0.0005
05/14/2011	INFLUENT-COMP	150	1.25
05/14/2011	EFFLUENT-COMP	<0.0005	0.0005

TABLE 7: WEEKLY PERCHLORATE IN FBR INFLUENT AND EFFLUENT
Nevada Environmental Response Trust Site
Henderson, Nevada

SAMPLE DATE	SAMPLE TYPE	PERCHLORATE mg/L EPA 314	PERCHLORATE SQL mg/L
05/21/2011	INFLUENT-COMP	150	1.25
05/21/2011	EFFLUENT-COMP	<0.0005	0.0005
05/28/2011	INFLUENT-COMP	170	1.25
05/28/2011	EFFLUENT-COMP	<0.0005	0.0005
06/04/2011	INFLUENT-COMP	140	1.25
06/04/2011	EFFLUENT-COMP	<0.0005	0.0005
06/11/2011	INFLUENT-COMP	130	1.25
06/11/2011	EFFLUENT-COMP	<0.0005	0.0005
06/18/2011	INFLUENT-COMP	150	1.25
06/18/2011	EFFLUENT-COMP	<0.0005	0.0005
06/25/2011	INFLUENT-COMP	140	1.25
06/25/2011	EFFLUENT-COMP	<0.0005	0.0005

Notes:
Comp = Weekly Composite Sample
mg/L = milligrams per liter
FBR = Fluidized Bed Reactor
SQL = Sample Quantitation Limit

Figures



Path: H:\LePetomane\NERT\GWM\GIS\Maps\Performance Report\2011Q2\Figures\Figure 1 - Location Map_v2_annotations_new_title_block.mxd

Figure

1

Project No.: 21-26719F

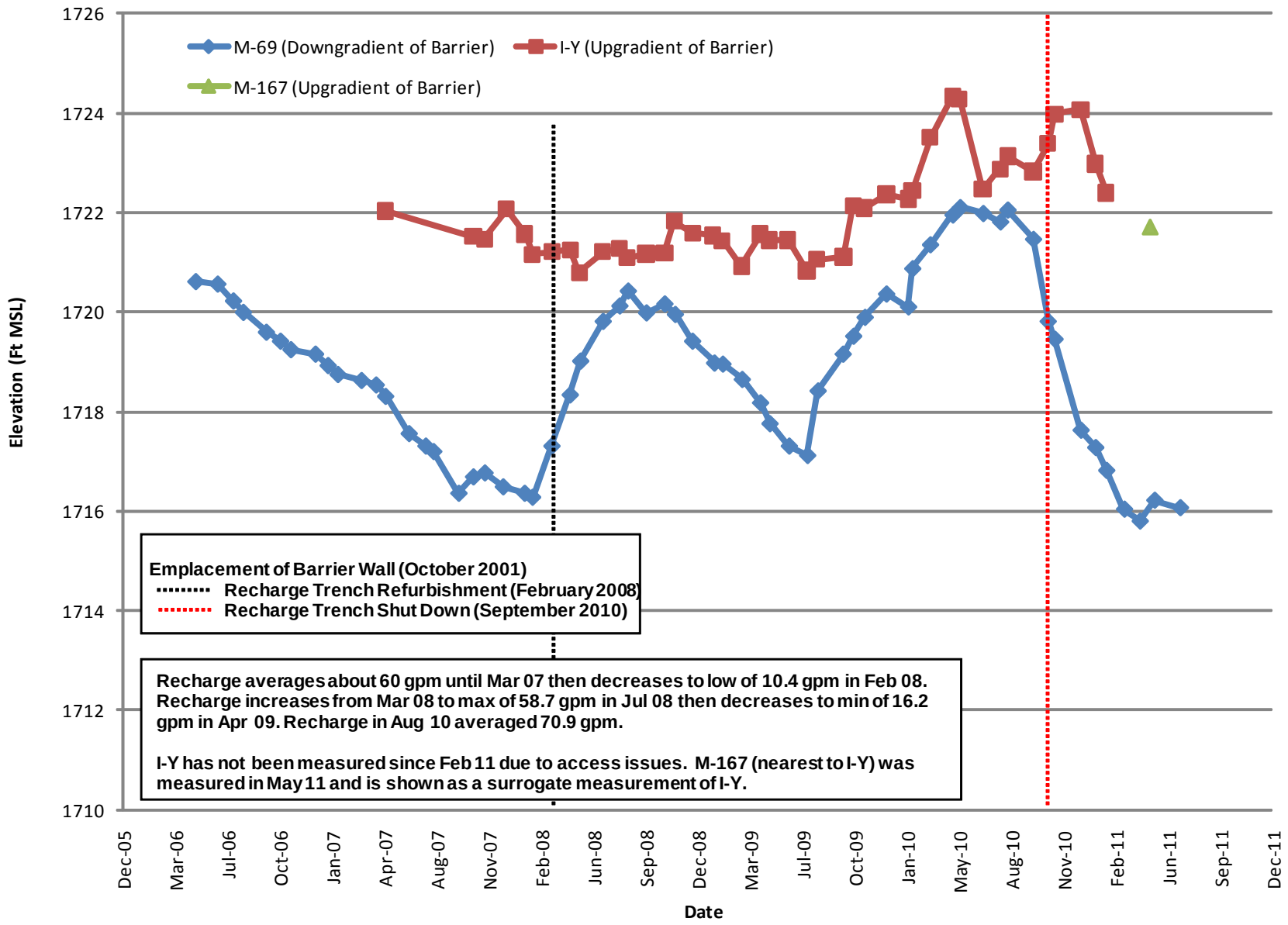
LOCATION MAP

Annual Performance Report
Nevada Environmental Response Trust Site
(NERT)
Henderson, Nevada

DESIGNED BY:	REVISIONS			
EJK	No.	DESCRIPTION:	DATE:	BY:
DRAWN BY:	0	GENERATE APPROVED MAP	8/26/2011	RS
RS				
CHECKED BY:				
CJR				
APPROVED BY:				
CJR/EJK				

ENVIRON

Q:\DRAWINGS\2126719F\2126719F-FIG-2A.dwg - Fri, 26 Aug 2011 - 4:20pm



ENVIRON

Hydrograph Pair Across the Barrier Wall - M-69 and I-Y

Nevada Environmental Response Trust Site (NERT)

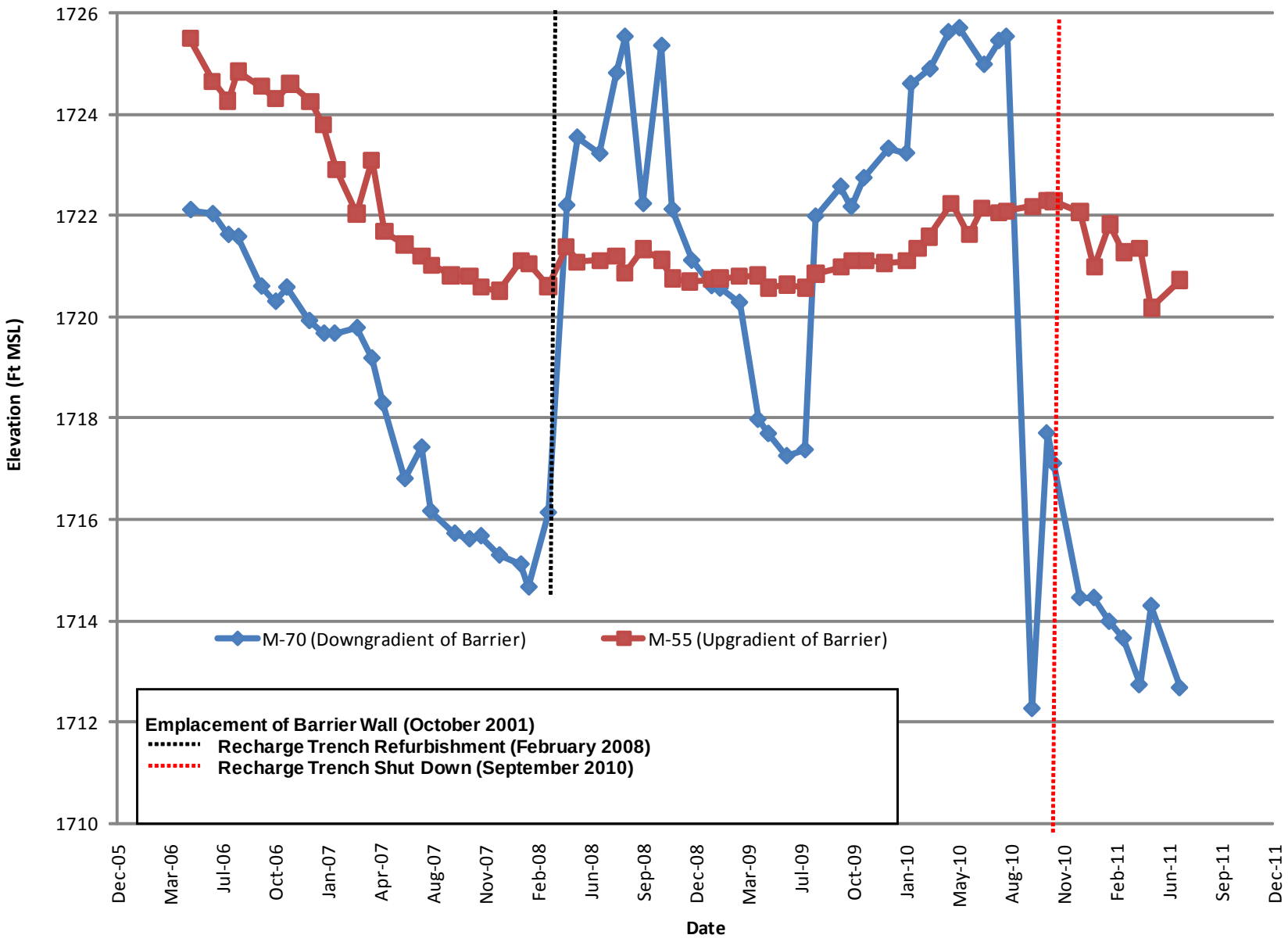
Henderson, Nevada

Figure

2A

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-2B.dwg - Fri, 26 Aug 2011 - 4:01pm



ENVIRON

Hydrograph Pair Across the Barrier Wall - M-70 and M-55

Nevada Environmental Response Trust Site (NERT)

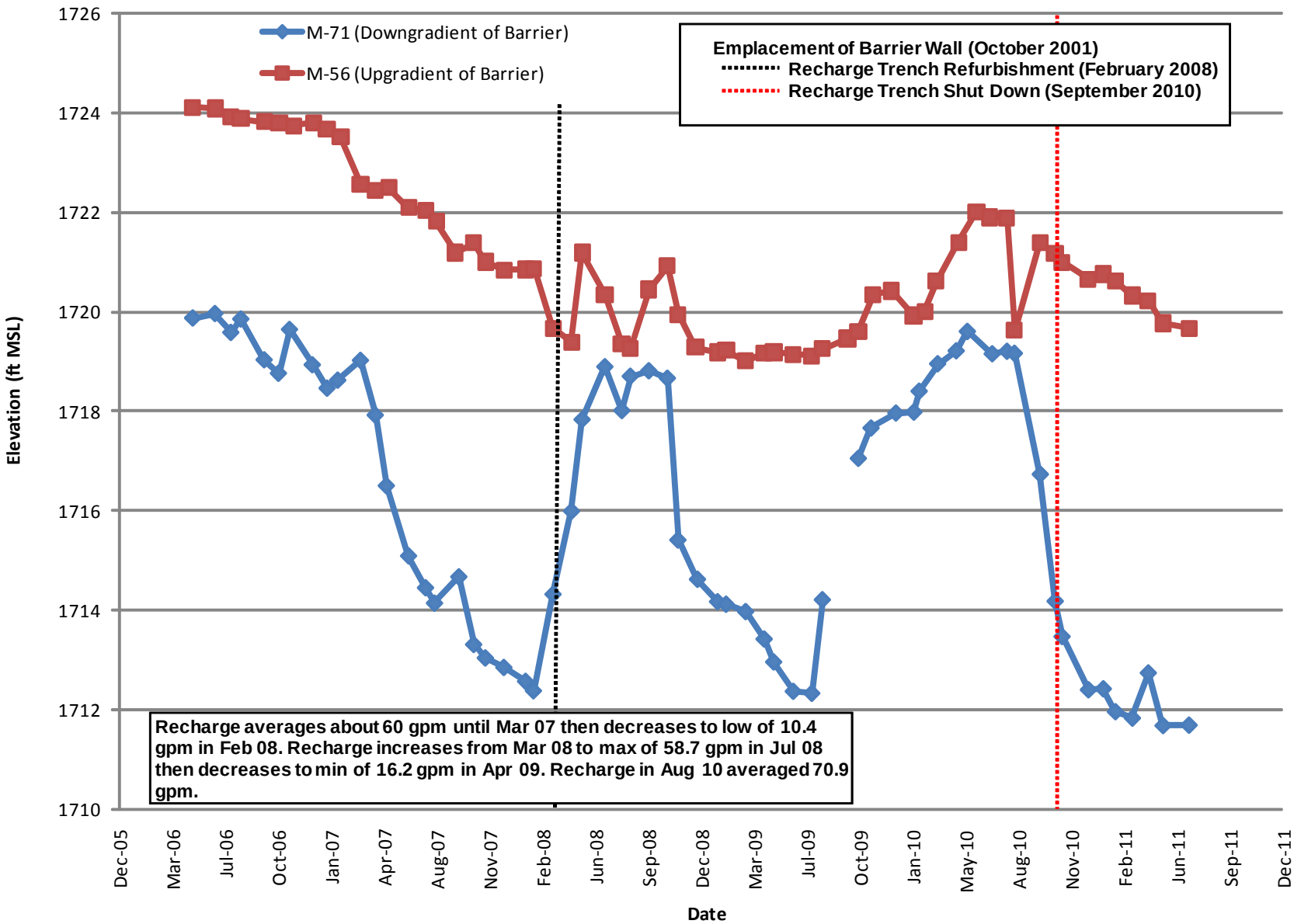
Henderson, Nevada

Figure

2B

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-2C.dwg - Fri, 26 Aug 2011 - 4:08pm



ENVIRON

Hydrograph Pair Across the Barrier Wall - M-71 and M-56

Nevada Environmental Response Trust Site (NERT)

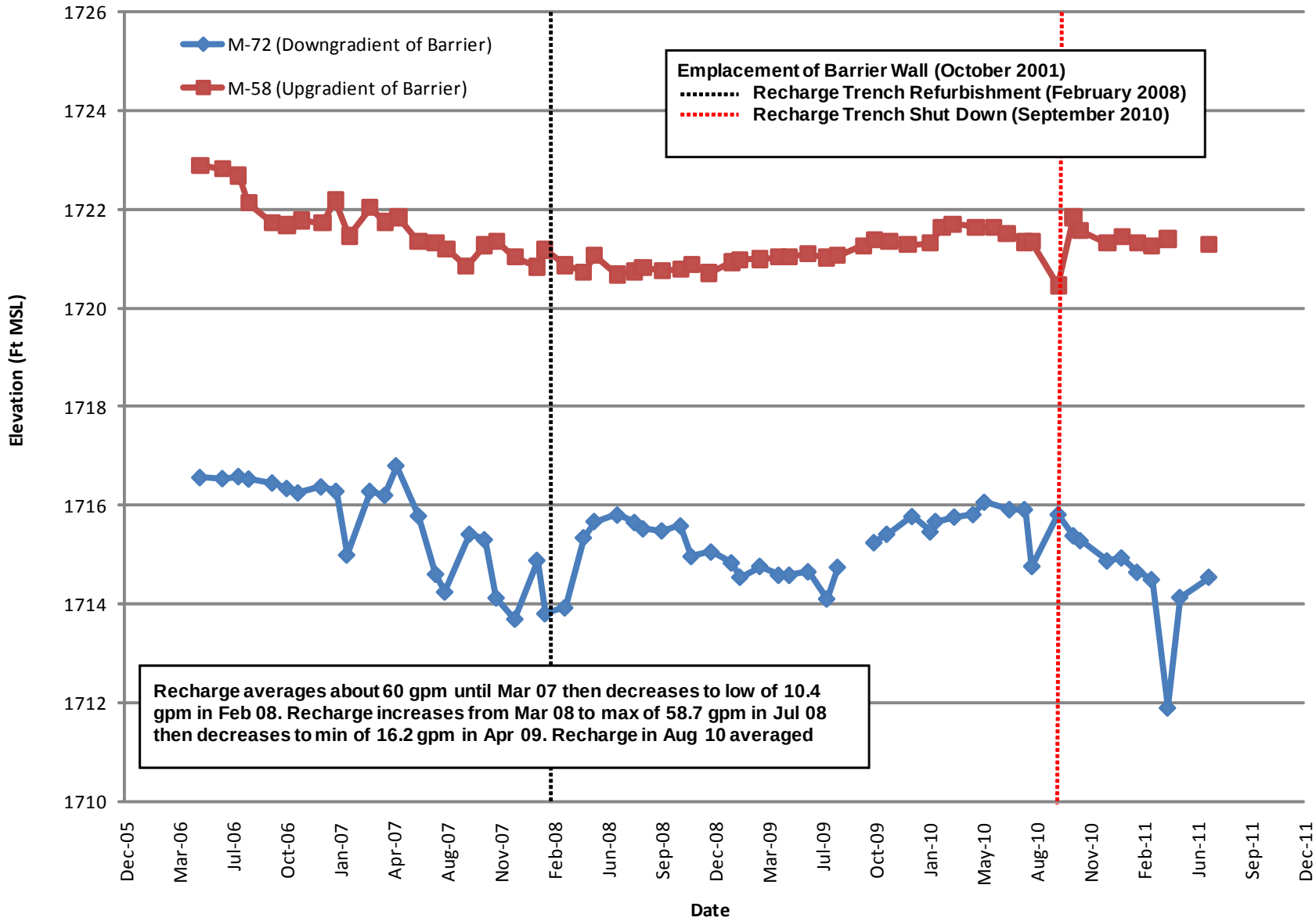
Henderson, Nevada

Figure

2C

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-2D.dwg - Fri, 26 Aug 2011 - 4:02pm



ENVIRON

Hydrograph Pair Across the Barrier Wall - M-72 and M-58

Nevada Environmental Response Trust Site (NERT)

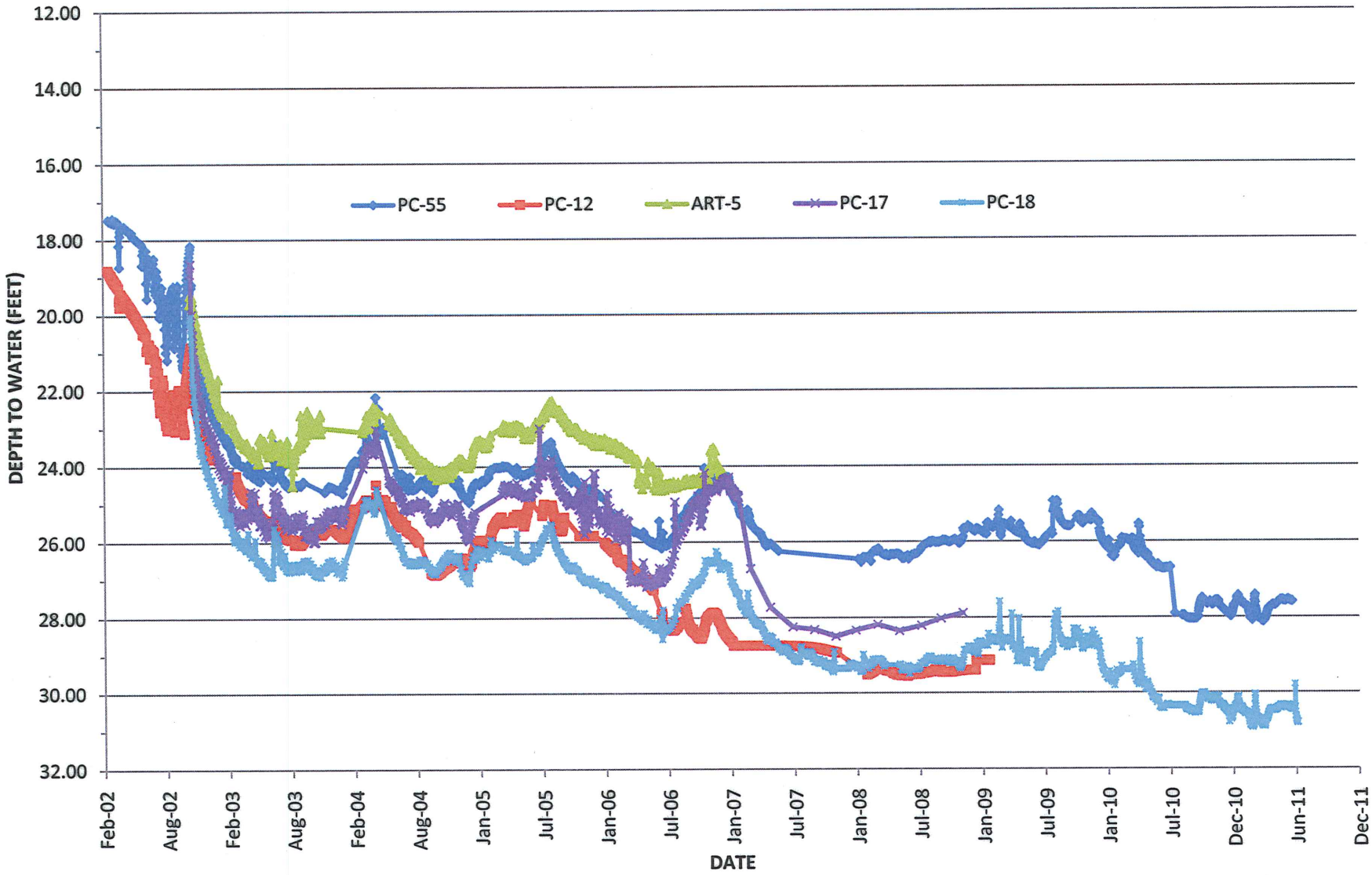
Henderson, Nevada

Figure

2D

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-3.dwg – Fri, 26 Aug 2011 – 4:22pm

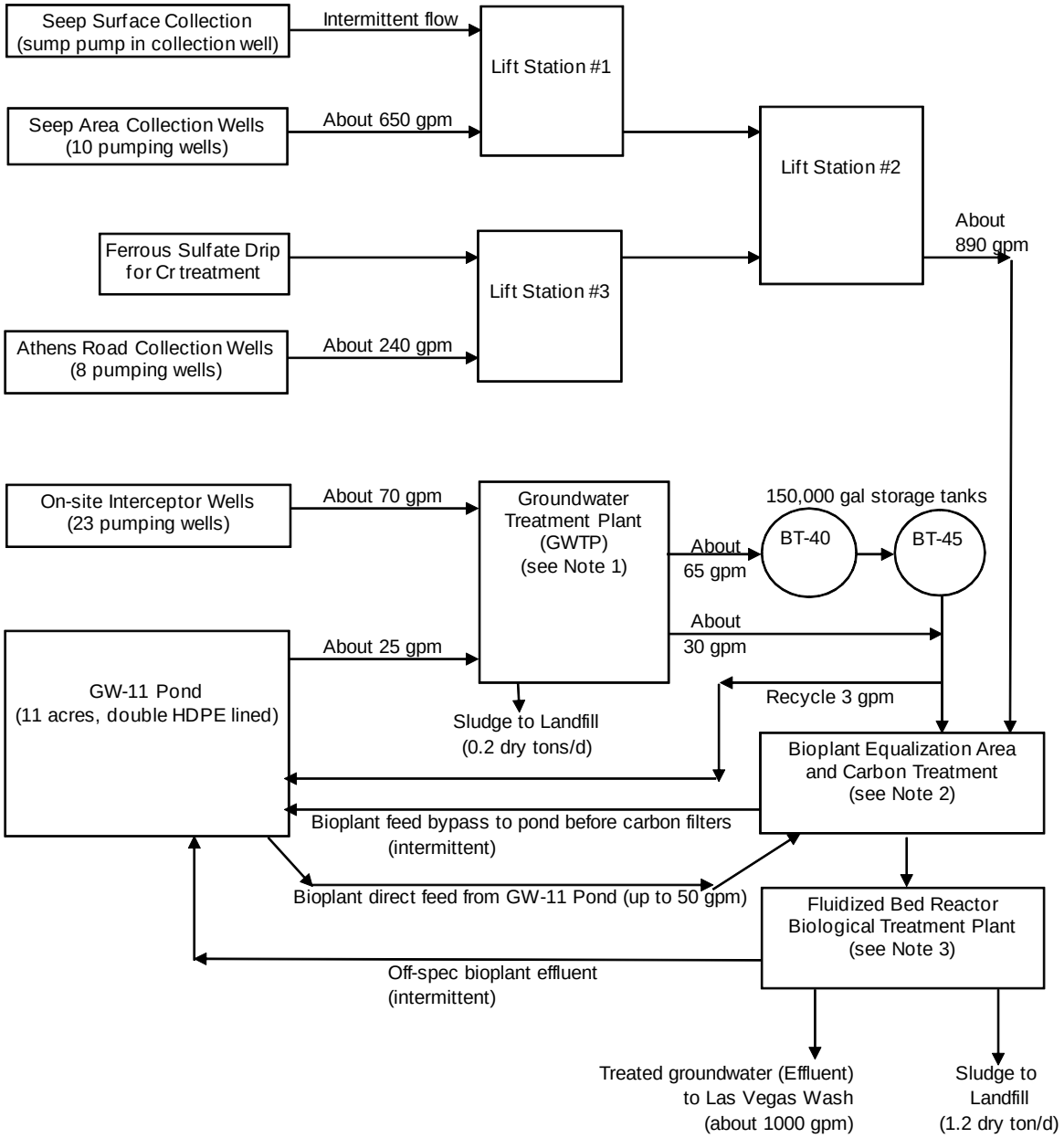


ENVIRON

Athens Road Well Field Drawdown
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
3

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:



Notes:

1) Ferrous sulfate added for chromium removal. Clarifier settles solids. Sludge is removed and landfilled.
2) Two 12,000 gallon tanks plus three activated carbon vessels to remove organics which could harm bacteria, followed by cartridge filters.
3) Five 33,000 gallon primary reactors, four 28,800 gallon secondary reactors, aeration, dissolved air flotation, UV disinfection, two plate and frame filter presses, and a sand filter.
4) Bioplant feed is sampled after cartridge filters (note 2) and effluent is sampled at the discharge to Las Vegas Wash.

Q:\DRAWINGS\2126719F\2126719F-FIG-4.dwg - Fri, 26 Aug 2011 - 4:08pm

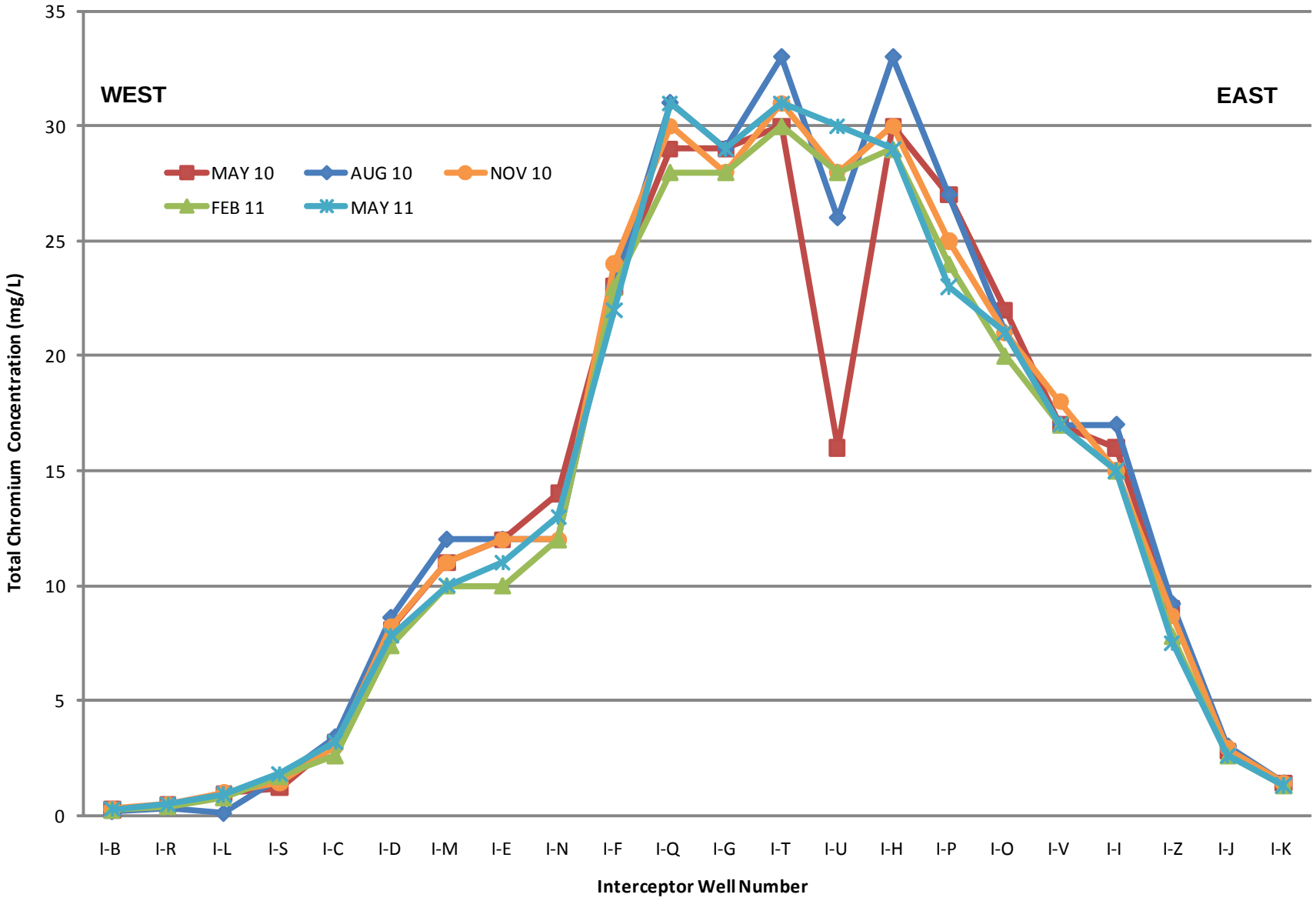
ENVIRON

Groundwater Extraction and Treatment System (GWETS) Flow Diagram
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
4

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-5.dwg – Fri, 26 Aug 2011 – 4:07pm



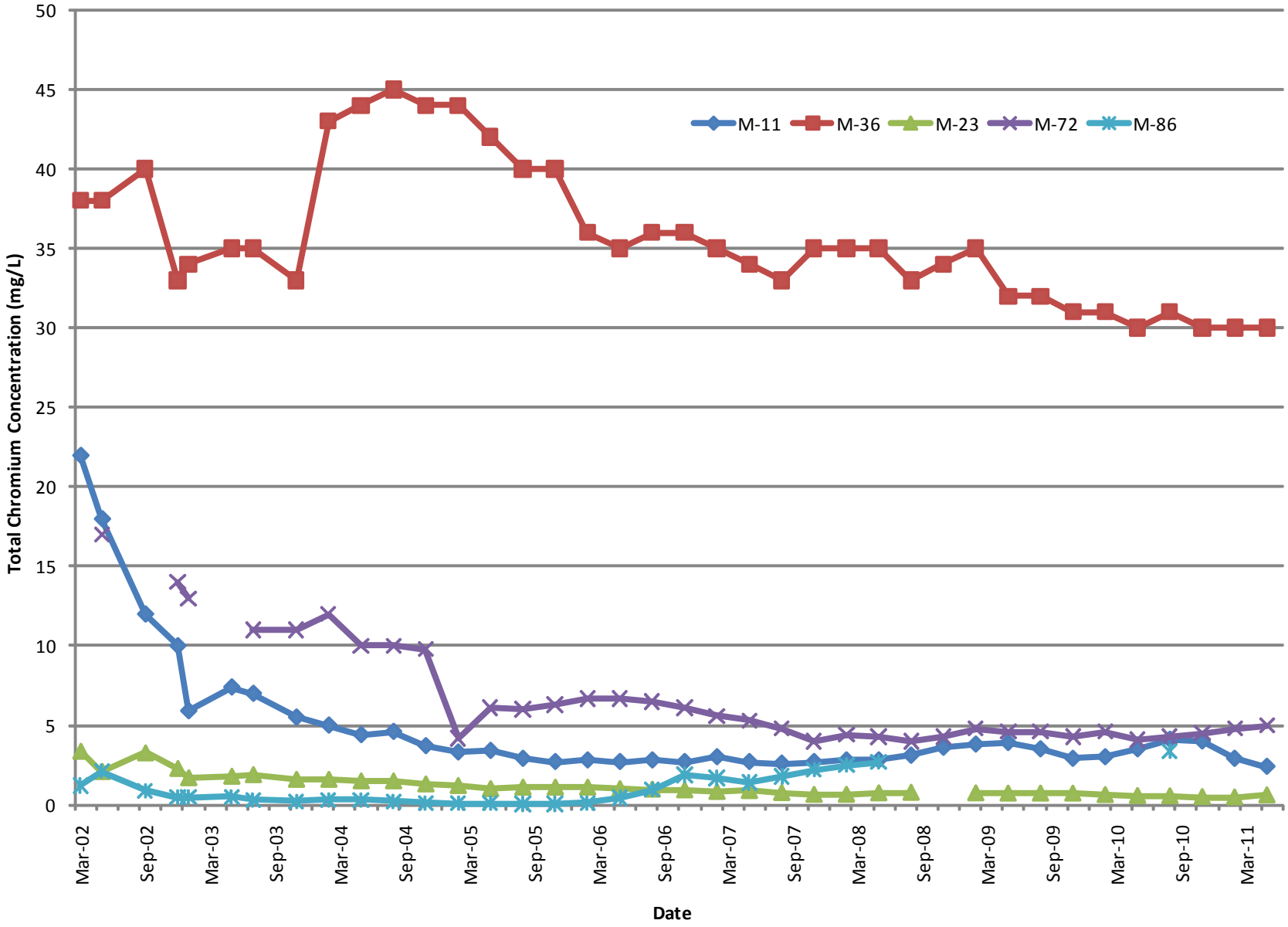
ENVIRON

Interceptor Well Field Total Chromium Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
5

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-6.dwg – Fri, 26 Aug 2011 – 4:07pm



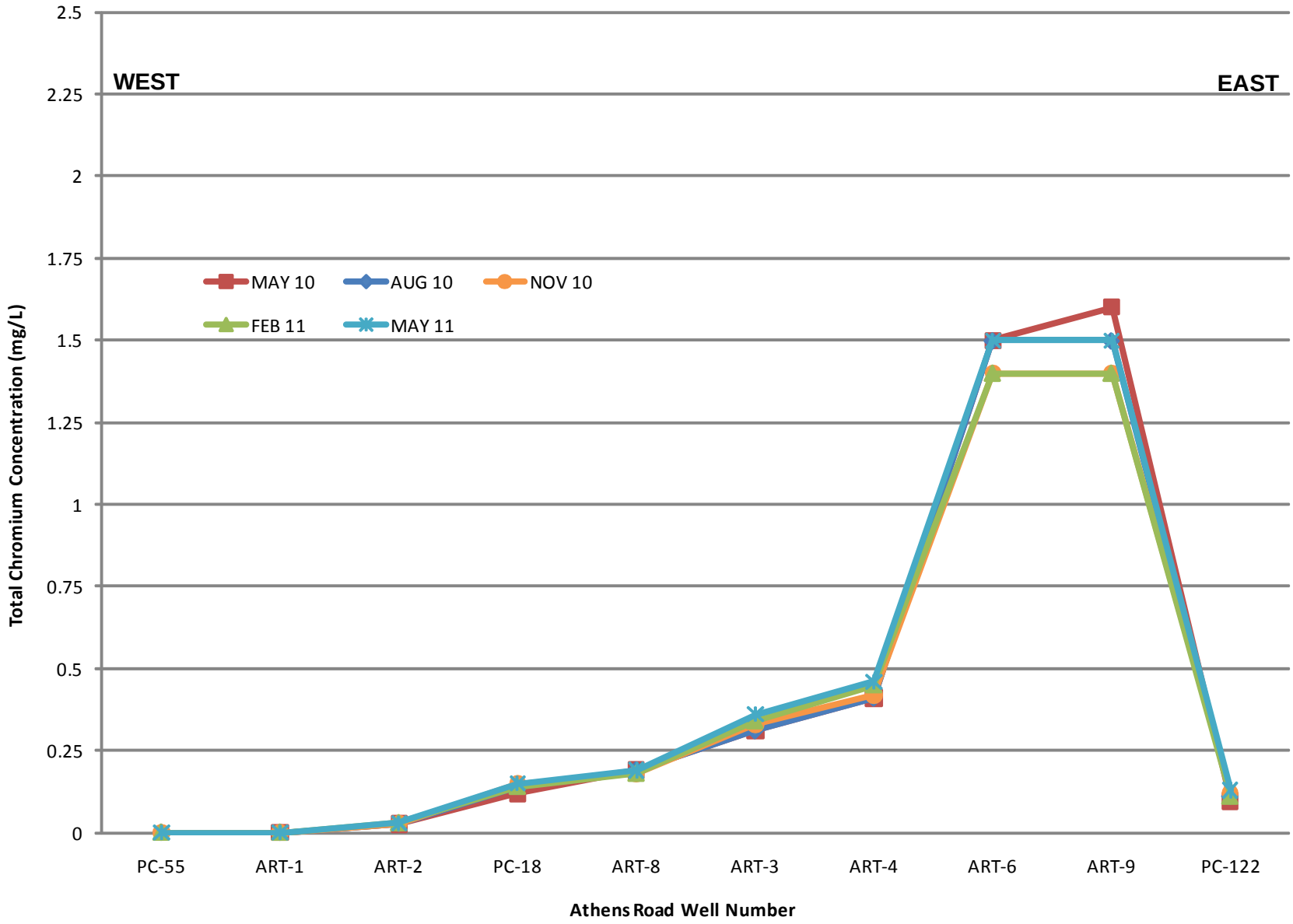
ENVIRON

Consent Order Appendix J Wells Total Chromium Concentration Trend Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
6

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-7.dwg - Fri, 26 Aug 2011 - 4:06pm



ENVIRON

Athens Road WF Total Chromium Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
7

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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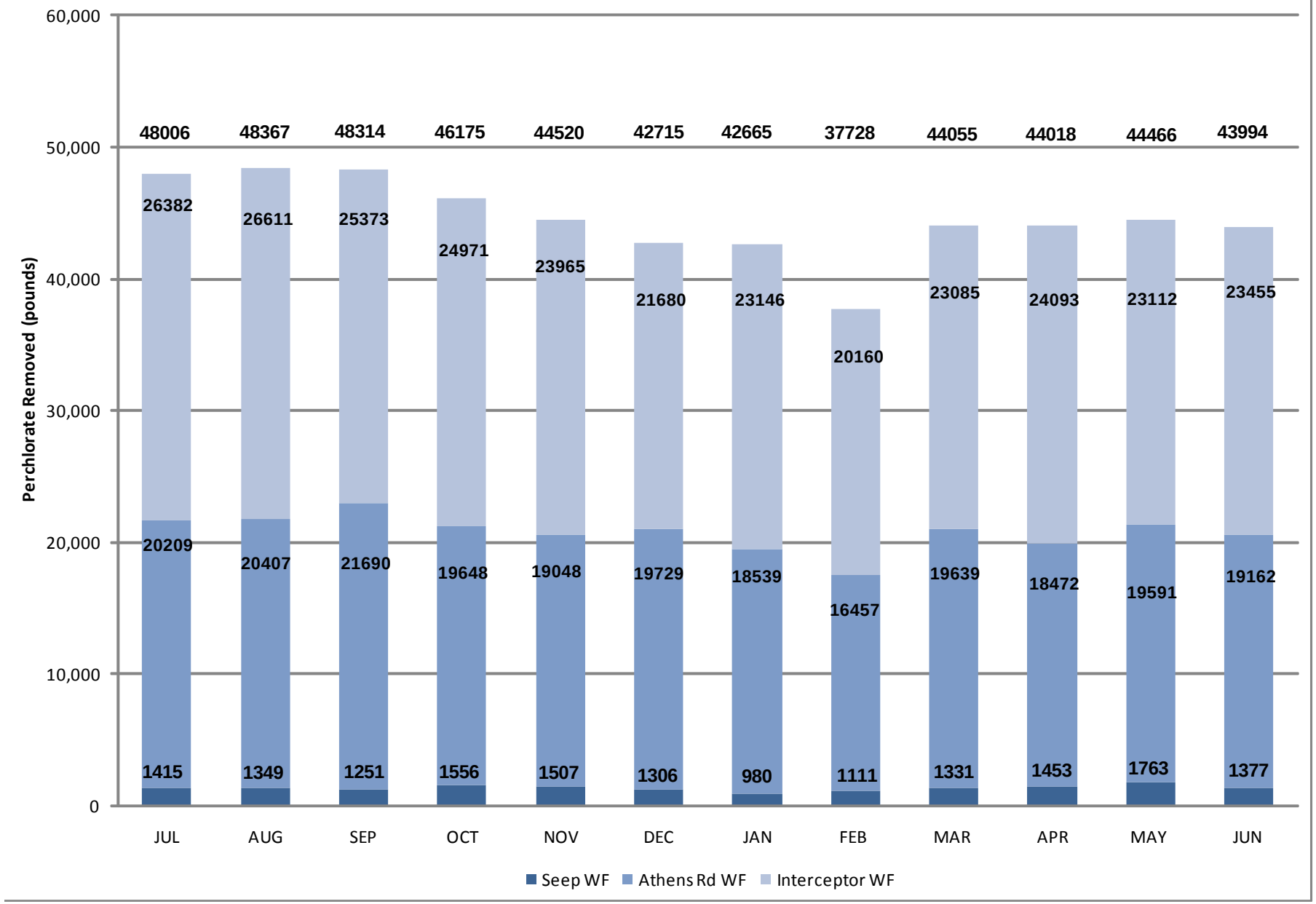


ENVIRON

Perchlorate Removed from the Environment July 2010 - June 2011

Nevada Environmental Response Trust Site (NERT)

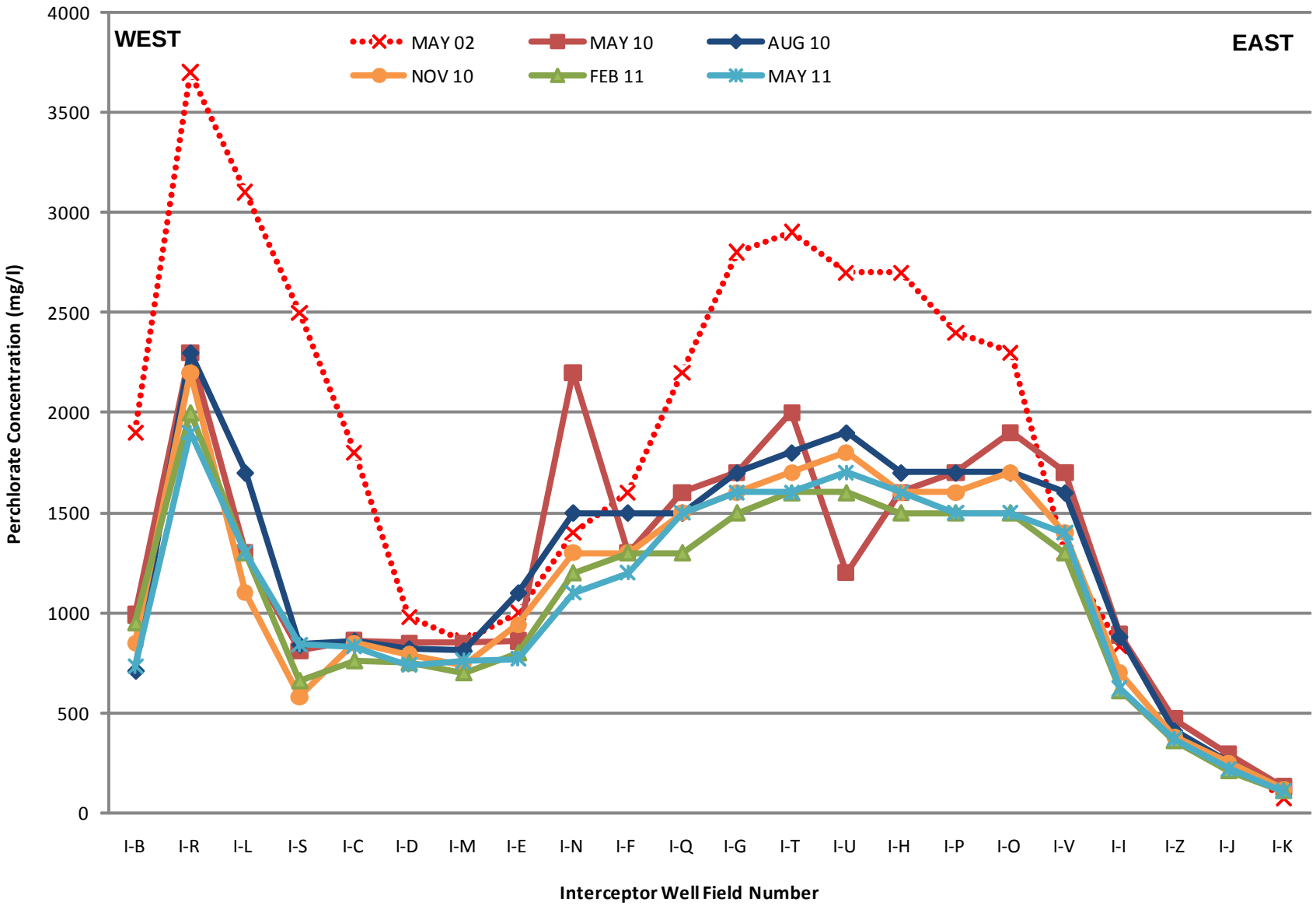
Henderson, Nevada

Figure

8

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-9.dwg - Fri, 26 Aug 2011 - 4:20pm



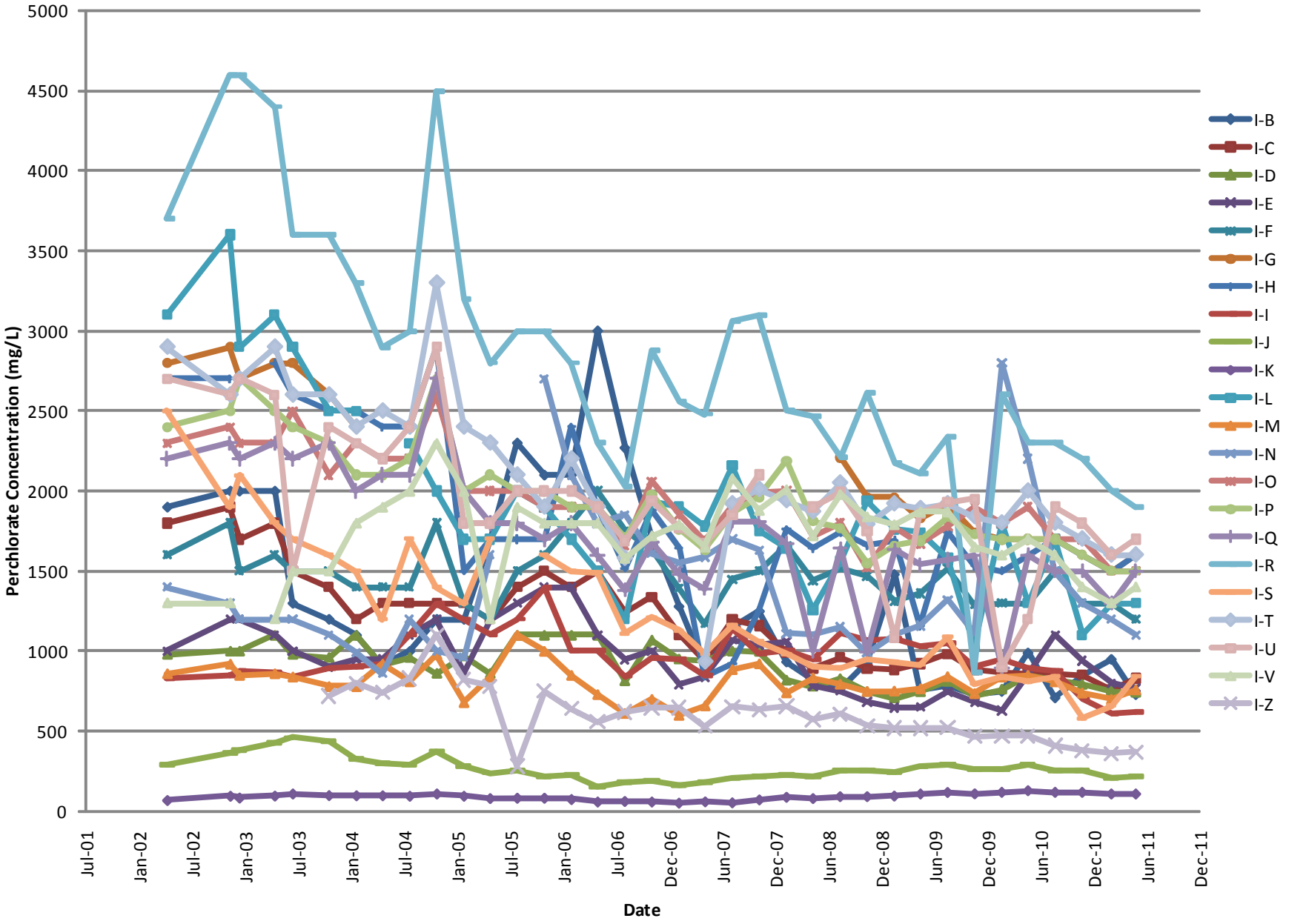
ENVIRON

Interceptor Well Field Perchlorate Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
9

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-10.dwg – Fri, 26 Aug 2011 – 4:30pm



ENVIRON

Interceptor Well Field Perchlorate Concentration Trend Graph

Nevada Environmental Response Trust Site (NERT)

Henderson, Nevada

Figure

10

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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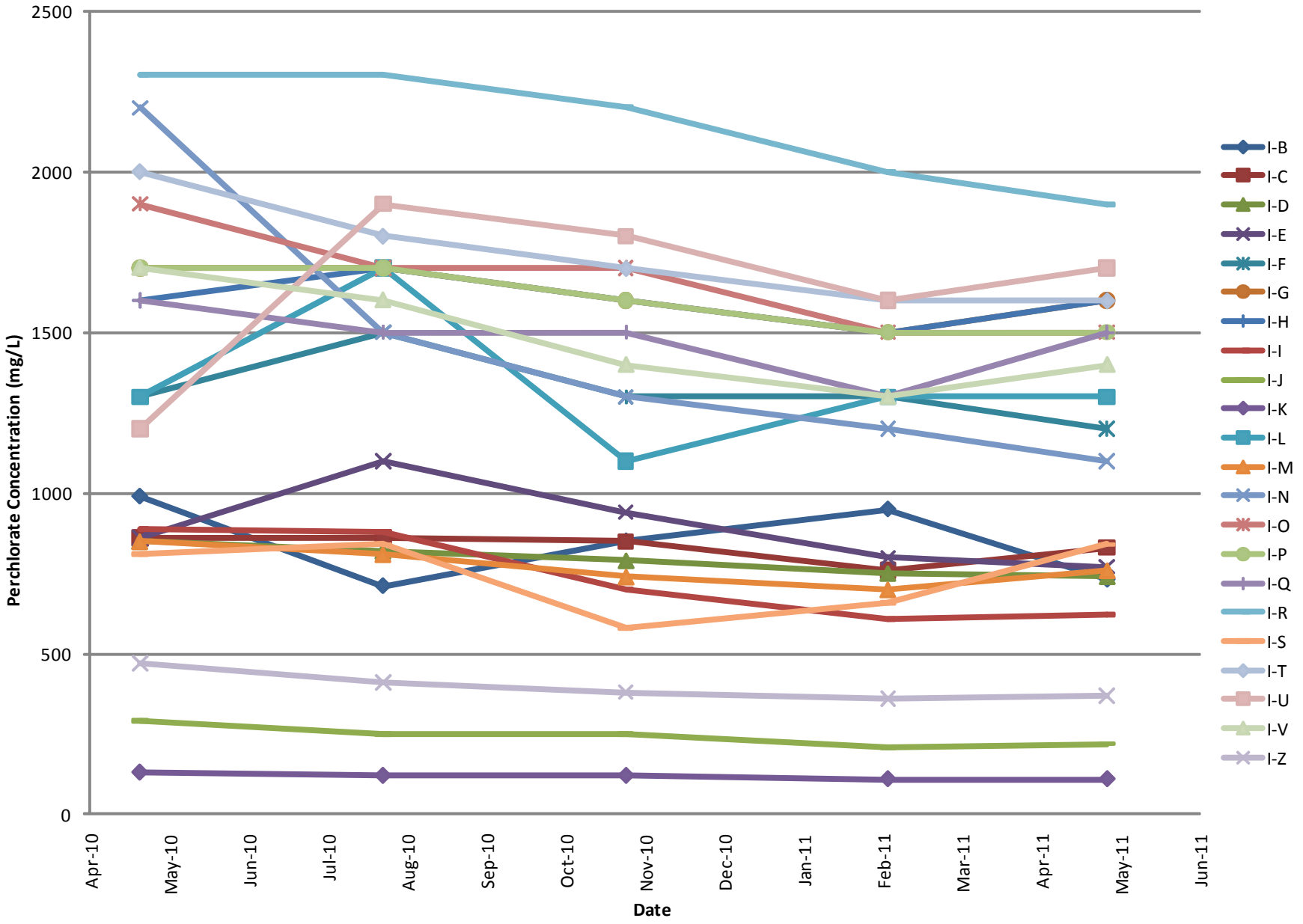

ENVIRON

Interceptor WF Perchlorate Concentration Trend Graph, May 2010 - May 2011
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
10A

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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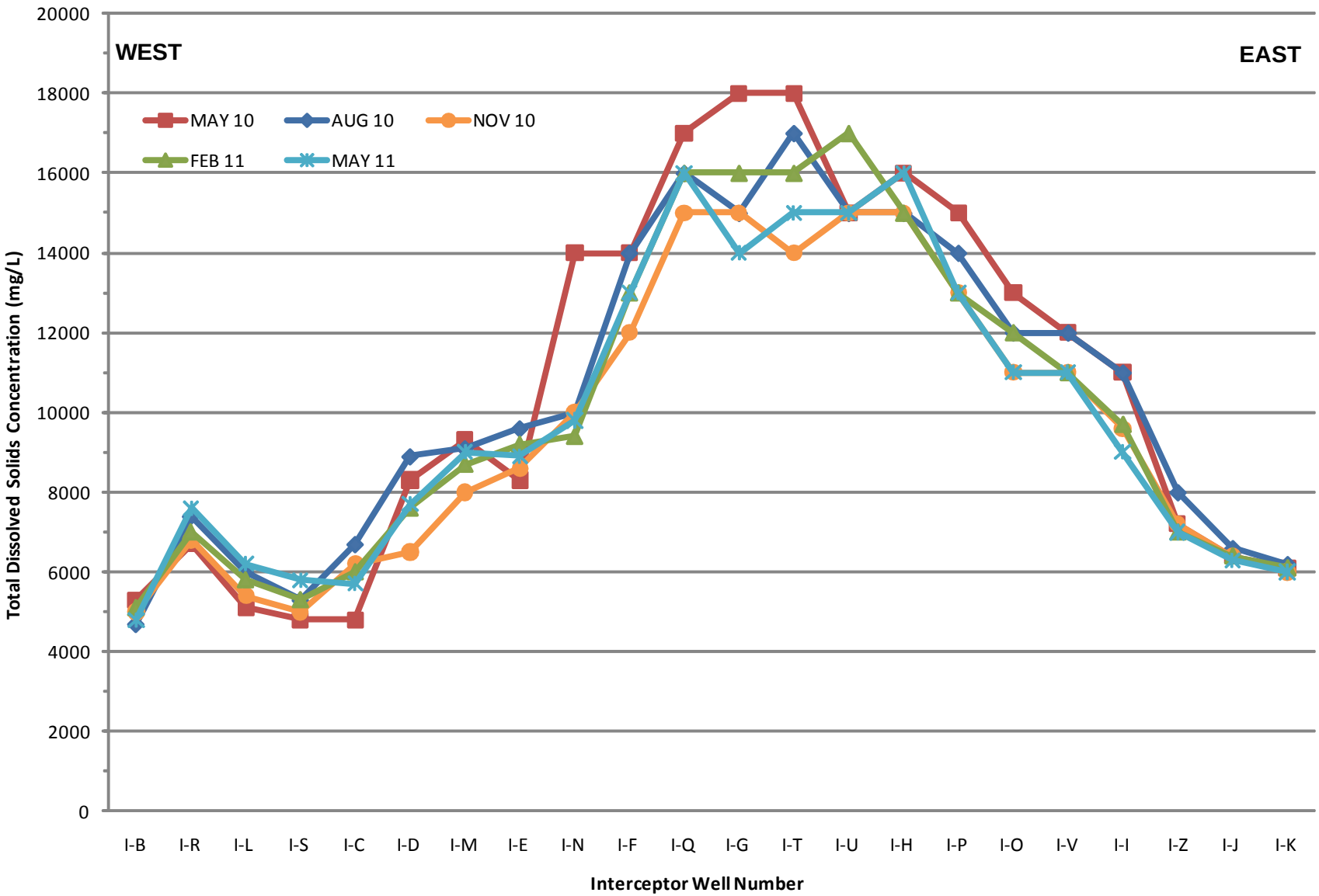

ENVIRON

Interceptor Well Field Total Dissolved Solids Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
11

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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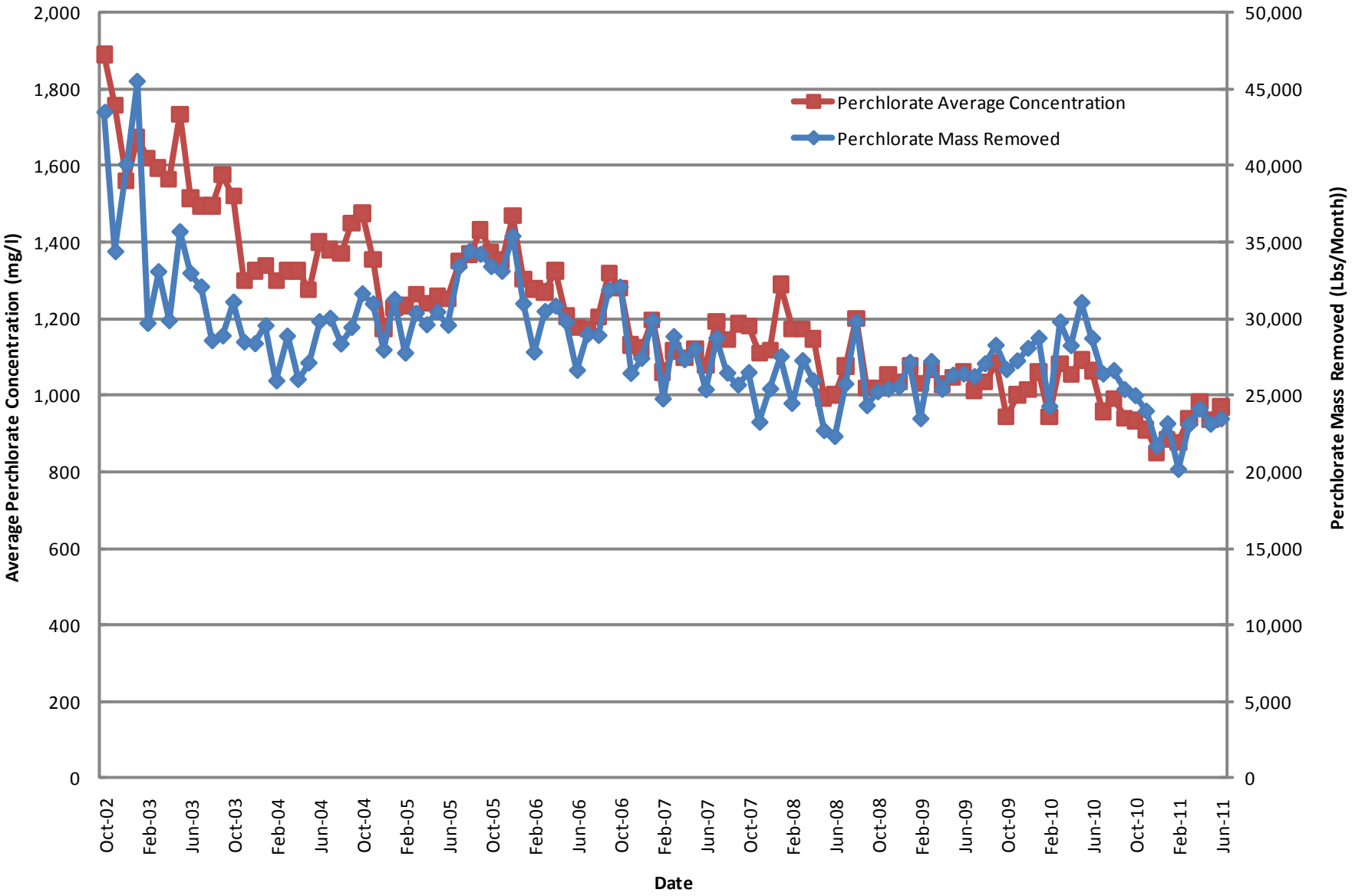

ENVIRON

Interceptor Well Field Average Perchlorate Concentration and Mass Removed
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
12

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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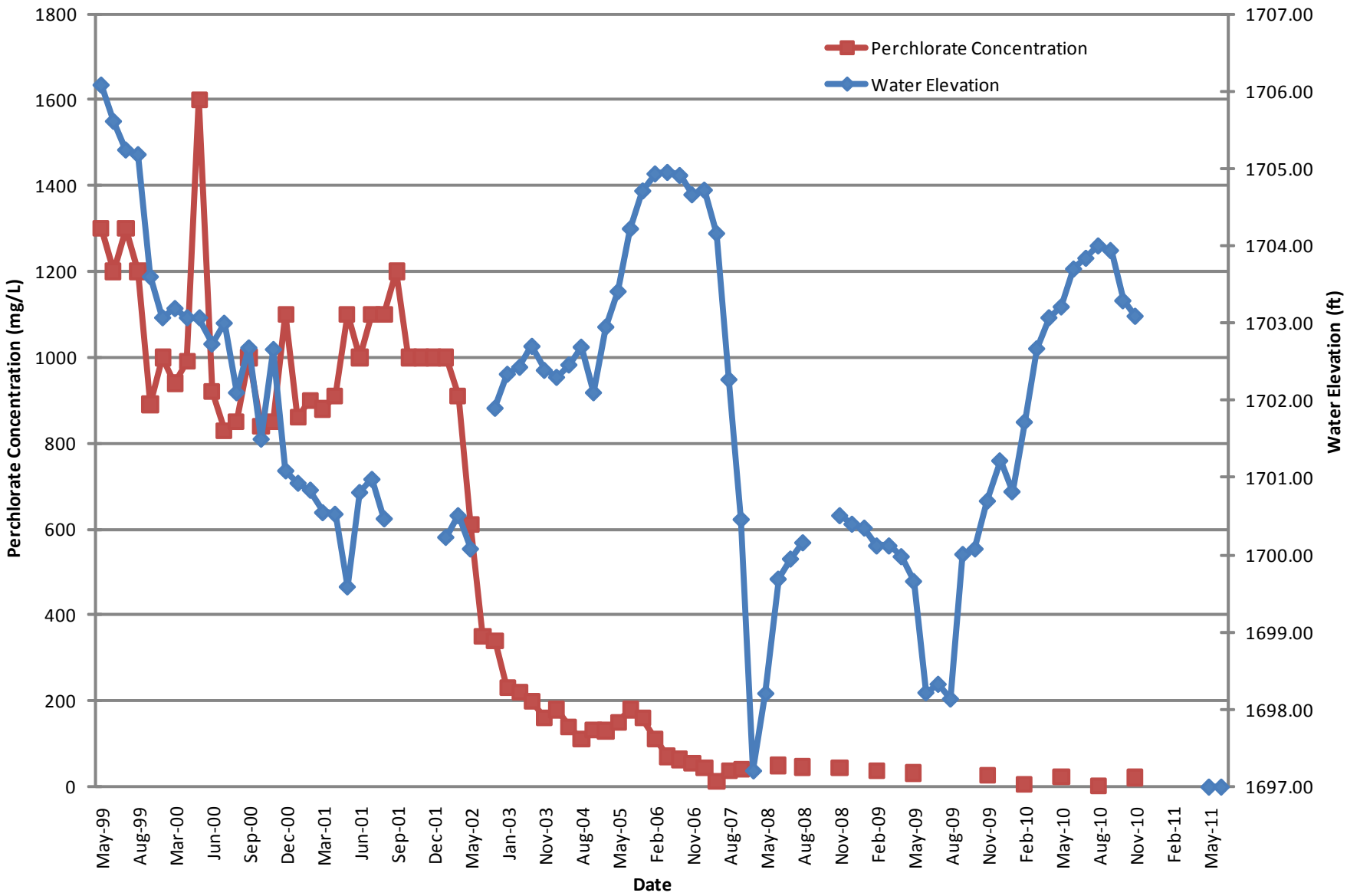


ENVIRON

Well M-100 Perchlorate Concentration vs. Water Elevation Trend Graph

Nevada Environmental Response Trust Site (NERT)

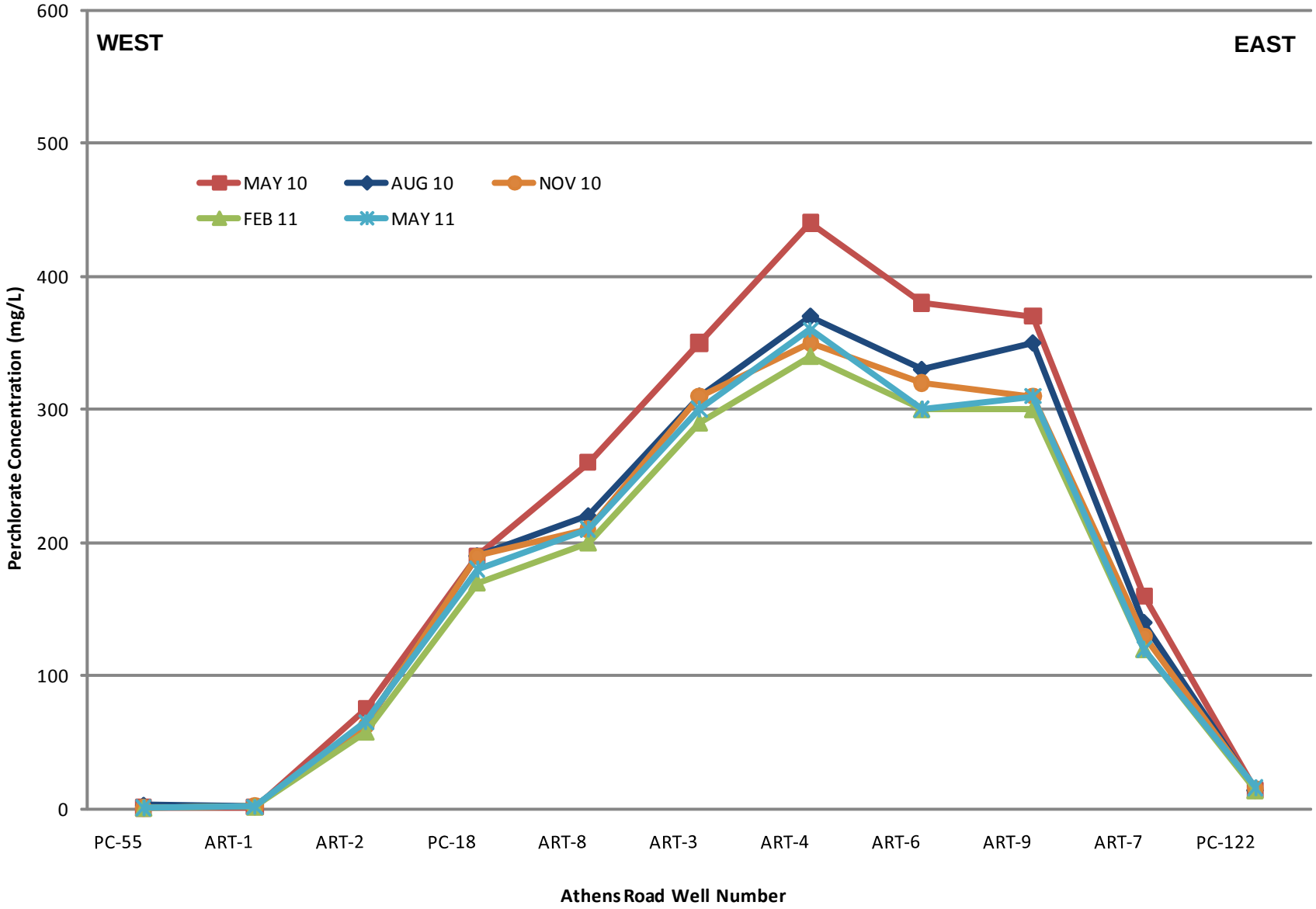
Henderson, Nevada

Figure

13

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-14.dwg - Fri, 26 Aug 2011 - 4:09pm



ENVIRON

Athens Road Well Field Perchlorate Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
14

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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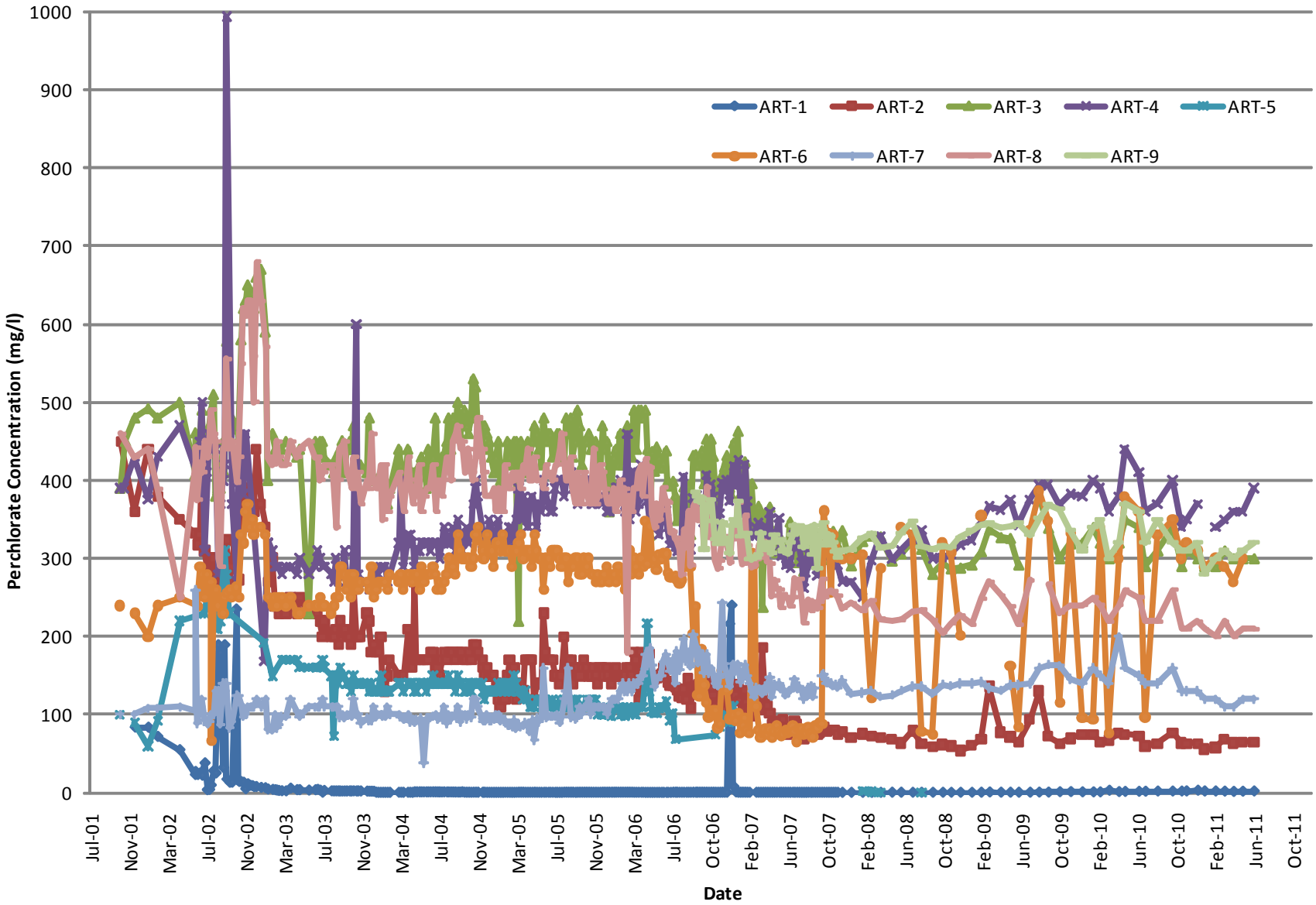

ENVIRON

Athens Road Well Field Perchlorate Concentration Trend Graph

Nevada Environmental Response Trust Site (NERT)

Henderson, Nevada

Figure

15

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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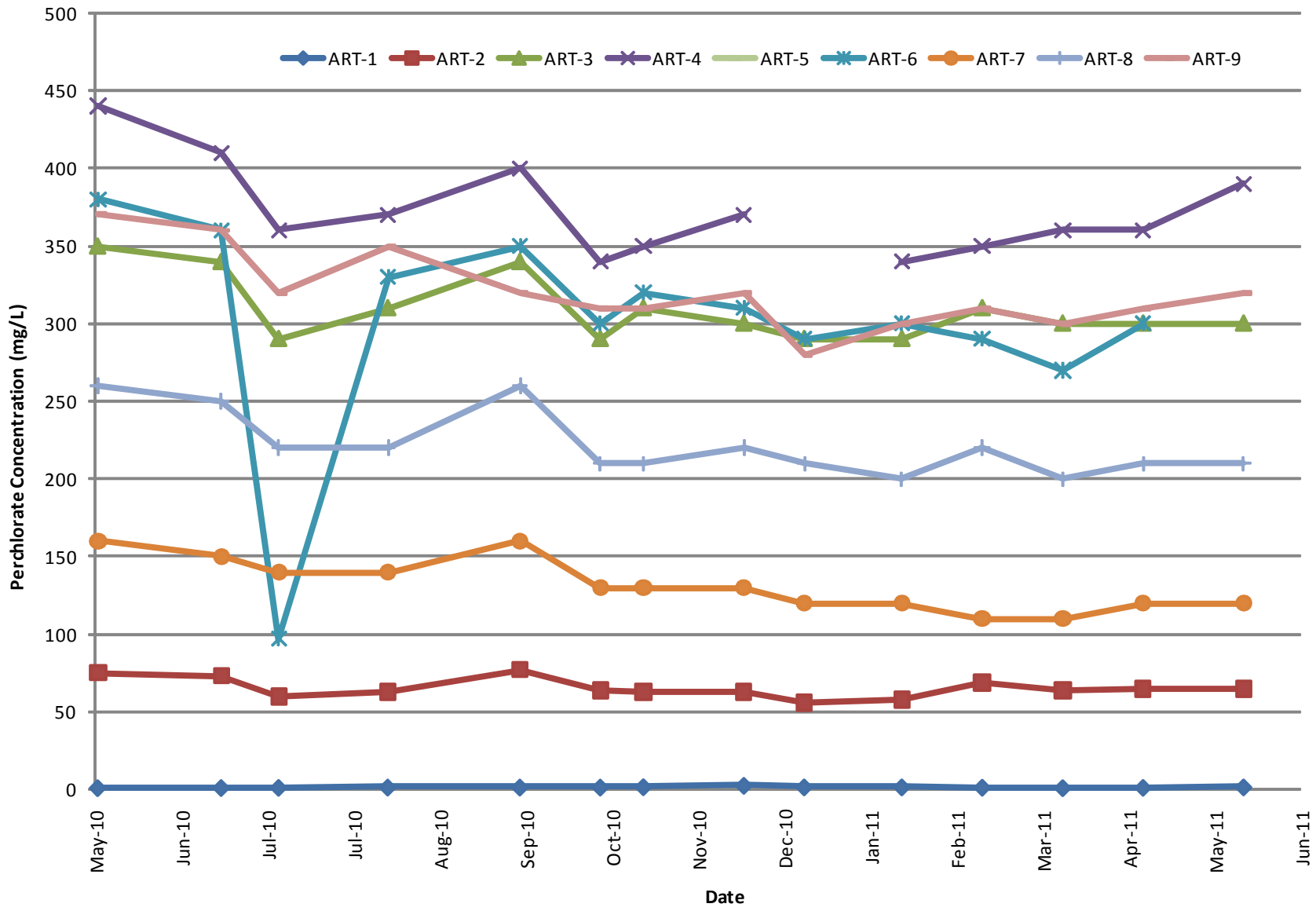


ENVIRON

Athens Road Perchlorate Concentration Trend Graph, May 2010 - June 2011

Nevada Environmental Response Trust Site (NERT)

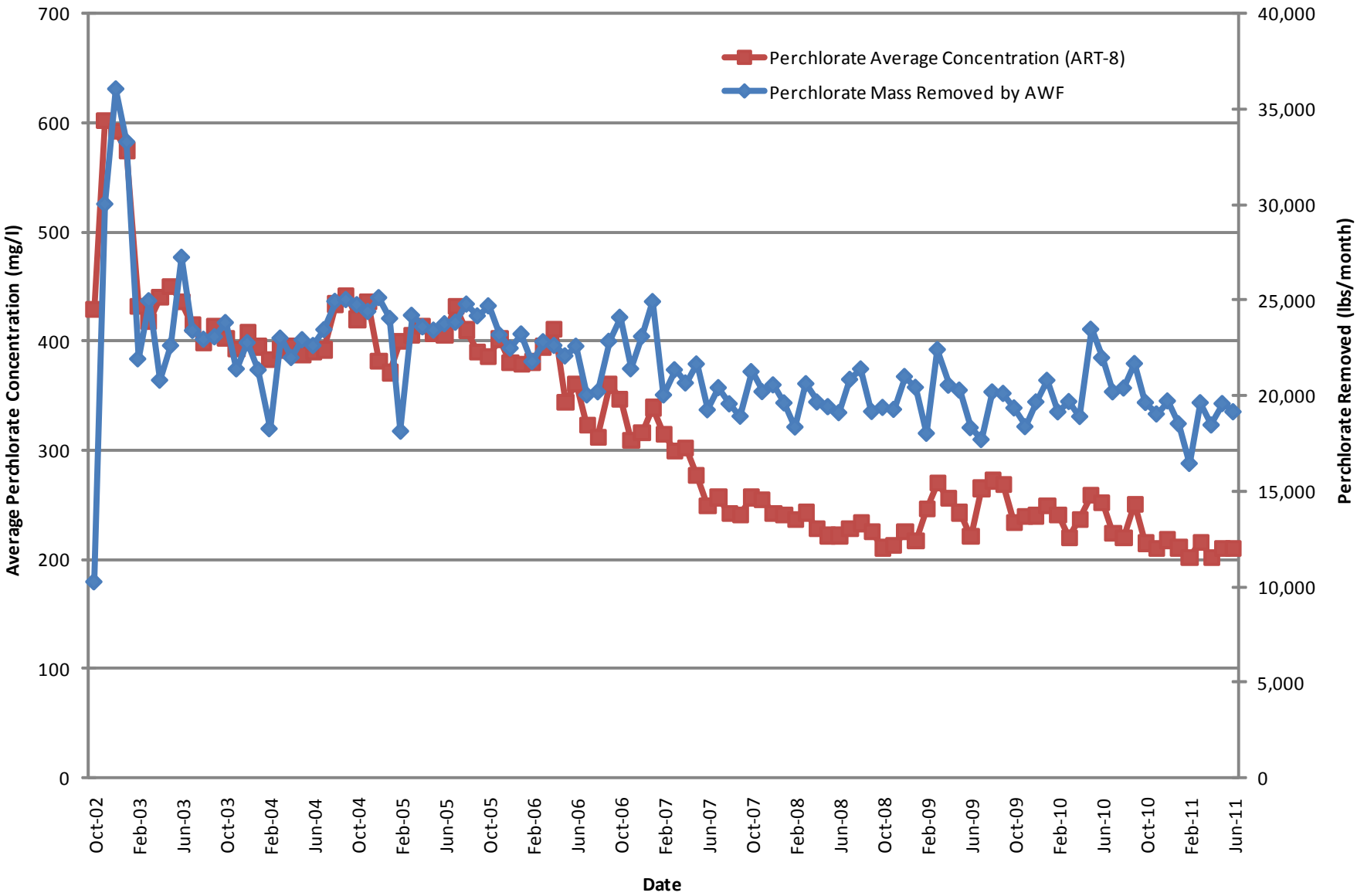
Henderson, Nevada

Figure

15A

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-16.dwg – Fri, 26 Aug 2011 – 4:10pm



ENVIRON

Athens Road Well Field Average Perchlorate Concentration in ART-8 and Mass Removed

Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure **16**

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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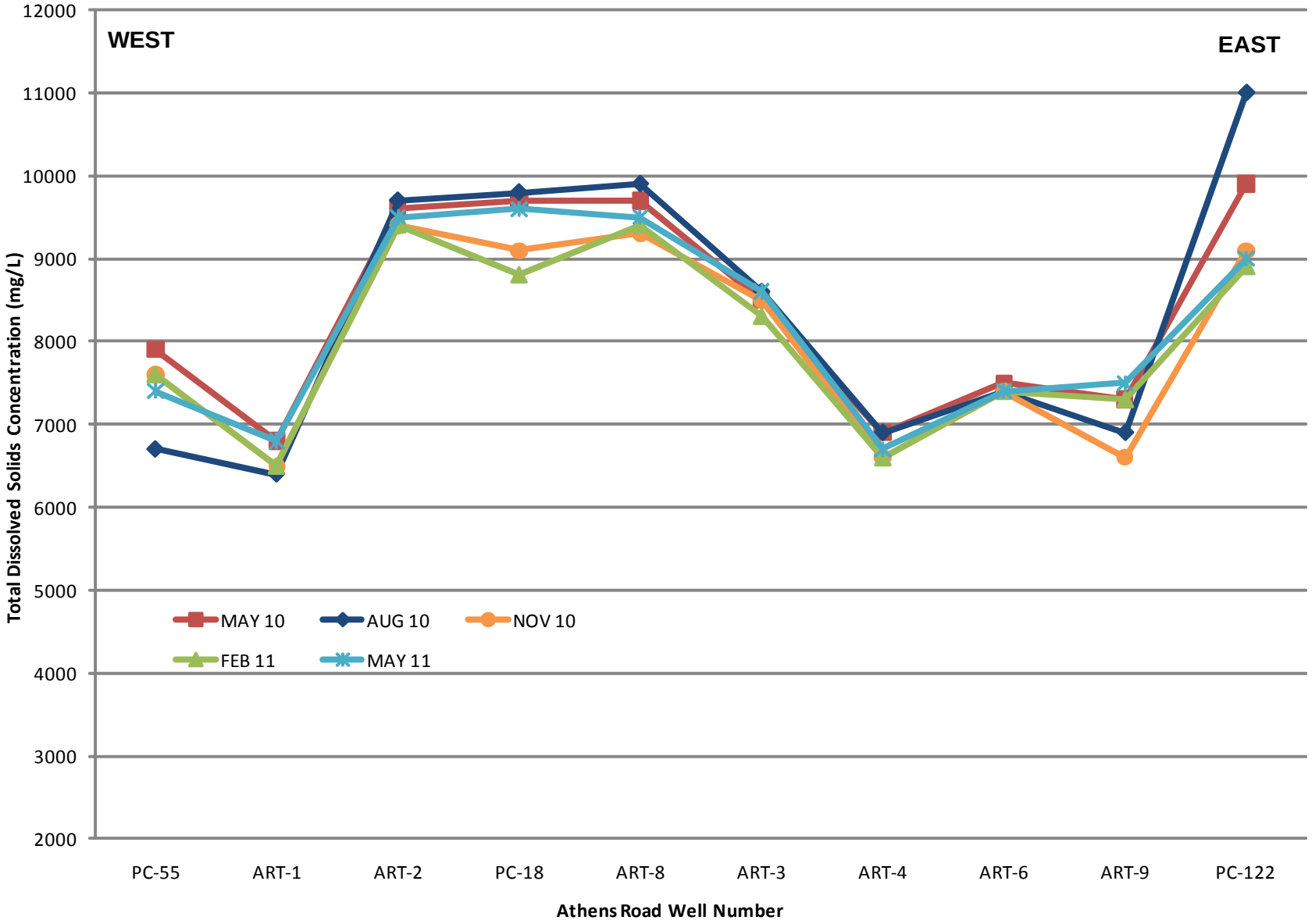

ENVIRON

Athens Road Well Field Total Dissolved Solids Concentration Section Graph

Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
17

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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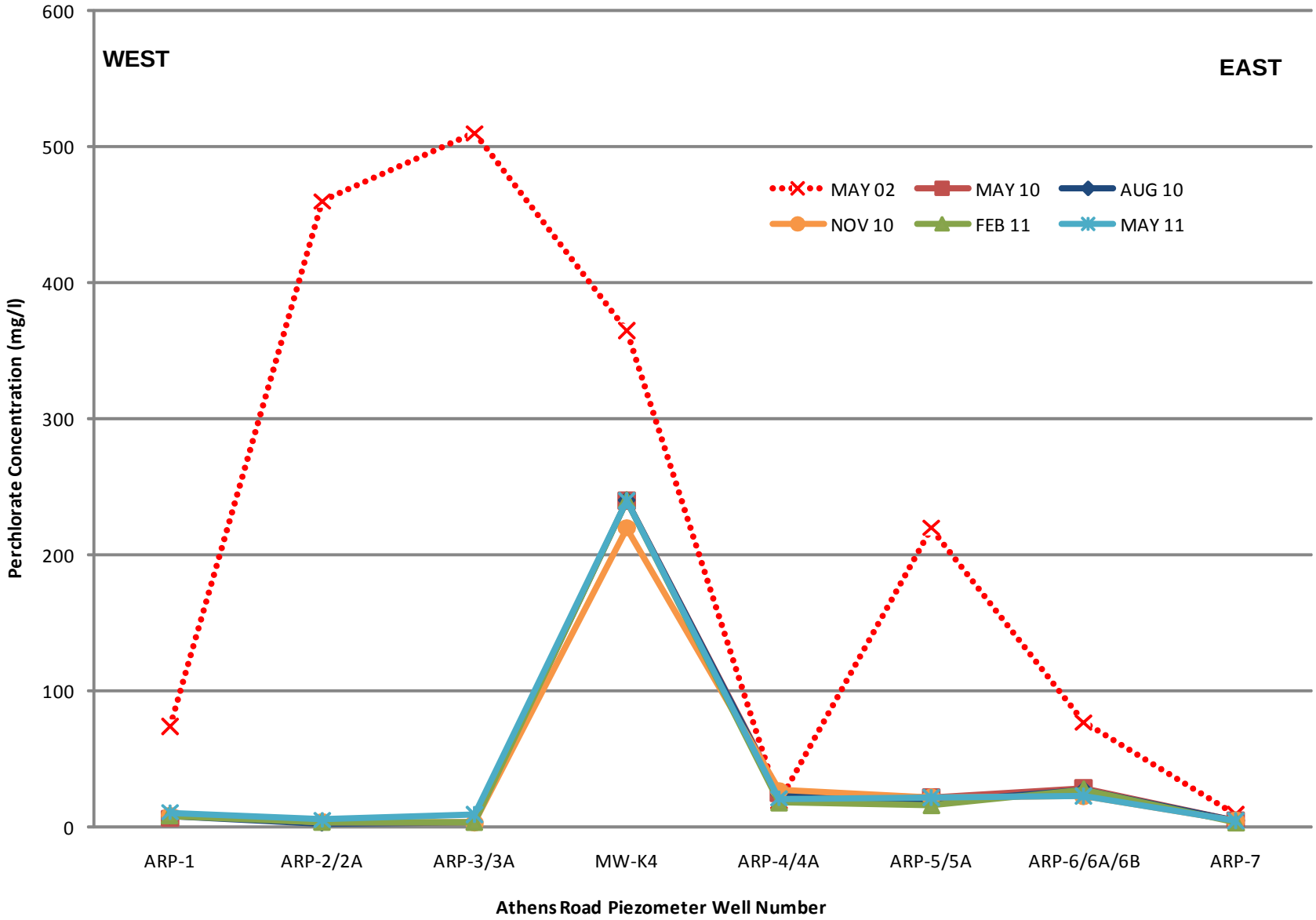

ENVIRON

Athens Road Piezometer Well Line Perchlorate Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
18

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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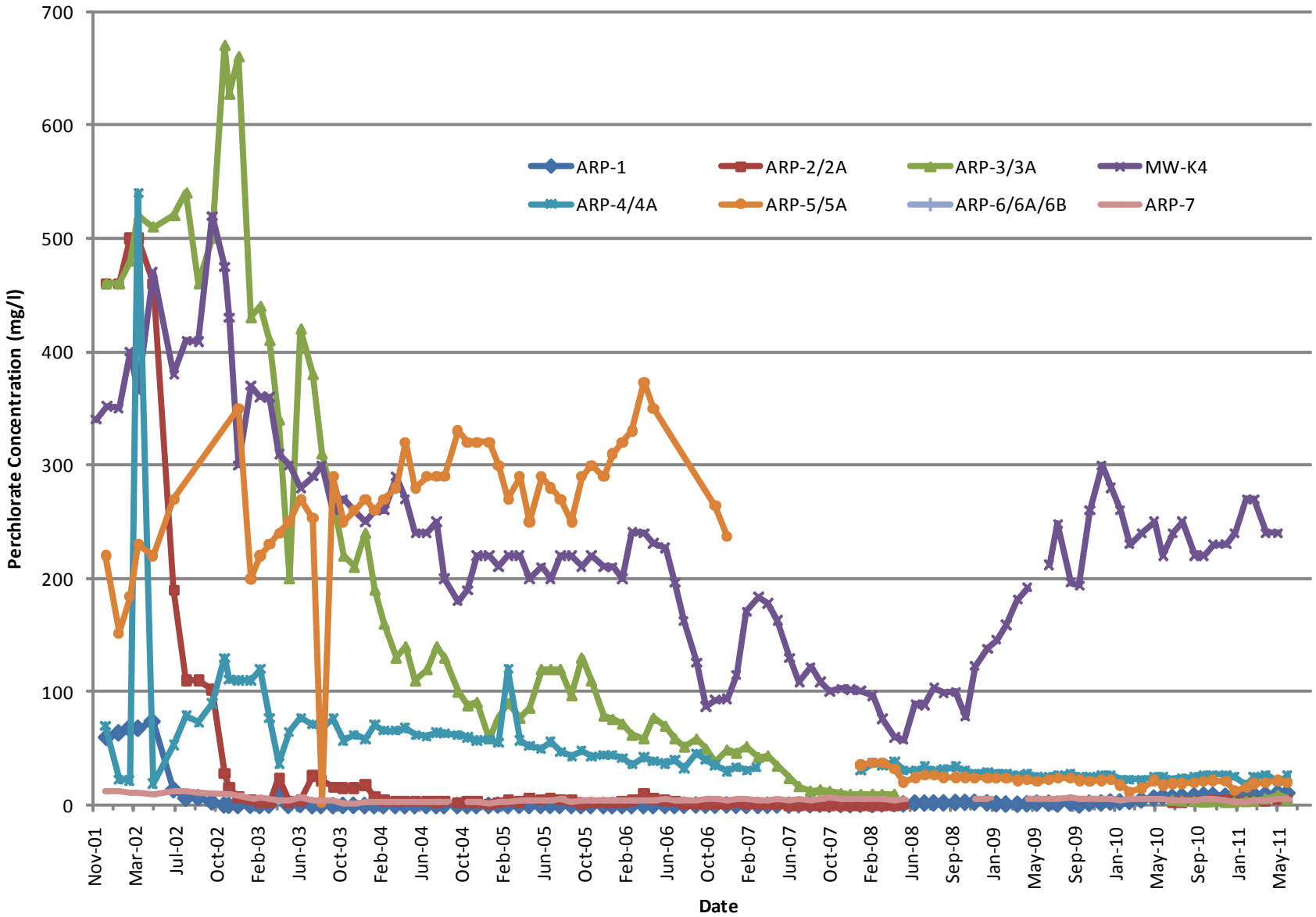

ENVIRON

Athens Road Piezometer Well Line Perchlorate Concentration Trend Graph

Nevada Environmental Response Trust Site (NERT)

Henderson, Nevada

Figure

19

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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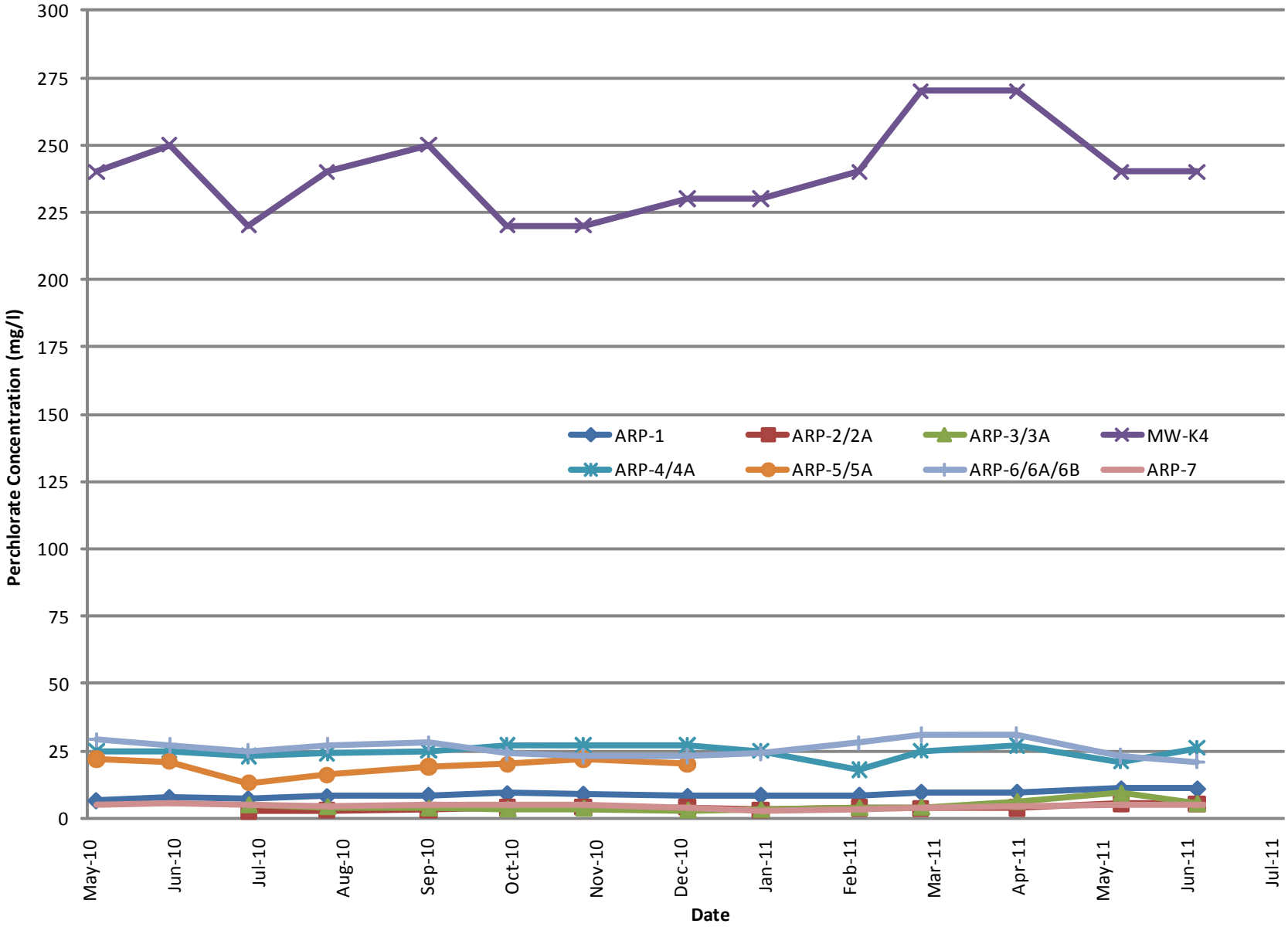

ENVIRON

Athens Road Piezometer Wells Perchlorate Concentration Trend Graph, May 2010 - June 2011

Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure **19A**

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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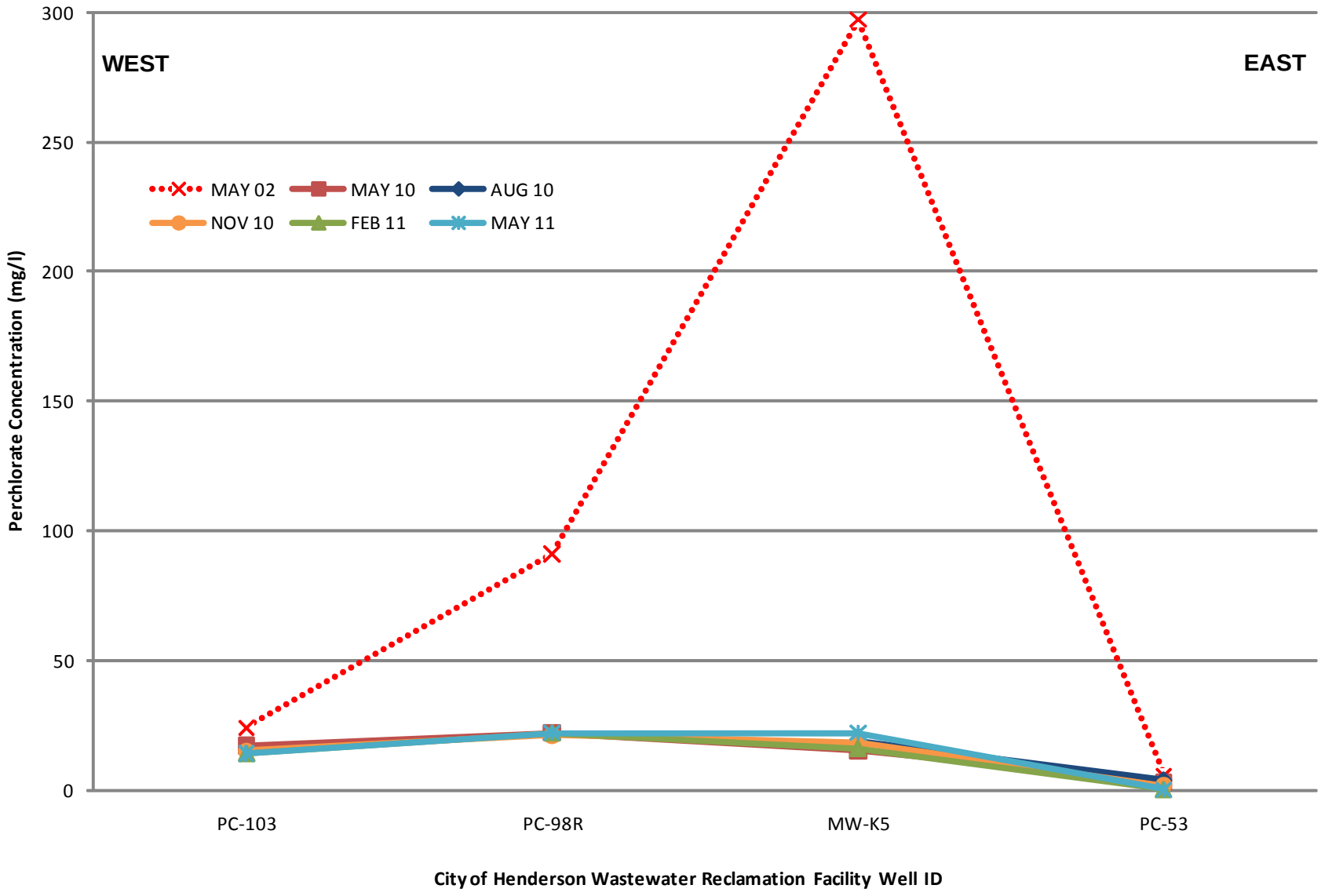

ENVIRON

City of Henderson WRF Perchlorate Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
20

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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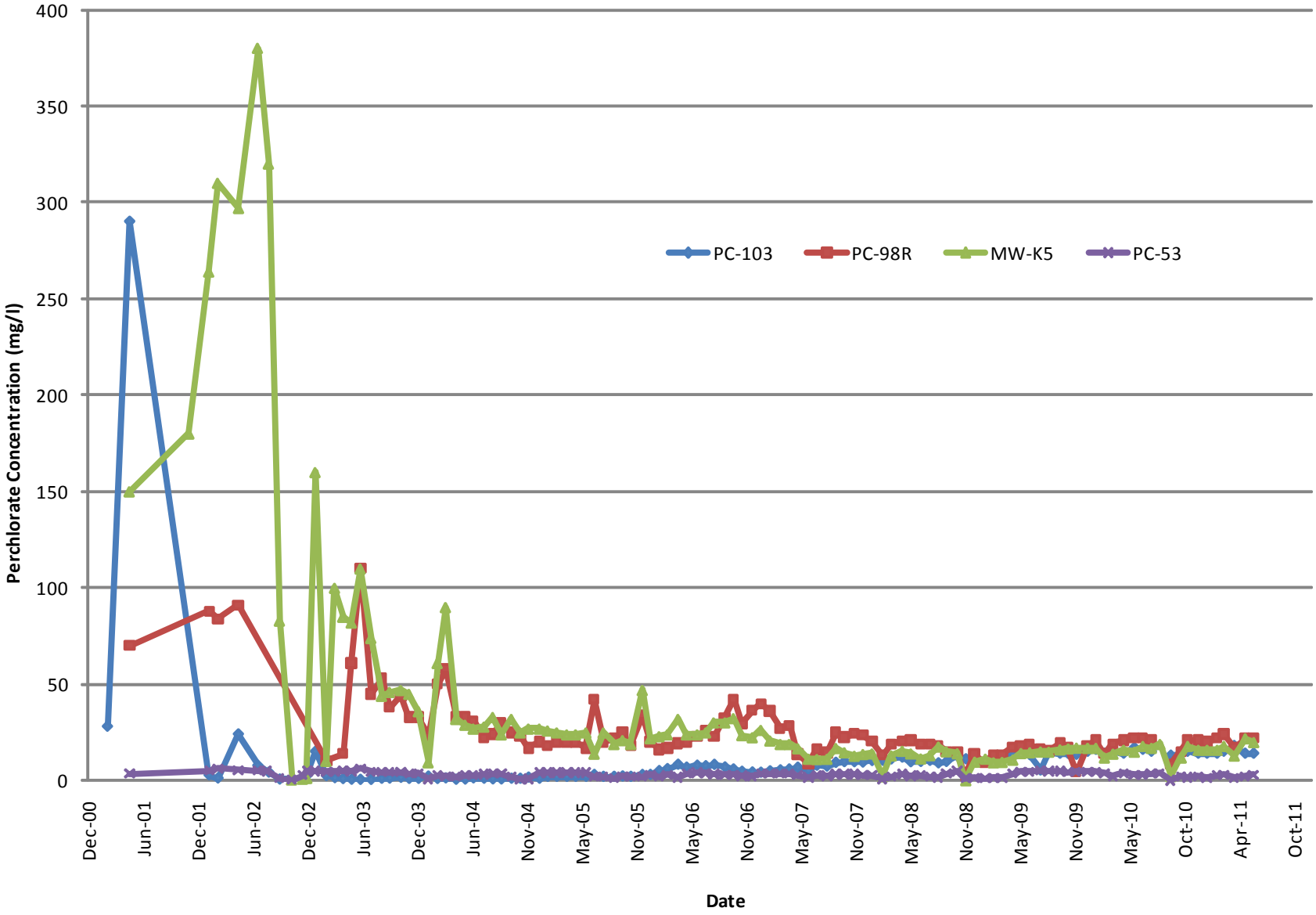


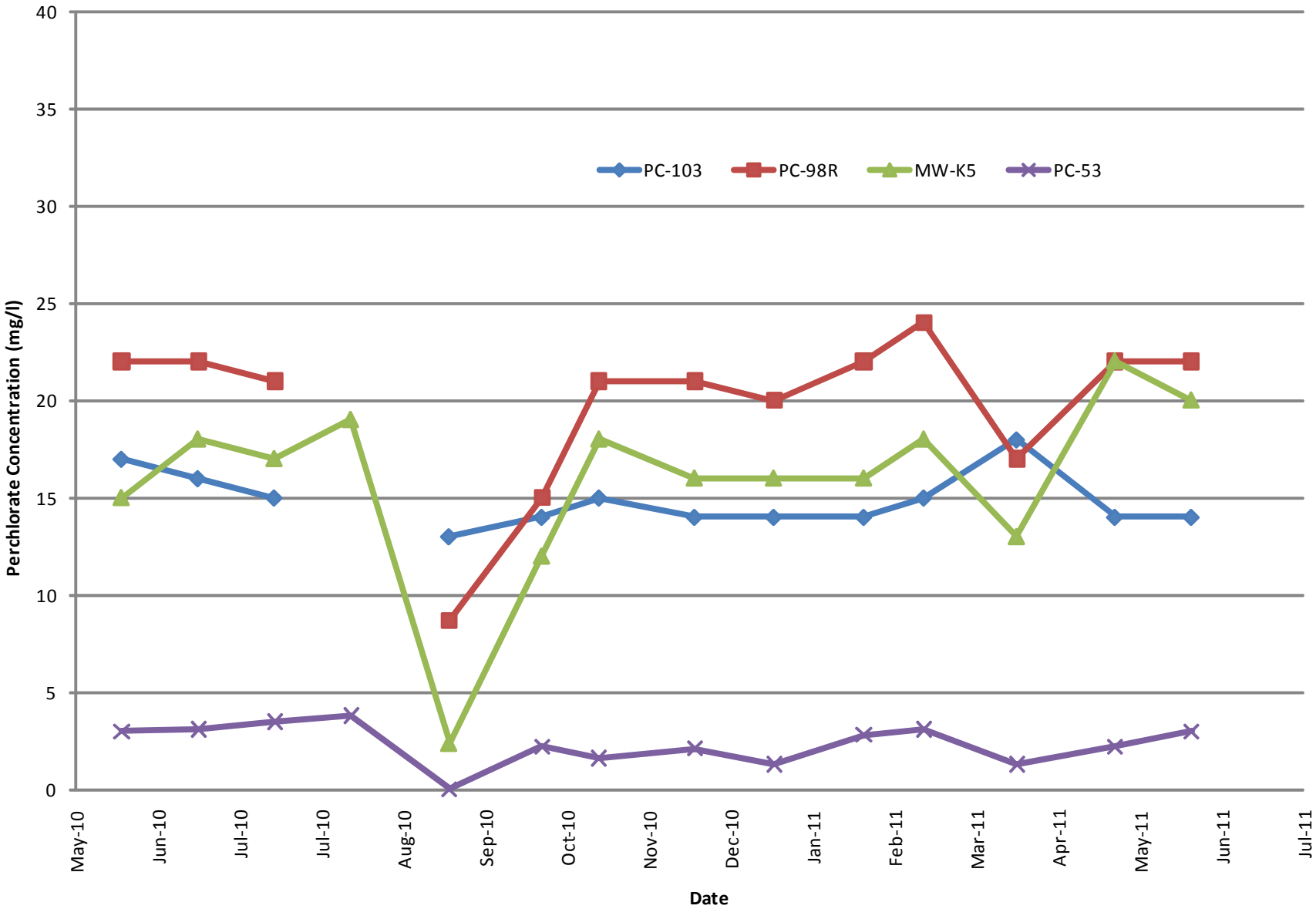
ENVIRON

City of Henderson WRF Well Line Perchlorate Concentration Trend Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
21

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-21a.dwg – Fri, 26 Aug 2011 – 4:14pm



ENVIRON

COH WRF Well Line Perchlorate Concentration Trend Graph, May 2010 - Jun 2011

Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure **21A**

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

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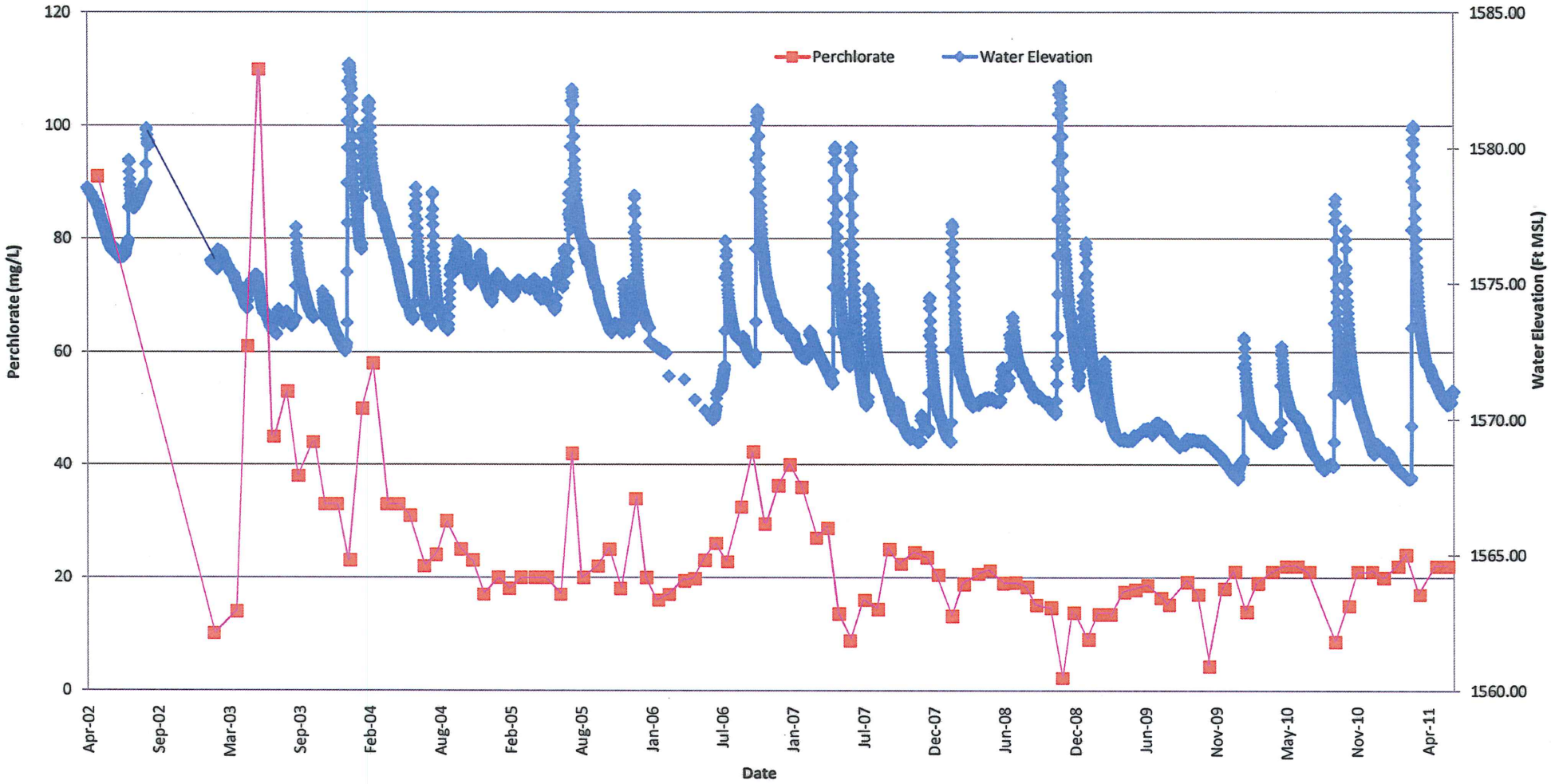

ENVIRON

Well PC-98R Perchlorate Concentration vs. Water Elevation Trend Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
22

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

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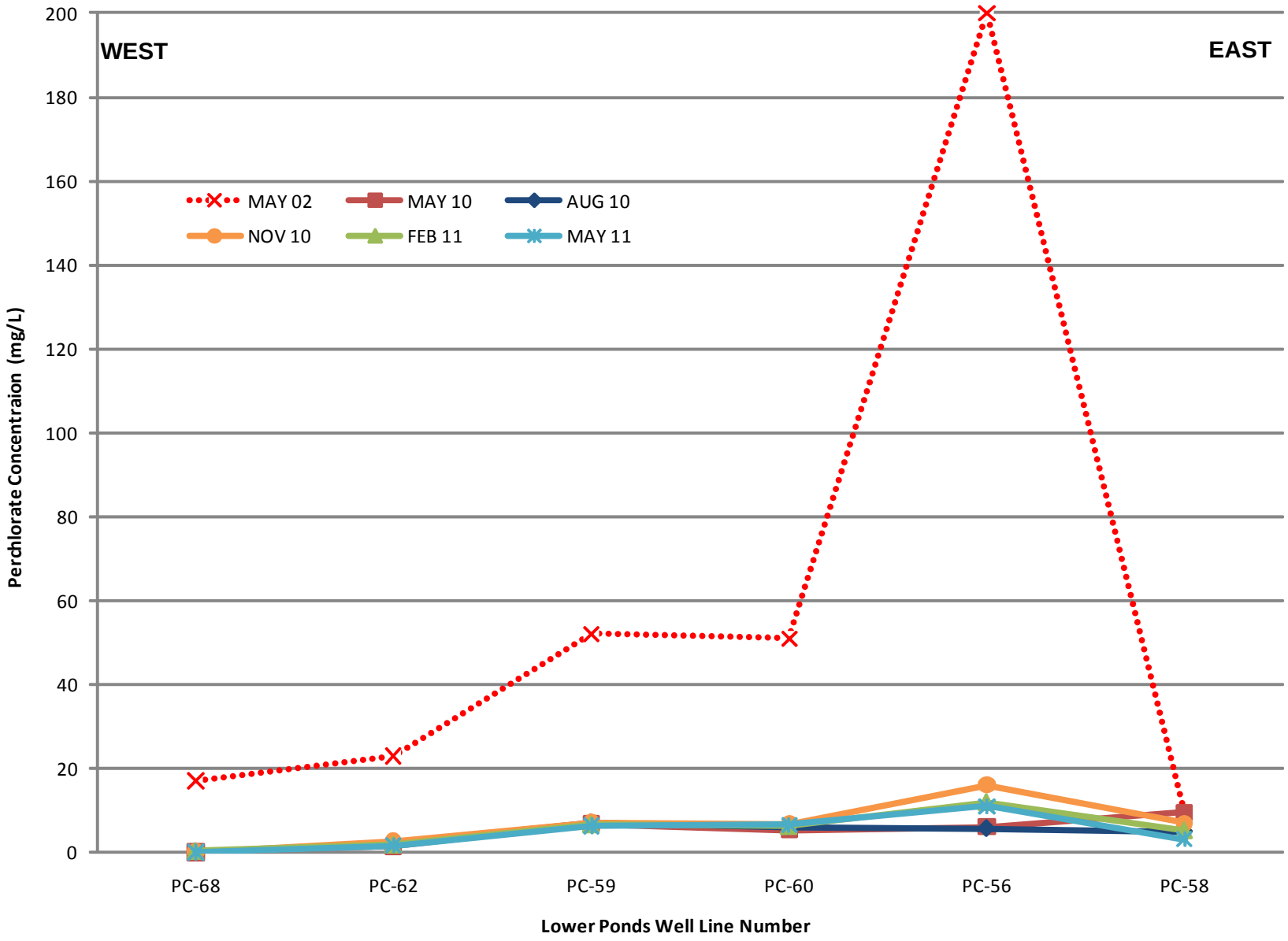


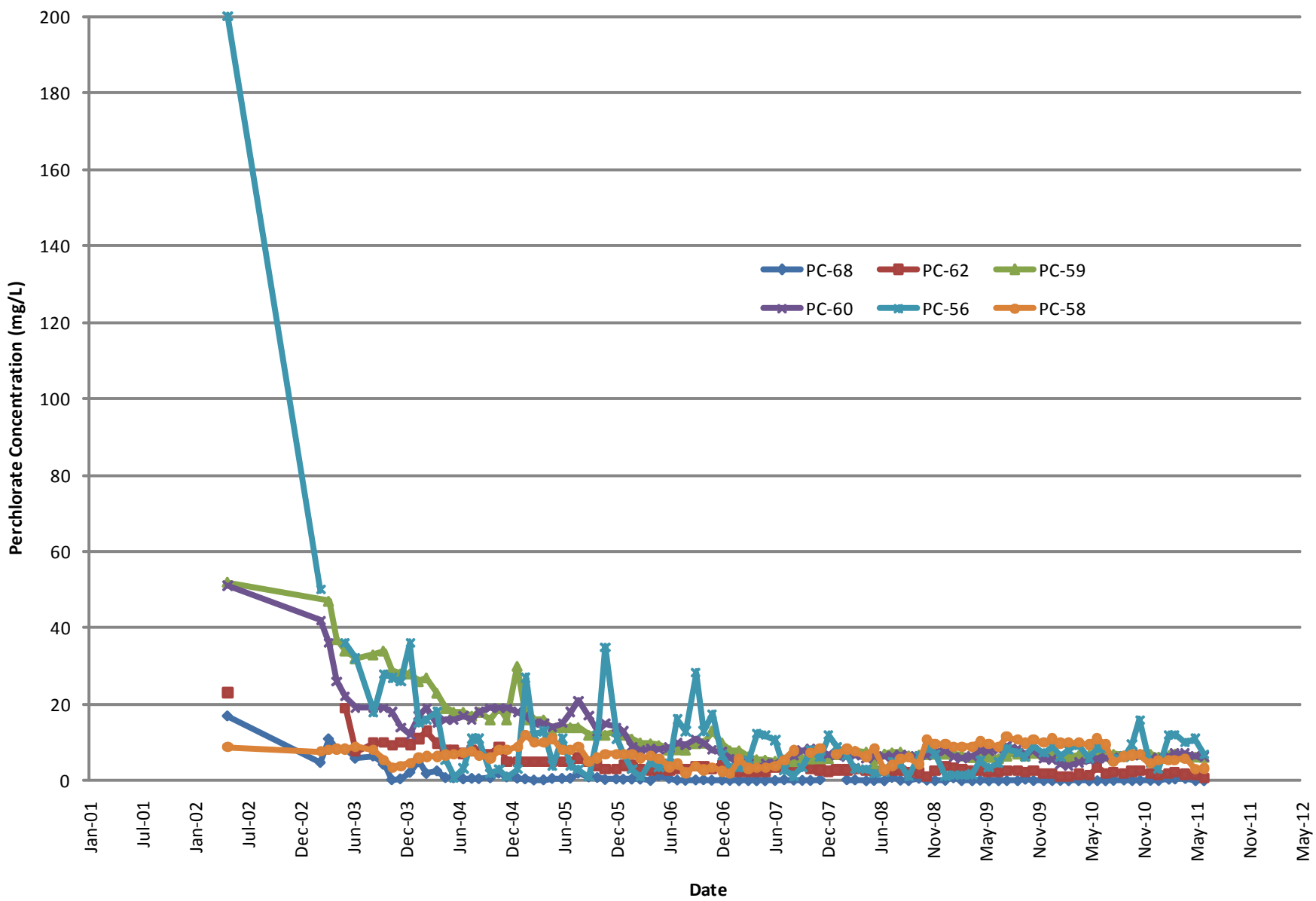
ENVIRON

Lower Ponds Well Line Perchlorate Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
23

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-24.dwg - Fri, 26 Aug 2011 - 4:14pm



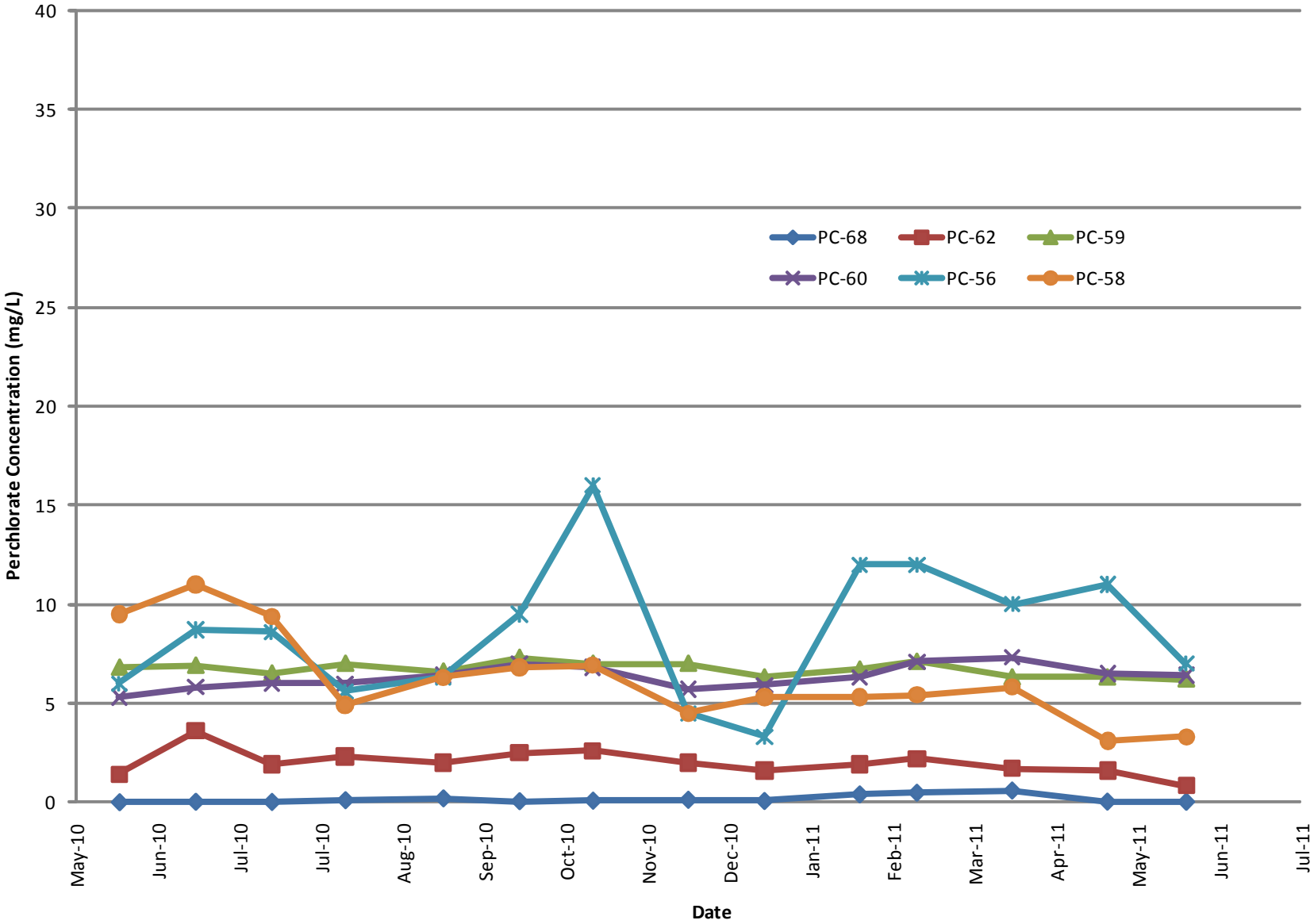
ENVIRON

Lower Ponds Well Line Perchlorate Concentration Trend Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
24

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-24a.dwg - Fri, 26 Aug 2011 - 4:15pm



ENVIRON

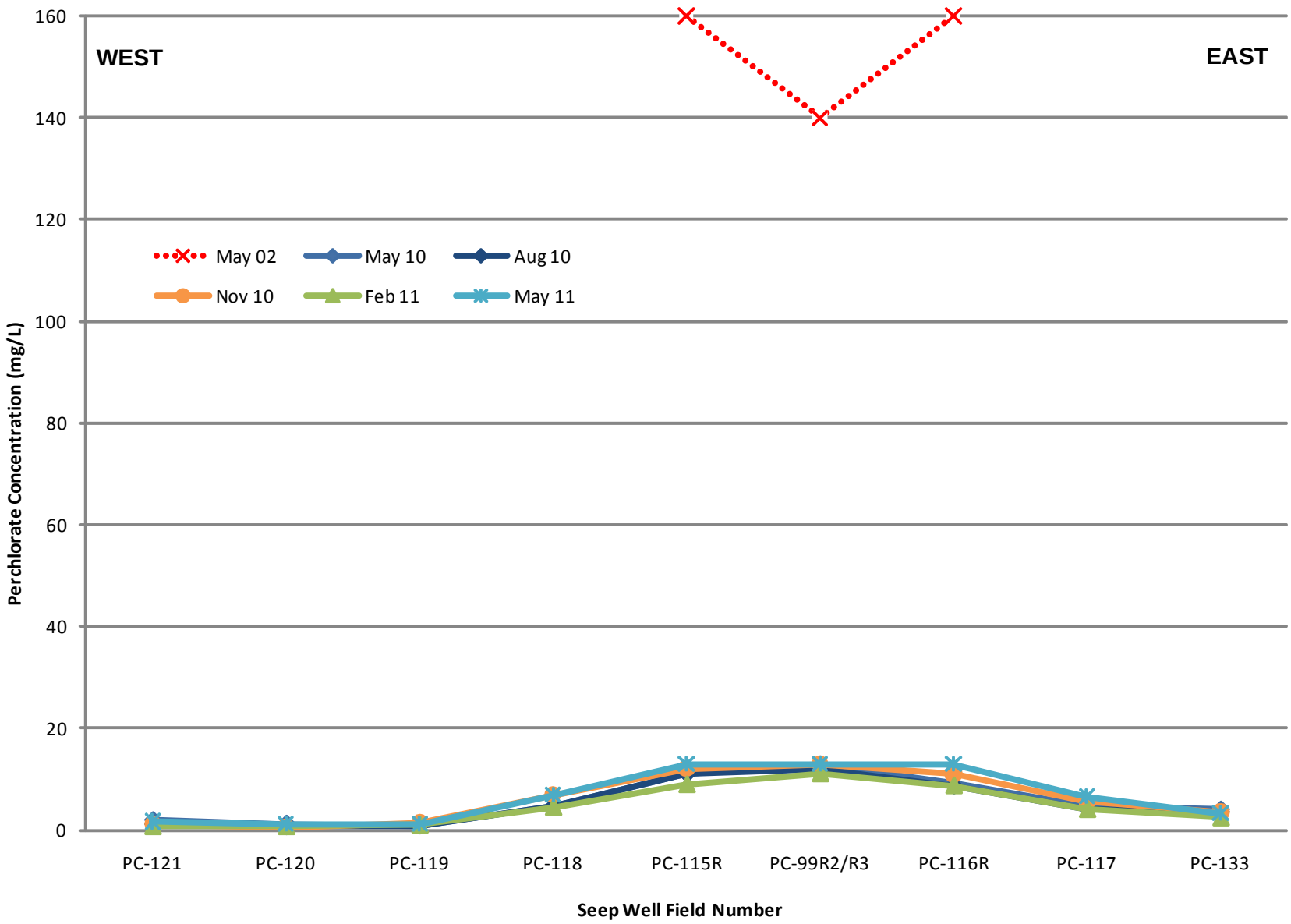
Lower Ponds Well Line Perchlorate Concentration Trend Graph, May 2010 - Jun 2011

Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure **24A**

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-25.dwg - Fri, 26 Aug 2011 - 4:15pm



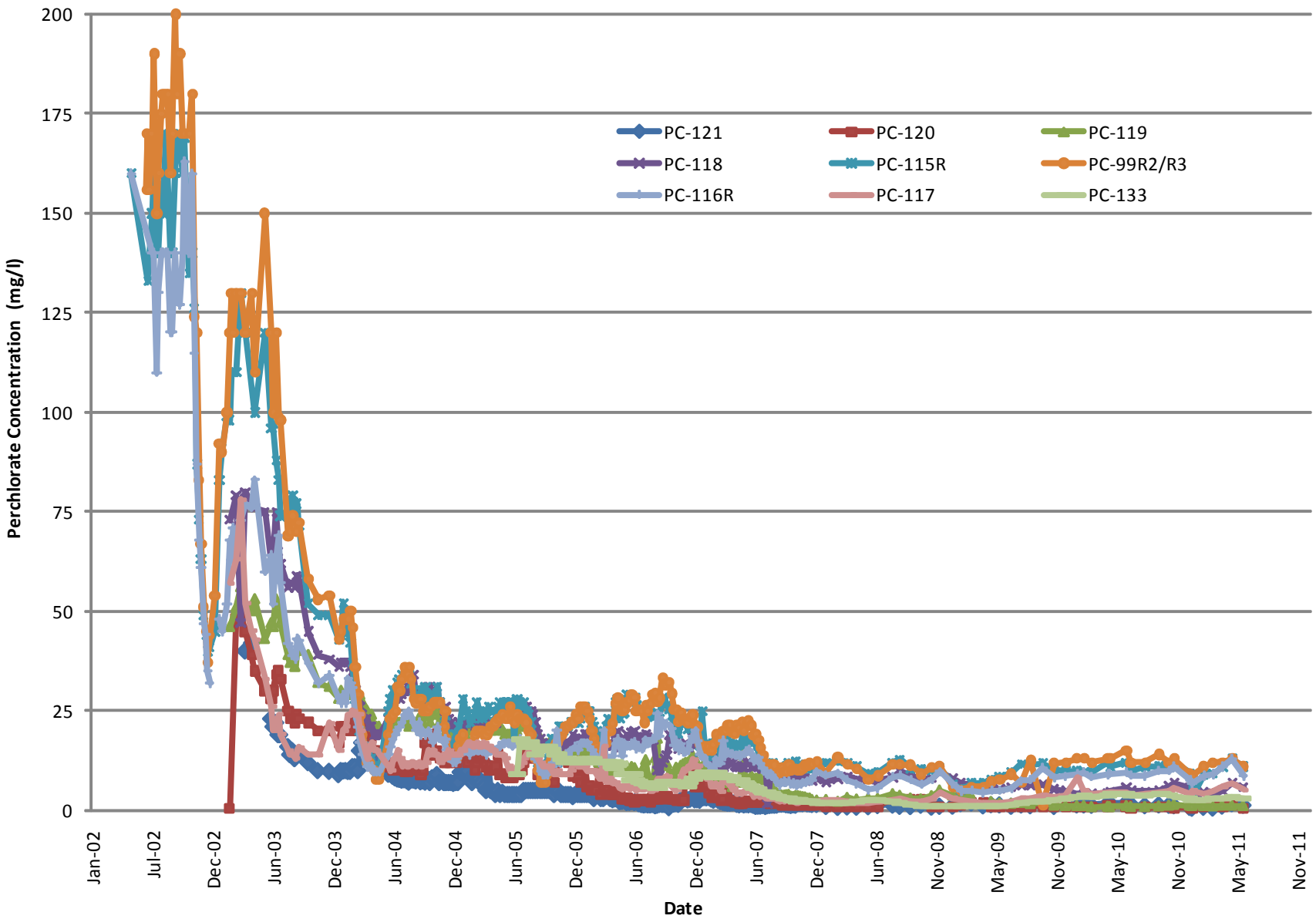
ENVIRON

Seep Well Field Perchlorate Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
25

Drafter: RS | Date: 8/26/11 | Contract Number: 21-26719F | Approved: | Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-26.dwg - Fri, 26 Aug 2011 - 4:16pm



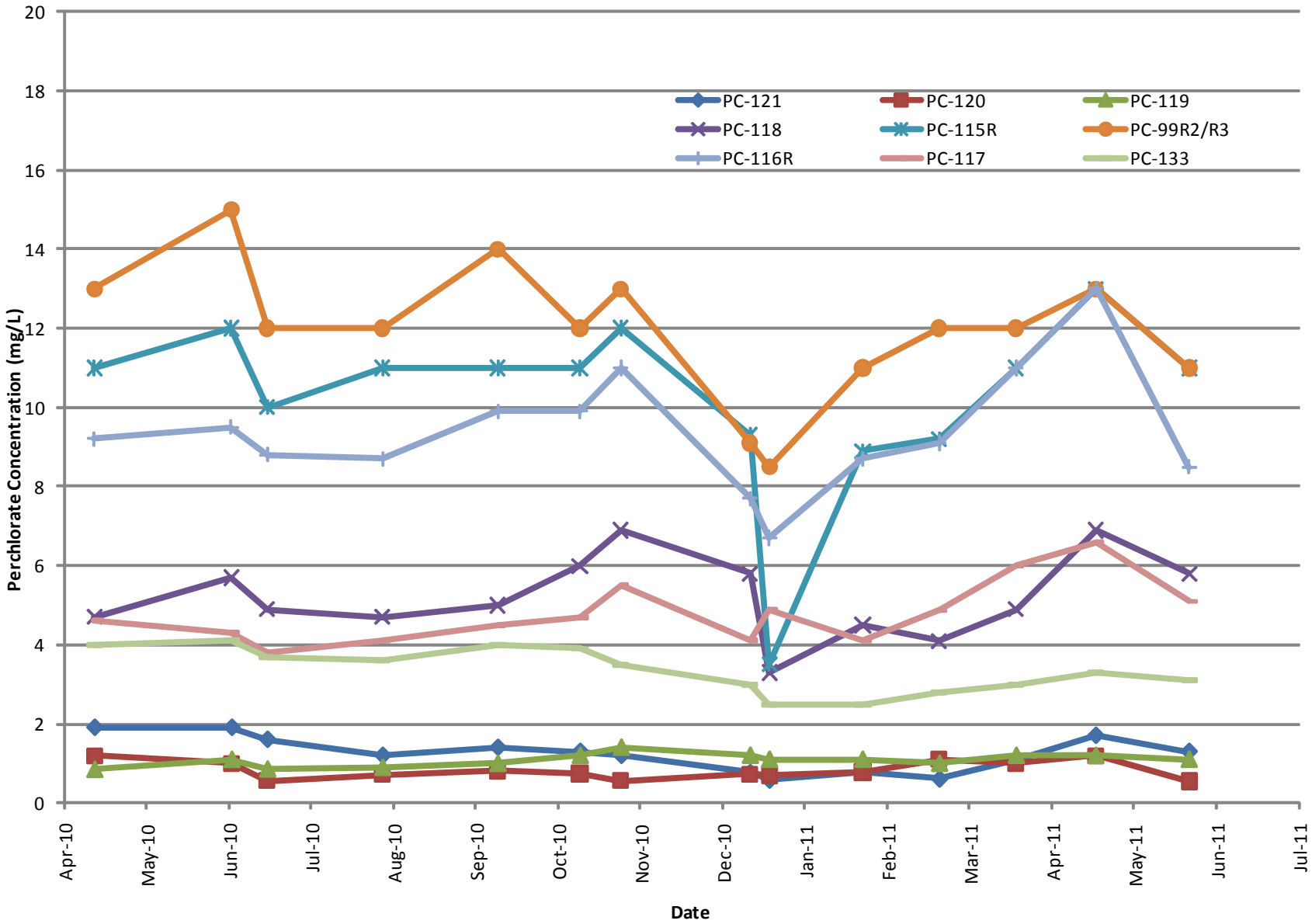
ENVIRON

Seep Well Field Perchlorate Concentration Trend Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
26

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-26A.dwg - Fri, 26 Aug 2011 - 4:16pm



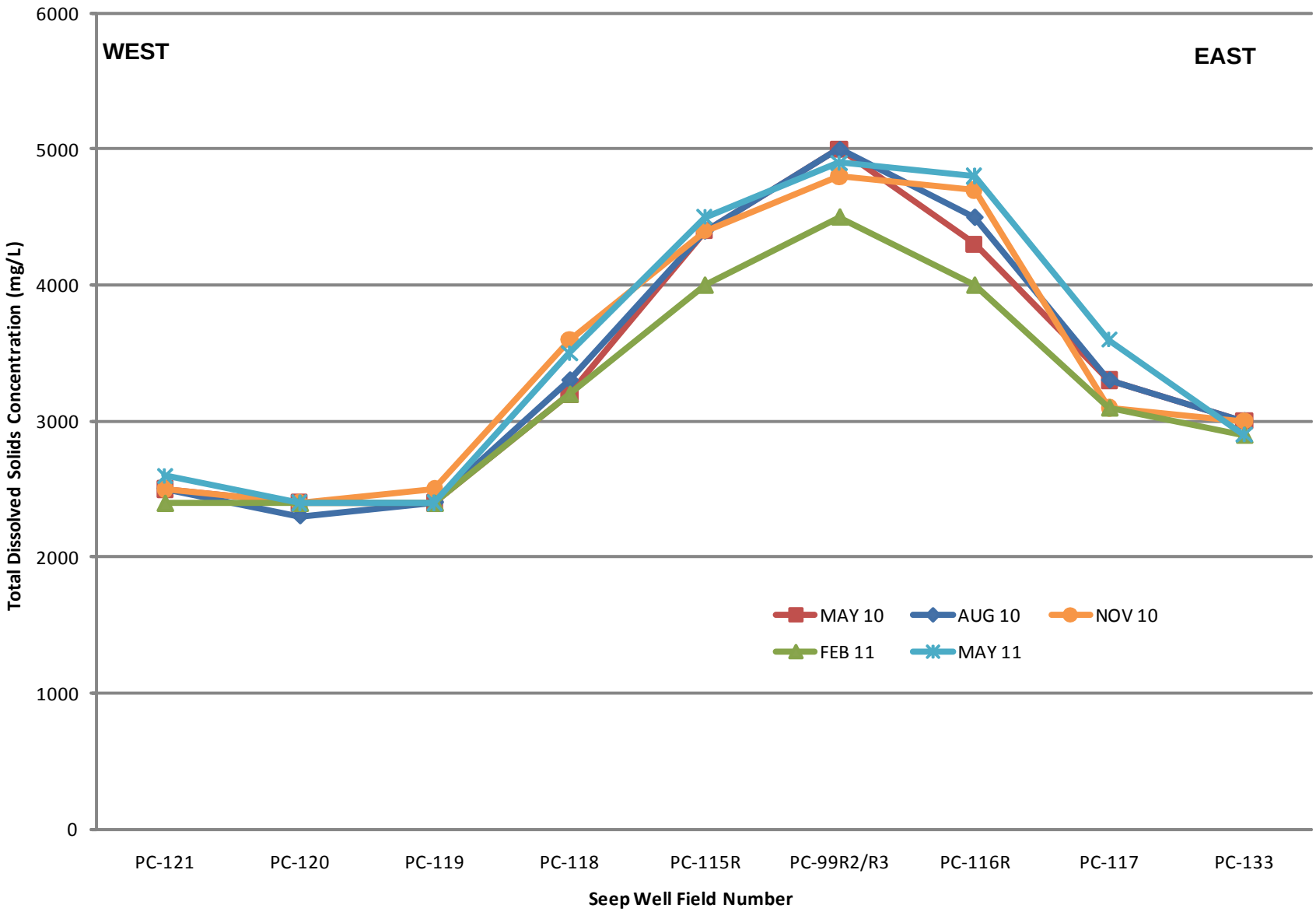
ENVIRON

Seep Well Field Perchlorate Concentration Trend Graph, May 2010 - June 2011
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
26A

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-27.dwg - Fri, 26 Aug 2011 - 4:17pm



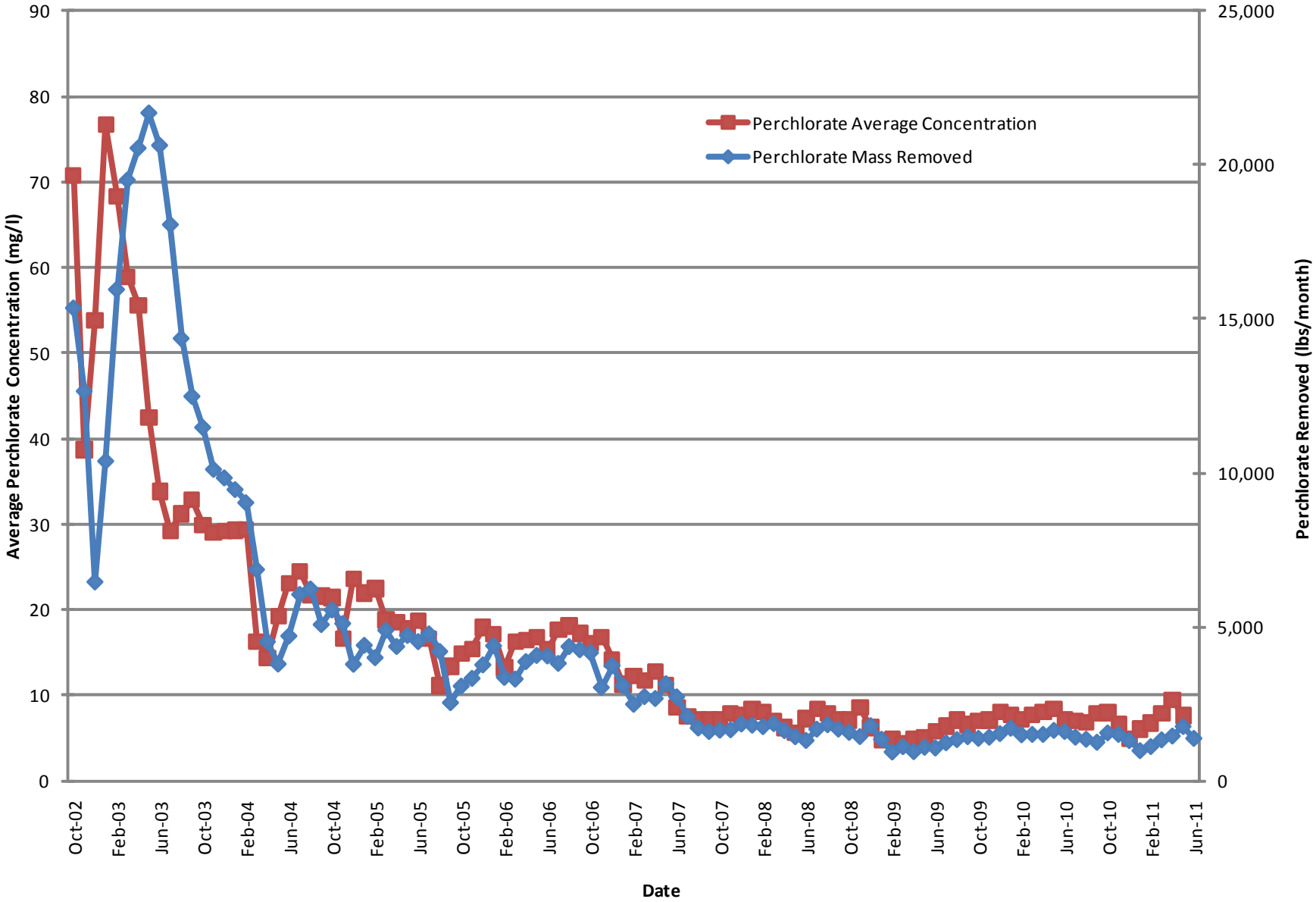
ENVIRON

Seep Well Field Total Dissolved Solids Concentration Section Graph
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
27

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Q:\DRAWINGS\2126719F\2126719F-FIG-28.dwg - Fri, 26 Aug 2011 - 4:17pm



ENVIRON

Seep Area Average Perchlorate Concentration and Mass Removed
Nevada Environmental Response Trust Site (NERT)
Henderson, Nevada

Figure
28

Drafter: RS Date: 8/26/11 Contract Number: 21-26719F Approved: Revised:

Plates

Appendix A

Groundwater Elevations and Analytical Data

Appendix B

Groundwater Field Records

Appendix C

Data Validation Summary Report (DVSR)