Interim Groundwater Capture Evaluation and Vertical Delineation Report

Tronox LLC

Henderson, Nevada

December 23, 2009

Prepared For:

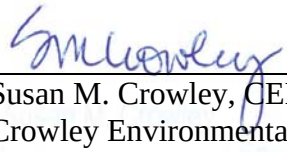
Tronox LLC
560 W. Lake Mead Parkway
Henderson, Nevada 89015

Groundwater Capture Evaluation
and Vertical Delineation Report
Tronox LLC
Henderson, Nevada

Responsible CEM for this project

I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

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.



Susan M. Crowley, CEM 1428 Exp.:03/08/11
Crowley Environmental LLC

Individuals who provided input to this document

Keith Bailey, Environmental Answers, LLC
Tom Reed, Tronox
Ed Krish, Edward J. Krish Consulting
Josh Otis, P.G., Northgate Environmental Management, Inc.
Deni Chambers, C.E.G., C.Hg., Northgate Environmental Management, Inc.

TABLE OF CONTENTS

TABLES

FIGURES

PLATES

APPENDICES

EXECUTIVE SUMMARY

Tronox LLC (Tronox) operates three primary groundwater containment and extraction systems associated with its Henderson, Nevada Facility: the on-site Interceptor well field and barrier wall, the Athens Road well field, and the Seep well field. The Nevada Division of Environmental Protection (NDEP) requires verification that the Tronox systems are effectively removing contaminants passing through the capture zones. The evaluation of groundwater capture found multiple lines of evidence to support the conclusion that the Interceptor extraction system is effective at hydraulic capture. Overall, the decrease in perchlorate loading in the Las Vegas Wash since 1999 is in itself a strong line of evidence of the effectiveness of the combined systems over the last 10 years. In May 1999, the perchlorate loading in the Wash was 1,104 pounds/day vs. 55 pounds/day in July 2009, a 95 percent drop. However, additional data are needed to fully evaluate hydraulic capture at the Athens Road and Seep extraction systems.

At the Interceptor well field, capture zone analysis, flow budget, declining perchlorate concentrations downgradient from the barrier wall over time, and overlapping cones of depression are lines of evidence demonstrating effective capture. Perchlorate mass flux calculations based on May 2009 sampling data indicate a 99.6 percent capture of perchlorate mass in the Quarternary alluvium (Qal) and upper portion of the Upper Muddy Creek formation (UMCf) by the Interceptor well field. It is acknowledged that a small amount of perchlorate is present in groundwater flowing past the Interceptor well field on the west and east sides of the barrier wall, and that underflow beneath the barrier wall within the deeper portion of the UMCf occurs, but at a greatly reduced rate based on low hydraulic conductivities estimated in the 10^{-5} cm/s range. In addition, density-adjusted vertical hydraulic gradients measured at the Site are generally upward, suggesting that any contaminants present in the UMCf that pass beneath the barrier wall will eventually daylight into the alluvium and be captured downgradient at the Athens Road well field. Tronox is proposing additional pumping and evaluation in the Interceptor well field area to further increase the contaminant capture and confirm that the barrier wall is not leaking.

For the Athens Road well field, previously identified data gaps have been partially addressed. However, installation of additional wells, repair of damaged and/or buried wells, and data collection are needed to fully address these data gaps. The primary lines of evidence supporting the effectiveness of capture at the Athens Road well field are the results of numerical modeling and the declining downgradient concentrations of perchlorate over time. According to the McGinley and Associates 2007 Modflow study, the Athens Road well field has greater than 99 percent capture efficiency. Decreasing perchlorate concentrations have been consistently

observed at monitoring wells downgradient of the Athens Road well field (PC-98R and MW-K5). Overlapping cones of depression are inferred from the cumulative drawdown results, but their interpretation is subject to uncertainty because of insufficient monitoring wells due to the loss of wells as a consequence of construction activities by the City of Henderson (COH). Based on available calculated hydraulic conductivities, the perchlorate mass flux moving toward the Athens Road well field is significantly less than the actual capture rate, suggesting that the available estimates of parameters needed to calculate the perchlorate mass flux are not well constrained. To address the identified data gaps, Tronox proposes to increase the pumping rates of wells in the western and eastern subchannels; attempt to locate and uncover or replace monitoring wells buried by COH construction; and potentially install new monitoring wells at locations chosen to reduce the uncertainty in the potentiometric contours. These efforts are scheduled for completion by the second quarter of 2010, and the additional data will be evaluated and presented in a revised version of this report.

Due to difficulties obtaining permission from Basic Management, Inc. (BMI) to drill and install monitoring wells outside of an existing easement, fieldwork at the Seep well field has not been completed, and therefore the capture efficiency of the well field has not been calculated. This report will be revised and resubmitted with the Seep well field evaluation when the additional data needed can be collected and analyzed.

In response to an NDEP request, Tronox completed eight deep nested wells in the UMCf at four locations on the Tronox plant-site for the dual purpose of further delineating the vertical extent of contaminant plumes and evaluating vertical hydraulic gradients. The perchlorate concentrations show that the bottom of the perchlorate plume lies between the shallow and deep delineation wells at about 160 feet below the ground surface (bgs). Based on available data, there is no chromium plume in the deeper UMCf. The calculated density-adjusted vertical hydraulic gradients from these wells generally demonstrate upward gradients.

1.0 INTRODUCTION

This report presents the results of investigations to assess the effectiveness of the groundwater capture systems, the vertical extent of contaminant plumes, and vertical hydraulic gradients at the Tronox facility in Henderson, Nevada (Site). In commenting on the Tronox *Semi-Annual Remedial Performance Report for Chromium and Perchlorate* dated February 28, 2007, NDEP (NDEP 2007a) requested that Tronox evaluate the effectiveness of its groundwater capture systems by considering at least three of six U.S. Environmental Protection Agency (USEPA) "lines of evidence" (USEPA 2002, 2005). In response to that request, a draft work plan was provided to NDEP on May 30, 2007 (ENSR 2007a). On June 26, 2007, NDEP provided comments on the *Draft Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems* (NDEP 2007b). Additionally, McGinley and Associates (2007) also provided a report dated June 30, 2007, describing the results of capture analysis using both an analog approach and a numerical groundwater model constructed for the Athens Road well field. In their report, McGinley evaluated well field capture efficiency and provided recommendations to further evaluate the capture zone at Athens Road. Following discussions with NDEP, and in response to their June 2007 comments, and in consideration of the recommendations provided by McGinley (2007), a revised work plan (ENSR 2007c) was prepared and submitted on August 29, 2007. Subsequently, NDEP provided additional comments on October 3, 2007 (NDEP 2007c). On November 28, 2007, Tronox provided a letter responding to the additional NDEP comments (Tronox 2007). On December 11, 2007, NDEP approved the revised work plan with a few exceptions noted for the administrative record (NDEP 2007d). Field work consisting of borehole drilling, lithologic sample description, geotechnical sampling, well completion, well development, and well testing was completed by March 2008. On August 25, 2008, Tronox submitted the Groundwater Capture Evaluation as Appendix B of the *Annual Remedial Performance Report for Chromium and Perchlorate, July 2007-June 2008* (ENSR, 2008d). On October 6, 2008, NDEP provided comments on the Annual Remedial Performance Report and the Groundwater Capture Evaluation, requesting submission of a stand-alone Revised Groundwater Capture Evaluation Report (NDEP 2008b). Appendix A contains copies of the NDEP and Tronox correspondence.

The scope of work proposed for the on-site barrier wall and Interceptor well field and Athens Road well field was completed in 2008 as originally proposed (ENSR 2007c). Additional drilling of two soil borings and completion of one recovery well at the west end of the barrier wall was proposed in the 2008 *Annual Remedial Performance Report for Chromium and Perchlorate* (ENSR, 2008d), and was completed in mid-2009. It is anticipated that the recovery well (I-AB) will begin extracting water by the second quarter of 2010. However, access agreement issues for

the Seep well field still prevent the installation of the proposed groundwater monitoring wells in this area. Consequently, this revised report only evaluates the evidence that hydraulic capture is occurring at the on-site Interceptor and the Athens Road extraction systems, and offers recommendations to improve and strengthen each of the systems' effectiveness. An evaluation of the Seep well field will await completion of the proposed monitor wells in that area. This report has been updated and revised based on second quarter sampling in May 2009 (with supplemental data from May and November 2008) and the additional drilling and well installation described above.

Additionally, a monitoring well completion program for eight deep Muddy Creek formation wells, for the dual purpose of further delineating the vertical extent of contaminant plumes and vertical hydraulic gradients at the Site, was added to the scope of work in October 2008. These wells were completed in September and October 2009 and are discussed in this report.

Boring logs and well completion diagrams for the soil borings and monitoring wells completed in 2009 are presented in Appendix B. Well development records are presented in Appendix C. Boring and well location survey data is presented in Appendix D.

1.1 Current Area Groundwater Plume Conditions

This discussion of current groundwater conditions is based on groundwater sampling data originally presented in the *Annual Remedial Performance Report for Chromium and Perchlorate* (Northgate, 2009), covering the period July 2008 through June 2009. Plates 2, 6, 7, and 8, and Table A-1 from that report are presented in Appendix E, and are referred to in the discussion below. The Plates illustrate the potentiometric surface and constituent loading in the shallow water-bearing zone at the Site. Table A-1 presents five quarters of analytical data (April 2008 – June 2009), including the water level and concentration data used to construct the plates.

Plate 2 (Appendix E), the *Potentiometric Surface Map: Shallow Water-Bearing Zone*, is based on groundwater elevation measurements taken in April-June 2009 by Tronox and AMPAC, and shows a generally north-northeast groundwater flow direction, with an average gradient of 0.02 feet per foot south of the Athens Road well field, flattening to approximately 0.007 feet per foot north of the well field approaching the Las Vegas Wash.

The extent of the chromium, perchlorate, and total dissolved solids (TDS) plumes at the Site interpreted from groundwater samples collected in May 2008 are shown on Plates 6, 7, and 8, respectively (Appendix E). There appears to be significant interaction between the perchlorate and chromium plumes originating from on-Site sources, and two TDS plumes originating from

adjacent off-Site sources. Plate 8 shows that a plume of groundwater containing a very high level of TDS exists west of the Tronox facility. This plume of high TDS enters the Main Channel (a large alluvial channel that trends north-northeast towards the Las Vegas Wash) beneath the northwestern corner of the Tronox property. Likewise, east of the Tronox facility a high TDS area (up to 19,000 mg/L) exists beneath the northern portion of the Timet property. For the TDS plume originating on-Site, the highest TDS concentration (15,100 mg/L) is found due south of the Interceptor well field and barrier wall. TDS concentrations above 10,000 mg/L are present upgradient of the barrier wall and trend about 1,800 feet south to an area around the Chemstar property. North of the barrier wall, TDS concentrations are in the 2,800 to 8,000 mg/L range due to the effective groundwater capture at the Interceptor well field and barrier wall and the recharge of low-TDS Lake Mead water.

Plates 6 and 7 show the configuration of the chromium and perchlorate plumes, respectively, from the site to the Las Vegas Wash. As mapped, both plumes occupy the inter-fluvial area east of the Main Channel from south of Warm Springs Road to Sunset Road where they begin to enter the channel. In the vicinity of the Athens Road well field, perchlorate and chromium monitoring data indicate that the plumes narrow and are tightly constrained. This is inferred to be due the morphology of underlying alluvial channels, and adjacent higher-density, high-TDS groundwater plumes in the channel prohibiting the chromium and perchlorate plumes from entering the Main Channel until the density difference dissipates downgradient.

1.2 Operational History

Tronox operates three primary groundwater containment and extraction systems associated with its Henderson Facility (Figure 1):

On-Site Barrier Wall and Interceptor Well Field: A bentonite-slurry wall was constructed as a physical barrier across the higher concentration portion of the perchlorate/chromium plume on the Tronox site. The barrier wall is 1,600 feet in length, about 60 feet in depth, and is combined with an upgradient series of 23 groundwater extraction wells that are situated due south of the barrier wall. The upgradient well field pumps about 70 gallons per minute (gpm), dewatering the alluvial aquifer and the upper portion of the UMCf in the vicinity of the pumping wells. Most of the wells comprising the Interceptor well field are completed in both the Qal and unconfined portions of the upper fine-grained UMCf.

Athens Road Well Field: Located approximately 8,200 feet north (downgradient) of the barrier wall and Interceptor well field, the Athens Road well field includes a series of 14 groundwater

extraction wells at seven paired well locations. The wells span roughly 1,200 feet of the alluvial paleochannel and pump from the Qal at a combined rate of about 250 gpm.

Seep Area Collection System: Located near the Las Vegas Wash, approximately 4,500 feet north (downgradient) of the Athens Road Well Field, the system includes a surface capture pump for the intermittent surface stream (Seep) flow and 10 groundwater extraction wells in the Seep well field to capture subsurface flow. The Seep Area Collection System pumps at a combined rate of about 560 gpm. The wells comprising the Seep well field are completed in the Qal.

All groundwater from the hydraulic containment systems is routed for treatment to the Tronox facility and, following treatment, is discharged to the Las Vegas Wash under a National Pollution Discharge Elimination System (NPDES) permit.

1.3 NDEP Guidance Concerning Evaluation of Groundwater Capture

NDEP (2007a) requires verification that the Tronox systems are effectively removing contaminants passing through the capture zones. The evaluation of the containment must consider three-dimensional capture including flow contributions from both the alluvium in the paleochannels and the upper portion of the UMCf (NDEP 2007a).

At least three of the six possible lines of evidence are required by the USEPA (2002, 2005) to demonstrate adequate capture. The possible lines of evidence include the following:

1. Capture zone estimated through calculations of flow-budget or analytical modeling;
2. Demonstration of overlapping cones of depression via flow nets both in plan view and vertical cross section;
3. Demonstration of inward flow from a compliance boundary using three-point gradient solutions at locations perpendicular to the boundary;
4. Concentration trends over time at sentinel wells located downgradient of the containment;
5. Particle tracking using a calibrated numerical model; and
6. Tracer testing.

2.0 EVALUATION OF GROUNDWATER CAPTURE

Section 2 discusses the on-site Interceptor and the Athens Road groundwater capture systems, the results of recent capture related field work, and provides a performance evaluation based on recent data collected in May 2009. Discussion of the Seep area groundwater capture system will await completion of proposed monitor wells, once access issues are resolved. Data gaps in demonstrating effective capture are identified, and a scope of work to address those gaps is presented. Table 1 presents the well completion, geotechnical information, and 2008 and 2009 perchlorate and chromium concentrations for the recently installed wells. Table 2 presents the vertical gradient information for the recently installed wells.

2.1 On-Site Barrier Wall and Interceptor Well Field

The Interceptor well field and barrier wall are shown on Figure 2, along with the locations of the recently installed monitoring wells, recovery wells, and soil borings. Figure 3 is a conceptual hydrogeologic block model summarizing the hydrogeologic conditions around the well field as is interpreted to date. The diagram shows that the groundwater flows northward from the UMCf coarse- and fine-grained units beneath Lake Mead Parkway, entering into the Qal channels south of the well field. Flow is interrupted by the barrier wall and groundwater is extracted at a current rate of about 70 gpm by the well field. North of the barrier the recharge trenches infiltrate Lake Mead water back into the aquifer. Nested wells, such as the M-74, M-132, and M-133 set shown here, exhibit upward vertical gradients adjusted for water density.

2.1.1 Previously Identified Data Gaps and Discussion of Results

In order to strengthen the lines of evidence for capture, Tronox identified the following data gaps and proposed methods to address them in the *Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Tronox LLC, Henderson, Nevada* (ENSR, 2007c):

Data Gap # 1: Demonstrate the barrier wall is continuous and does not leak significantly along its length or have underflow from beneath.

Proposal: Pump wells M-70, M-71, and M-72 on the downgradient side of the barrier wall and monitor the perchlorate concentrations over time. Concentrations of perchlorate are expected to decrease over time indicating that the barrier wall is functioning as designed. Tronox proposed to pump these three wells north of the barrier wall at a rate of about one gpm each or as formation transmissivity permits. Capacity to handle the water in the Groundwater Treatment Plant

(GWTP) will be made available by routing the discharge from selected wells connected to the west header, directly to the GW-11 pond.

Results: In anticipation of pumping these wells, M-70, M-71, and M-72 were redeveloped in 2007. At that time they were found to be very poor producers – with M-71 yielding the most water at 0.75 gpm (see Table 2, Appendix B, ENSR, 2008d). At the present time, no pumping has been performed at any of the wells. Tronox is working on securing a power source for the well pumps in wells M-70, M-71, and M-72 – including solar panels – since pumping rates are expected to be low. It is anticipated that a power source can be secured and pumping can begin in the second quarter of 2010.

In the interim, water level fluctuations in monitoring wells north (downgradient) of the barrier wall provided an opportunity to assess the hydraulic connection between well pairs located across the barrier wall and evaluate possible leakage. The water level fluctuations in wells M-69 through M-72 occurred as a result of variation in groundwater injection rates during refurbishment of the recharge trenches and subsequent maintenance work. Water elevation differences between well pairs located on opposite sides of the wall are shown on Figure 4, *Hydrograph Pairs Across the Barrier Wall*. The hydrographs show the redevelopment of a groundwater mound on the north side of the barrier wall after recharge trench refurbishment (about February 2008), and its subsequent dissipation starting in July-August 2008 as recharge rates slowed due to issues related to the delay of installation of a water filtration system. With the trenches now performing near design levels (64.3 gpm as of November 2009), the mound is redeveloping and water levels in M-69, M-70, M-71, and M-72 are once again increasing. The hydrographs (current to September 2009) show a relatively instantaneous rise of the water levels in the wells downgradient of the barrier wall (M-69 through M-72) starting in July 2009. This is interpreted to be due solely to the increased quantity of water being recharged in the trenches. In contrast, the above-barrier wells (I-Y, M-55, M-56, and M-58) show only minor water elevation changes attributable to pumping rate changes in nearby recovery wells and general dewatering of the aquifer. The fact that the water elevation in M-70 spiked above the water elevation of M-55 without a concurrent rise in M-55 indicates that the barrier is not leaking. If the barrier was leaking significantly, it would be expected that the below-barrier wells would not show such a dramatic decrease in water levels as was observed during times of trench shutdown, since the below-barrier wells would be recharged by water coming through the barrier wall from upgradient.

It is assumed that underflow beneath the barrier wall occurs, but at a greatly reduced rate based on estimated hydraulic conductivities in the 10^{-5} cm/s range in the UMCf. In addition, as shown

on Table 2, density-adjusted vertical hydraulic gradients measured at the Site, including on both ends of the barrier wall, are generally upward. This suggests that any contaminants present in the deeper UMCf that pass beneath the barrier wall will eventually daylight into the alluvium and be captured downgradient at the Athens Road well field.

Tronox believes that this data gap has been partially addressed by monitoring shallow groundwater elevation trends in well pairs located on opposite sides of the barrier wall. During the period when the groundwater mound decreased between March 2007 and February 2008 and subsequently redeveloped following refurbishment of the infiltration trenches, the well pairs did not exhibit a significant hydraulic connection indicating that the barrier wall has negligible leakage. This data gap will be further addressed when water-level responses to proposed pumping in wells M-70, M-71 and M-72 are evaluated.

Data Gap # 2: Demonstrate the upward gradient from the Muddy Creek to the alluvium.

Proposal: Install nested monitoring wells at the west and east ends of the barrier wall. Complete these wells in the alluvium and at different depths within the UMCf, and compare their respective static water levels to determine vertical groundwater gradient. The proposed nested wells will consist of two wells each completed in the UMCf at different depths adjacent to shallow wells that are used to evaluate horizontal flow around the west and east end of the barrier wall.

Results: Wells M-132 and M-133 were completed in close proximity to M-74 on the east end of the barrier wall (see Figure 2). Table 2 provides the well completion data and shows that the May 2009 water elevation in the deepest well (M-132) is higher than the water elevation in adjacent shallower well M-133; thus indicating an upward vertical gradient; adjusted for water density. Further, the water level data for May 2009 show that the water elevation for well M-74, completed in the uppermost portion of the UMCf, is lower than both the water levels measured in wells M-132 and M-133. This also indicates that there is an upward vertical gradient into the shallowest saturated portion of the UMCf. Likewise, on the western end of the barrier, wells M-134, M-135, and M-136 were drilled and screened at different depths to a maximum of 90 feet (M-136). The May 2009 water elevations from these wells also show an upward, water density-adjusted, vertical gradient.

Core samples of the UMCf were taken from three borings on the east end of the barrier (M-129, M-130, and M-132) and one from the west end (M-136) and tested for physical property

measurements which showed all samples to have vertical hydraulic conductivities in the 10^{-6} to 10^{-7} cm/s range (see Table 1).

This data gap has been addressed.

Data Gap # 3: Reconcile the flow budget around the west and east end of the barrier wall.

Proposal: To further evaluate the movement of groundwater around the west and east ends of the barrier wall, Tronox proposed to install at total of five monitor wells just past the ends of the barrier wall.

Results: As shown on Figure 2, between November 2007 and March 2008, wells M-129 and M-130 were installed east of the barrier wall on TIMET property and wells M-131, M-134, M-135, and M-136 were installed west of the barrier wall. Extraction well I-AA was also installed to enhance groundwater recovery on the west end of the barrier wall. Table 1 summarizes the well completion, water elevation, and 2009 perchlorate and chromium concentrations for each well. The cross section of the Interceptor well field (Plate 1) shows that the M-130 boring encountered the previously inferred ridge of UMCf that separates I-K from CLD2-R. The water table in M-130 is located in the UMCf, and the overlying Qal above the ridge is dry. On the west, Plate 1 shows that I-AA and M-131 intersected a previously unknown alluvial channel to the west of an unsaturated Muddy Creek high. The thickness of saturated Qal in I-AA and M-131 is about 0.33 feet and 0.75 feet, respectively. After well I-AA was developed, short-term pumping showed that the well could only sustain a maximum pumping rate of approximately 1.3 gpm (see Table 2, Appendix B, ENSR, 2008d). In order to capture additional flow around the west end of the barrier wall from the UMCf, well I-AB was completed half way between wells I-AA and I-B (see Figure 2 and Plate 1). Based on adjacent wells, well I-AB is expected to pump a maximum of 1 gpm. Extraction wells I-AA and I-AB will be hooked up to the Interceptor well field and begin pumping by the second quarter of 2010. Capacity to handle the additional groundwater in the GWTP will be made available by routing the discharge from selected wells that are currently connected to the west header, directly to the GW-11 pond.

As will be discussed in Section 2.1.2 below, the majority of groundwater flow in the area of the Interceptor well field, and thus the perchlorate and chromium mass flux, is within the saturated alluvium. As seen on the cross section (Plate 1), there is negligible alluvial groundwater flowing past the east side of the barrier wall and minimal alluvial groundwater (0.54 ft of average saturation) flowing around the west side. In order to evaluate the size of the newly-discovered channel at M-131, two soil borings (M-157 and M-158) were recently drilled west of M-131 (see

Table 1 for borehole data and chemical analyses). Cross section A-A' (Plate 1) shows that M-157 had a saturated thickness of only 0.3 feet in the alluvium. The new data were used to estimate the mass flux of perchlorate in groundwater flowing in the alluvium around the west end of the barrier wall, which is calculated to be about 1.1 pounds/day (see Table 4).

This data gap has been addressed.

Data Gap # 4: Demonstrate that there are overlapping cones of depression for the Interceptor extraction wells.

Proposal: Conduct short-term shutdowns of up to four Interceptor wells with low pumping rates in areas lacking monitoring coverage within the well field in order to obtain water elevation data to aid in contouring cones of depression. Perform distance drawdown plots following procedures outlined in Driscoll (1986) to evaluate pumping well efficiency.

Results: Between June 2 and 4, 2008, extraction wells I-B, I-E, I-F, I-J, I-K, I-N, I-R, I-T, and I-U were turned off for between 7 to 19 hours and water levels were allowed to recover (see Attachment E, Appendix B, ENSR, 2008d). Distance drawdown tests were performed in wells I-K, I-N, I-R, and I-T, wherein the wells were pumped at rates ranging from 0.4 to 4.2 gpm for a period between 150 and 200 minutes. The results from pumping well I-T provided adequate data in adjacent observation wells to assess the well efficiency, which was estimated to be about 20 percent (see NDEP correspondence dated October 6, 2008 in Appendix A). In the case of the other three wells, (I-K, I-N, and I-R), either drawdown could not be measured or there was only one well with measurable drawdown, which precluded evaluation of well efficiency following the methods described by Driscoll (1986). With regard to the influence measured during the short-term pumping, measurable drawdown was observed in observation wells located about 20 feet from the pumping well. Beyond this distance, measurable drawdown was not recorded in observation wells during the period of short-term pumping. The absence of drawdown beyond 20 to 25 feet is likely a function of the short-term nature of the testing, which may not have been long enough to adequately assess the influence of the pumping and the boundary effect that would be induced by the barrier wall. It would be anticipated that with a longer period of testing, the extent of the influence would have been greater than measured. However, the mounding effect caused by the barrier may have precluded collection of any usable drawdown data from these wells. Additional distance drawdown testing will not be performed due to the interfering influences of adjacent pumping wells, the boundary effects of the barrier wall, and the need to continue to extract a maximum amount of impacted groundwater.

In order to determine the extent of overlapping cones of depression and drawdown in the well field, a potentiometric surface map (Figure 5) was constructed. Inspection of this map in conjunction with the hydrogeologic cross section (Plate 1) shows that the groundwater surface slopes eastward from M-57A toward I-X on the west and slopes westward from at least CLD2-R toward I-T on the east. Note that the surface between I-Y and I-M is gentle (0.011) relative to other parts along the well line. Three-point problems were solved for the following well triplets using February 2009 data in the EPA On-line Hydraulic Gradient and Flow Direction calculator (accessed at www.epa.gov/athens/learn2model/part-two/onsite/gradient3ns.htm):[1]

Well Triplets Used for Gradient Calculation	x-coordinate	y-coordinate	GW Elev. (ft msl)	Hydraulic Gradient	Flow Direction
M-61	828671.937	26719953.97	1721.99	0.015454	N6W
M-67	828508.518	26719829.72	1723.64		
M-68	828750.965	26719864.51	1723.49		
M-66	828183.642	26719787.47	1722.83	0.02453	N15W
M-67	828508.518	26719829.72	1723.64		
I-W	828245.871	26719895.87	1720.59		
M-78	827777.453	26719838.17	1718.64	0.01858	N15W
M-65	827899.716	26719746.36	1720.87		
M-56	827980.362	26719859.52	1719.22		
I-Y	827334.687	26719800.78	1721.44	0.01619	N1W
M-14A	827045.361	26719382.67	1728.15		
M-25	827677.804	26719503.57	1726.32		

All of the four three-point problem solutions show northward flow toward recovery wells.

Figure 6 and Table 3 of this report show the drawdown in the well field between 1987 and May 2009. The maximum drawdown shown is 15.0 feet in well M-68 and that drawdown decreases westward to about 7.0 ft in well I-Y. Although the pumping tests were inconclusive, the evidence of northward flow vectors toward the barrier wall and the long-term pattern of significant drawdown of shallow groundwater levels demonstrate that there are overlapping cones of depression for the Interceptor extraction well field.

This data gap has been addressed.

[1] Tronox considered using the computer program Surfer™ to draw vectors for a groundwater direction analysis but rejected it because of the anticipated boundary condition problems due to the proximity of the barrier wall.

2.1.2 Performance Evaluation

The current lines of evidence for effective groundwater capture at the Interceptor well field include calculated estimates of captured perchlorate mass, a groundwater flow budget, downgradient concentrations declining over time, and overlapping cones of depression. These lines of evidence are discussed further below.

2.1.2.1 Capture Zone

The 1,600-foot long barrier wall was designed to provide a physical barrier to groundwater migration across most of the identified perchlorate plume. Based on May 2009 perchlorate concentrations, Table 4 shows that on the east end of the barrier wall and Interceptor well field all alluvial perchlorate except about 0.2 pounds/day (at 9.7 mg/L) in cell CLD2-R and all Muddy Creek formation perchlorate except about 0.4 pounds/day (at 25 mg/L) in cell M-130 is being recovered. On the west end of the barrier wall and Interceptor well field all alluvial perchlorate except about 1.1 pounds/day (at 114 mg/L) in cell M-131 and all Muddy Creek formation perchlorate except about 0.8 pounds/day (at 250 mg/L) also in cell M-131 is being recovered. These estimates indicate that approximately 2.5 pounds/day perchlorate is getting past both ends of the barrier wall. It should be noted that these calculations do not include assumed underflow of perchlorate in the deeper UMCf, which is discussed under Data Gap #1 in Section 2.1.1 above.

Based on data and calculations presented in Table 4**,** a total of about 698 pounds/day of perchlorate is estimated to be flowing toward the well field and barrier wall. Of this 698 pounds/day, approximately 2.5 pounds/day are bypassing the collection system. This equates to an estimated effective capture rate of 99.6 percent [(698 – 2.5)/698 = 0.996)]. For comparison, data presented in the *Annual Remedial Performance Report for Chromium and Perchlorate* (Northgate, 2009) indicate that the Interceptor well field actually removed 849 pounds/day of perchlorate in May 2009 at an average pumping rate of about 69.3 gpm (pumping rate from June 2009 data). When scaled up for the increased discharge rate (the calculations in Table 4 estimate that 57.6 gpm is captured by the Interceptor well field), the predicted mass captured is approximately 837 pounds/day. For the Interceptor well field, the observed mass removal is consistent with the calculated mass flux towards the barrier wall and Interceptor wells, indicating effective hydraulic capture. The current groundwater flow calculations appear to underestimate the amount of water flowing towards the Interceptor well field and barrier wall. However, the data still indicate greater than 99 percent perchlorate mass capture in the Qal and upper portion of the UMCf by the Interceptor well field.

2.1.2.2 Flow Budget

The barrier wall installed in 2001 has dramatically improved groundwater capture. Current pumping rates of about 70 gpm are double those before the wall was installed. Water level data indicate the alluvial aquifer has been mined and is effectively dewatered behind the barrier wall. The barrier wall is keyed into approximately 30 feet of the fine-grained facies of the UMCf, and as noted above there is an upward vertical gradient in the vicinity of the wall. It would be anticipated that the upward flow of groundwater is enhanced by pumping upgradient of the barrier wall. Given this enhancement to upward flow, with the removal of the alluvial groundwater head, perchlorate mass present within the upper portion of the UMCf would be drawn upward in the vicinity of the Interceptor well field and barrier wall.

The known or inferred sources of water contributing to the Qal for ultimate capture by the Interceptor well field and barrier wall are:

- Upgradient (Offsite) Contribution of Groundwater to the Qal: Previous subsurface investigations in the southern (upgradient) portion of the facility indicate that the water table resides in either the coarse-grained facies of the UMCf (vicinity of Lake Mead Parkway) or the fine-grained facies of the UMCf (vicinity of the unit buildings). The Qal unconformably overlies both. Water occurring in the Qal in the upgradient area is due to residential over watering and precipitation and is subject to evapotranspiration. Any water that percolates through the vadose zone mixes with groundwater in the UMCf.

- UMCf "daylighting" groundwater into the Qal: Groundwater flow from the upgradient UMCf begins to "daylight" into the overlying Qal northeast of the unit buildings within one discrete alluvial channel cut into the UMCf. The average beginning point of this "daylighting" occurs approximately 1,200 feet south of the Interceptor well field. The width of this zone is defined as approximately the length of the barrier wall. Saturated alluvium thicknesses vary based on the topography of the UMC erosion surface.

- UMCf upwelling groundwater into the Qal: Since the vertical hydraulic gradient has been shown to be upward from the UMC into the alluvium the upward movement of groundwater continues to supplement the water already in the alluvium within this same area. This upwelling groundwater is in addition to the "daylighting" groundwater in the buried alluvial channel, as discussed above.

- Rainfall: Rainfall is not considered to be a significant source of recharge to the Qal at the site due to the minimal amount of annual precipitation (4 to 5 inches/year).

- Onsite Water Line Leaks: The majority of the older water distribution lines at the facility carry untreated Lake Mead water. These lines were installed in the 1940's and have been the source of line failures and leaks many times in the past. Even though subsurface water delivery line leaks have occurred and are occurring onsite, the volume of water released to the subsurface cannot be quantified.

Since the installation of the barrier wall, the Interceptor well field at the barrier wall has recovered an average of 62 gpm (currently 70+ gpm). Based on this review of possible water sources for the saturated alluvium at the well field, the only significant source for the groundwater in the Qal is groundwater moving from the UMCf laterally into and upward into the alluvium, and sporadic water distribution line leaks. Whereas a volume calculation for groundwater moving from the UMCf can be determined, the actual total groundwater budget available for recovery at the Interceptor well field cannot be determined because of the non-quantifiable nature of water line leak contributions.

An estimate of the groundwater flow at the Interceptor well field and barrier wall was developed based on a solution of Darcy's Law assuming two main sources of groundwater potentially available for capture (ignoring the contribution of water line leaks):

- Groundwater in the Qal: As mentioned above, an area upgradient of the barrier wall contains variable thicknesses of saturated Qal. A flow budget was prepared using saturated alluvial thicknesses from the May 2009 data plotted on the hydrogeologic cross section (Plate 1). The cross sectional area used in the calculations is the plane of the barrier wall from M-131 on the west to CLD2-R on the east. From this estimate, a total of about 53.8 gpm is flowing toward the barrier wall in the Qal. Calculations and assumptions are shown on Table 4.

- Groundwater upwelling from the UMCf: As previously confirmed, groundwater in the UMCf has an upward vertical hydraulic gradient averaging about 0.07 and hydraulic conductivities on the order of 10^{-6} cm/s or about 0.06 gpd/ft^2. The southernmost upwelling occurs about 1,200 ft upgradient of the barrier wall and the width of the zone is the length of the barrier or about 1,600 ft. This is an area of about 1,920,000 sq. ft. Solving for Darcy's Law (Q = KiA) gives 0.06 gpd/ft^2 X 0.07 ft/ft X 1,920,000 ft^2 = 8,064 gpd or 5.6 gpm flows upward into the alluvium from the UMCf upgradient of the barrier wall. Calculations and assumptions are shown on Table 4.

The total flow budget approaching the barrier wall from these two sources is about 59.5 gpm. An undeterminable amount – probably due to water line leaks – also contributes to the flow budget. It is not possible to calculate a more exact flow budget because of the unknown quantity of water released from line leaks.

As discussed above, in order to determine the perchlorate and chromium concentrations in the deeper parts of the UMCf, Tronox has installed eight deep Muddy Creek wells at four locations (two wells at each location) on the Tronox facility. These wells were completed in September/ October 2009 and will be discussed in section 3.0, *Vertical Delineation of Contaminant Plumes and Hydraulic Gradient*.

2.1.2.3 Downgradient Concentration Declines over Time

Perchlorate itself is an effective tracer, since it migrates advectively and is not readily adsorbed to soils. The perchlorate in downgradient wells indicates reduction of a zone containing greater than 100 mg/L perchlorate downgradient of the recharge trenches, where stabilized lake water is added to offset extracted groundwater and maintain groundwater flow. As the recharge water flow is slightly less than the water volume being extracted upgradient of the barrier wall, the rapidly shrinking area containing greater than 100 mg/L perchlorate indicates perchlorate capture. Recently, because of trench clogging and diminished water infiltration, the reduction of the area of greater than 100 mg/L perchlorate has slowed. With the recent refurbishment of the infiltration trenches, this reduction is expected to accelerate. Figure 7 shows the perchlorate concentration decline over time in wells M-100, M-23, and M-96; 1,000, 1,600 and 2,800 feet north of the well line, respectively. Well M-100, which contained 1,000 mg/L perchlorate in November 2001, contained 32.3mg/L in May 2009.

2.1.2.4 Overlapping Cones of Depression

Figure 5 and Plate 1 show that the groundwater surface, based on May 2009 data, slopes eastward from M-57A toward I-X on the west and slopes westward from at least CLD2-R toward I-T on the east. The areas between I-S and I-D, I-E and I-U and I-J and I-K have groundwater elevations below 1,720 ft MSL. Figure 6 shows drawdown in the well field between September 1987 and May 2009 and that the maximum drawdown is 15.0 ft in well M-68 and that drawdown decrease westward to about 7.0 ft in well I-Y.

2.1.3 Evaluation of Groundwater Velocity Downgradient of the Barrier

As suggested by NDEP (2007b), Tronox has completed a qualitative evaluation to determine the times at which perchlorate and chromium plumes might reach the Athens Road well field. The evaluation was done through an analysis of "break over", wherein the effect of the recharged Lake Mead water was used to approximate the groundwater velocity north of the barrier. The resulting groundwater velocity was used to approximate the travel time to the Athens Road well field for both the perchlorate and chromium plumes. The calculations indicate that the mitigating effects of the onsite barrier wall will reach the Athens Road well field between the years 2010 and 2015, depending on velocity. This discussion is contained in the *Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems* (ENSR, 2007c).

2.1.4 Data Gaps and Proposed Additional Evaluation

In addition to the previously identified data gaps discussed above, Tronox has identified the following data gap and corresponding proposal to strengthen the lines of evidence for capture at the Interceptor well field:

Data Gap #1: More impacted groundwater should be recovered from the Interceptor well field.

Proposal: Tronox will connect wells I-AA, I-AB, I-X, I-W, and I-Y to the recovery system by the second quarter 2010. Capacity to handle the additional groundwater in the GWTP will be made available by routing the discharge from selected wells (containing low chromium concentrations) now connected to the west header, directly to the GW-11 pond.

2.2 Athens Road Well Field

The locations of the recently installed monitoring and recovery wells and soil borings in the vicinity of the Athens Road well field are shown on Figure 8. Figure 9 is a conceptual hydrogeologic block model summarizing the hydrogeologic conditions around the well field as is interpreted to date. Groundwater flows northward in the alluvium beneath Sunset Road toward the well field. The ART-series wells extract the impacted water at a current rate of about 257 gpm and pump it back to the fluidized bed reactors (FBRs) on the Tronox plant site. The well field is dewatering the alluvium, and deeper water from the UMCf is flowing upward based on vertical gradient calculation from deep well pairs such as PC-136 and PC-137 (see Table 2).

In their assessment of the Athens Road well field, McGinley (2007) compared both analog methods and numerical groundwater modeling to USEPA guidance for determining capture effectiveness and mass recovery efficiency.

Results of the numerical groundwater model showed:

- In a particle-tracking study where a total of 260 particles released at the southern boundary of the model, all of the particles were captured by the Athens Road well field; and
- A mass flux evaluation indicated the well field was over 99 percent efficient in mass recovery.

Results of the analog assessment showed:

- Flow vectors using triangulated extraction wells (ART) and downgradient monitor wells (ARP) did not show inward flow, suggesting capture might not be achieved using the ARP wells as the compliance boundary.

McGinley (2007) concluded that the numerical groundwater model provided some use in showing the well field had a high degree of efficiency, but that installed well pairs did not exist that could validate model predictions. They recommended that:

- Analog capture analysis be considered using a standard procedure;
- Five monitoring wells be completed to evaluate inward flow and to provide vertical definition across the extraction well field; and
- Data gathered from pump tests conducted on the proposed new wells be used in expanding the site conceptual model and for possible updating of the numerical groundwater model.

The McGinley groundwater modeling results agree with those of a model previously constructed by Tronox that was used in designing the Athens Road well field. In both cases, calibrated numerical models, constructed independently, demonstrated complete particle capture, one of the USEPA criteria required to demonstrate capture. McGinley's 99+ percent mass recovery is also a significant result that would support the demonstration of effective well field capture.

2.2.1 Previously Identified Data Gaps and Discussion of Results

To further evaluate the capture zone at Athens Road and strengthen the lines of evidence for capture, Tronox identified the following data gaps and proposed methods to address them:

Data Gap #1: In contrast to numerical modeling results, McGinley (2007) was not able to demonstrate inward flow using water level data from the second half of 2006 due to the absence of sufficient monitor wells. Also, there are insufficient data to demonstrate influence from pumping of the Athens Road well field on water within the underlying UMCf.

Proposal: In order to demonstrate upward vertical head and inward flow, two additional nested well pairs will be completed within 100 feet downgradient of recovery wells ART-3 and ART-9 in the western and eastern sub-channels, respectively. The new wells will allow calculation of flow vectors and vertical head to confirm capture.

Results: Nested wells PC-134 and PC-135 were constructed 41 and 38 feet north, respectively, of ART-3; whereas nested wells PC-136 and PC-137 were constructed 47 and 54 feet north, respectively, of ART-9 (see Figure 8). The cross section of the Athens Road well field (Plate 2) shows the new wells projected into the plane of the section. The most recent (August 2008) water data from the PC-134/135 pair (Table 2) show that the water elevation is highest in the deepest well (PC-134), confirming upward vertical gradient. However, no groundwater temperature measurements have been made in PC-135, so the density-adjusted gradient cannot be calculated. Likewise, in the PC-136/137 pair, the deepest well (PC-137) has the highest water elevation (based on the most recent May 2008 data), but because no temperature data exist the density-adjusted gradient cannot be calculated. Due to ongoing City of Henderson construction activities at the well field, all four wells are now buried under parking lots.

One core sample from each of the two well pairs was collected from the UMCf and tested for various physical properties including hydraulic conductivity. Table 1 shows the tests performed and that the hydraulic conductivities of both samples are in the 10^{-6} cm/s range.

In order to determine the extent of the cones of depression and drawdown in the well field, a potentiometric surface map (Figure 10) was constructed. Inspection of this map in conjunction with the hydrogeologic cross section (Plate 2) shows that the groundwater surface slopes eastward from L637 toward ART-4 and ART-4A in the western subchannel. In the eastern subchannel, the groundwater surface slopes westward from at least PC-122 and eastward from ART-6 toward ART-7 and ART-7A. To calculate horizontal flow directions in the vicinity of the Athens Road recovery wells, three-point problems were solved for the following well triplets using May/June 2008 and November 2008 data in the EPA On-line Hydraulic Gradient and Flow Direction calculator (accessed at www.epa.gov/athens/learn2model/part-two/onsite/gradient3ns.htm).

Wells Used for Gradient Calculation	x-coordinate	y-coordinate	GW Elev. (ft msl)	Related Athens Road Recovery Well	Hydraulic Gradient	Flow Direction
ART-4	828850.71	26728085.28	1588.22	ART-3	0.00751	S19E
PC-17	828732.629	26728089.23	1588.54			
PC-135	828765.25	26728123.177	1588.70			
ART-6	829472.92	26728140.63	1584.99	ART-9	0.01162	N29E
ART-7A	829576.521	26728145.71	1584.35			
PC-136	829517.888	26728191.374	1584.22			

Note: Groundwater elevation data are from June 2008 for the ART-3 and ART-9 areas, with the exception that the May 2008 groundwater elevation was used for well PC-136, as reported in Appendix A of the Tronox *Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada*, July 2008 – June 2009, dated August 21, 2009.

Calculations of flow vectors using the USEPA online tool and May/June 2008 water elevations (see table above) indicate inward flow is being achieved at ART-3, but cannot confirm that inward flow is being achieved at ART-9. Concerning the ART-3 well triangle, the differences in groundwater elevation among the wells was very slight, indicating that additional pumping may be necessary to increase the inward flow under this configuration of wells.

Another solution of the ART-3 three-point problem for November 2008 indicated that inward flow could not be confirmed (see table below). As in June 2008, the hydraulic gradient was a very flat 0.007; however, the flow vector in November was calculated to be N42E. As discussed above, no additional flow vectors can be calculated for either the ART-3 or ART-9 three-point problems until wells PC-134 through 137 are unburied or redrilled.

Wells Used for Gradient Calculation	x-coordinate	y-coordinate	GW Elev. (ft msl)	Related Athens Road Recovery Well	Hydraulic Gradient	Flow Direction
ART-4	828850.71	26728085.28	1588.54	ART-3	0.00744	N42E
PC-17	828732.629	26728089.23	1589.11			
PC-135	828765.25	26728123.177	1588.76			

Note: Groundwater elevation data are from November 2008 for the ART-3 area, as reported in Appendix A of the Tronox *Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada*, July 2008 – June 2009, dated August 21, 2009.

Figure 10 shows the contoured potentiometric surface in the well field area. The 1,585-foot contour in the eastern subchannel and the 1,590-foot contour in the western subchannel are interpreted and drawn as closed contours based on the distribution of groundwater elevation measurements within the contour line (Figure 10), the significant local drawdown of up to 13.2 feet centered on the pumping wells (see Figure 11 and Table 5), and our experience at the Site. However, currently available and accessible monitoring wells are insufficient to confirm the precise location of these contours.

This data gap is partly filled with the demonstration of upward vertical gradients in nested well pairs PC-134/135 and PC136/137, and will be further addressed by increasing the pumping rates to improve inward flow in the areas of ART-3 and ART-9 as will be described in Section 2.2.3. Temperature data will be collected from nested well pairs during future monitoring events, when COH allows the wells to be located and unburied or replaced. Additionally, more wells may be needed between the well field and the ARP well line in order to evaluate the potentiometric surface around the well field. This can't be accomplished until after COH construction activities cease.

Data Gap # 2: Since the abandonment of downgradient monitor wells ARP-4, ARP-5 and ARP-6A in March 2007 there is inadequate monitoring capability north of the well field.

Proposal: The three recently abandoned ARP-series piezometers, ARP-4, ARP-5, and ARP-6A downgradient of the well field will be re-established near their former locations.

Results: Three new wells ARP-4A, ARP-5A, and ARP-6B were installed near the abandoned wells. Table 1 shows a summary of the well completion, groundwater elevation and chemical data.

This data gap has been filled.

2.2.2 Performance Evaluation

Capture Zone: The Athens Road well field was designed to provide a hydraulic barrier spanning the approximately 1,160-foot width of the identified perchlorate plume in this area (i.e., greater than 5 mg/L perchlorate). The well field is stopping the downgradient flow of perchlorate above about 1 mg/L perchlorate on the west end and about 5 mg/L on the east end. This means that the capture zone is defined as extending 1,160 feet from about 50 feet west of ART-2 to about 50 feet east of PC-122. As shown on the west-east cross section (Plate 2), a zone of

unsaturated alluvium about 480 feet wide separates the western sub-channel from the eastern sub-channel so the alluvial portion of the capture zone is only a total of 880 feet wide.

Flow Budget: Table 6 shows the calculated groundwater underflow and perchlorate mass flux condition at the well field in May 2009. The table shows that about 131 gpm, containing about 234 pounds/day perchlorate, were calculated to be flowing toward the well field in the Qal whereas the UMCf calculation yields only 0.027 pounds/day flowing through the entire width of the capture zone to a depth of approximately 70 feet bgs. The table also shows the perchlorate loading on either side of the 5 mg/L capture zone, whereby 0.05 pounds/day (PC-55 cell) and 0.3 pounds/day (PC-122 EAST cell) are flowing around the west and east ends, respectively. This calculated water flow and mass flux is lower than the documented May 2009 well field recovery of 257 gpm containing 655 pounds/day perchlorate (Northgate, 2009). When corrected for the increased rate of pumping (257 gpm captured by the well field instead of 121 gpm), the data in Table 6 calculates a mass removal of approximately 497 pounds/day from the Athens Road well field. The cause of this lower calculated mass flux in Table 6 may be that the hydraulic conductivities from the ART-series well pump tests in 2002 are now lower than the current in-place hydraulic conductivities, as the constant pumping since 2002 has cleaned much of the silt out of the formation around the wells. In addition, it appears likely that perchlorate concentrations in one or more of the pumping wells are higher than the measured concentrations in adjacent monitoring wells used to estimate the mass flux in Table 6.

Tronox has considered performing new pump tests in the recovery wells but has rejected the idea because of the interference that would be expected from the adjacent pumping wells and the importance of keeping all of the wells on-line. In the meantime Tronox has increased the pumping rate in the west subchannel in order to further increase recovery.

Overlapping Cones of Depression: As shown on Figure 10, the potentiometric surface is mapped to include closed contours around the wells in both the western and eastern sub-channels. Though these contours cannot be conclusively drawn because of the limited data between the well field and the ARP wells to the north, it is thought that such a representation is warranted because of the significant drawdown, 12.7 feet in monitor well ART-3, 13.2 feet in monitor well ART-7A and the large zone of greater than 8 feet drawdown that extends at least 350 feet north to the ARP wells as shown on Figure 11 and Table 5. These data indicate that the well field has developed a capture zone sufficient to encompass the width of the plume in this area. In fact, the entire 1,160 feet length of the target capture zone is within an area of overlapping cones of depression. Tronox appreciates the distinction that drawdown and capture only coincide when the prevailing hydraulic gradient is zero. However, the combination of

paleochannel geometry, extraction well locations, overlapping cones of depression, and a decreasing hydraulic gradient in the vicinity of the well field are adequate evidence for drawdown to be used as a line of evidence for capture.

Numerical Modeling: A numerical evaluation by an NDEP contractor (McGinley, 2007) using MODFLOW showed that particles released in the model were completely captured by the Athens Road well field, and that mass flux within the model showed greater than 99 percent capture efficiency.

Downgradient Concentration Declines over Time: Figure 12 shows that downgradient wells PC-98R and MW-K5 have exhibited consistent decreasing trends of perchlorate concentrations over time with minor reversals. Since full-scale system operation of the Athens Road well field in October 2002, perchlorate concentrations from well PC-98R and MW-K5 have been reduced 83 and 85 percent, respectively, since June 2003. The figure shows that the rate of decline has decreased since early 2004. Currently the wells are experiencing a slight increase in concentration, probably in response to a temporary decrease in pumping rate in the west subchannel wells due to well pump issues. The historic decrease in perchlorate shown on the figure does not appear asymptotic at this time. These wells are located about 2,000 feet downgradient of the Athens Road well field.

2.2.3 Data Gaps and Proposed Additional Evaluation

To further evaluate the capture zone at Athens Road, Tronox has identified four additional data gaps and has developed proposals to address them; these are in addition to the previously identified uncompleted data gaps discussed above:

Data Gap #1: Tronox was not able to demonstrate consistent inward flow in the western and eastern subchannels using water level data from May 2008.

Proposal: Tronox will increase pumping rates to demonstrate inward flow. ART-7 can be deepened through the hard caliche layer that stopped deeper completion of ART-7 in 2001. This will be completed by the second quarter 2010.

Data Gap #2: Wells ARP-2 and ARP-3 were buried during COH construction activities. There are currently no monitoring data points between ARP-1 and MW-K4.

Proposal: Tronox will re-complete ARP-2A and ARP-3A near the original locations of ARP-2 and ARP-3. This will be completed by the second quarter 2010.

Data Gap #3: Wells PC-134, PC-135, PC-136, and PC-137, used to prove inward flow, were buried during COH construction activities.

Proposal: Wells PC-134, PC-135, PC-136, and PC-137 will either be unburied or recompleted near the original well locations. This will be completed by the second quarter 2010. Temperature data will be collected during future monitoring events for the unburied or recompleted wells to allow calculation of density-corrected vertical gradients.

Data Gap #4: Additional monitoring wells may be needed to map closed potentiometric surface contours around the eastern and western parts of the well field.

Proposal: Tronox will consider installing two additional monitor wells between the well field and the ARP well line. Due to continued COH construction activities in the area, it is impossible to estimate a timeframe for this work. The results of further evaluation based on the additional data gathered will be included in the final revised and updated report.

3.0 VERTICAL DELINEATION OF CONTAMINANT PLUMES AND HYDRAULIC GRADIENT

In response to an NDEP request in May 2008 (NDEP, 2008) Tronox added a task to the capture evaluation work plan to complete up to eight deep nested wells in the UMCf at four locations on the Tronox plant site. These wells, sited adjacent to existing shallow monitor wells, were completed in September-October 2009. Well development records appear in Appendix B and borehole lithology logs and well completion diagrams appear in Appendix C. A summary of the well completion and chemical data is shown in Table 1, and the evaluation of vertical hydraulic gradient is shown in Table 2.

Plate 3, the *South-North Hydrogeologic Cross Section C-C'*, shows the location of these eight wells (M-149 through M-156) and the hydrogeologic and stratigraphic subsurface relationships along the line of cross section. The cross section shows that all of the wells except M-154 and M-155 were screened in the first fine-grained facies of the UMCf (UMCf-fg1), whereas the two exceptions were screened in the second coarse-grained facies of the UMCf (UMCf-cg2). Well M-156, on the north end of the section, was screened in an interfluve unit between two channel deposits. As shown on the cross-section and in Table 2, all of the calculated vertical hydraulic gradients adjusted for density are upward, with M-155 exhibiting an artesian condition.

Table 1 contains chemical data for perchlorate, total chromium, and TDS from September-October 2009, which are graphically portrayed on Plate 3; November 2009 data are pending. These data show that the highest perchlorate and TDS concentrations are found in M-149, the shallowest delineation well located closest to the on-site contaminant source. Downgradient, two other shallow delineation wells (M-150 and M-152) also contain perchlorate up to 181 mg/L. Chromium is non-detect (<0.01 mg/L) in six of the eight wells, with a maximum detected concentration of 2.9 mg/L in well M-149.

The perchlorate plume is interrupted between M-150 and M-152 by the low concentration (0.07 mg/L) in M-151; screened in the UMCf-fg1 facies above artesian well M-155. This anomalous condition may be the product of faulting in the subsurface creating the artesian flow. Another possibility may be that the near-surface Lake Mead water infiltration in the recharge trenches has descended to the level of the M-151 screen. However, this is considered less likely because of the upward vertical gradients proven in all of these deeper wells.

The results of the installation of these deep wells show that the bottom of the perchlorate plume (based on perchlorate concentrations less than 5 mg/L) lies between the shallow and deep delineation wells; excluding the low-perchlorate-bearing groundwater present at M-151, above

the flowing artesian well M-155. The vertical extent of the chromium plume is shown to be limited to the vicinity of the southernmost shallow delineation well (M-149), although this plume may not even exist in M-149 since the two available analyses are quite different (0.014 vs. 2.9 mg/L). The pending November 2009 results will provide further data to evaluate the vertical extent of the chromium plume. These results will be reported in the updated and revised report.

4.0 CONCLUSIONS

Tronox has performed this evaluation to verify the effectiveness of the groundwater extraction systems at the Site. Overall, the decrease in perchlorate loading in the Las Vegas Wash since 1999 is a strong line of evidence of the effectiveness of the combined systems over the last 10 years. In May 1999, the perchlorate loading in the Wash was 1,104 pounds/day vs. 55 pounds/day in July 2009, a 95.0 percent drop. The evaluation of groundwater capture found multiple lines of evidence to support the conclusion that the Interceptor extraction system is effective at hydraulic capture. However, there is not yet sufficient data to demonstrate hydraulic capture at the Athens Road and Seep extraction systems. Tronox has made every effort to fill data gaps in the Athens Road and Seep areas, but has not yet been able to collect the additional data necessary to support a complete capture evaluation. This interim report is being submitted at the request of NDEP, and a revised and updated final report will be submitted with the results of the evaluations at the Athens Road and Seep extraction systems.

At the Interceptor well field, capture zone analysis, flow budget, declining perchlorate concentrations downgradient from the barrier wall over time, and overlapping cones of depression are lines of evidence demonstrating effective capture. Perchlorate mass flux calculations based on May 2009 sampling data indicate a 99.6 percent capture of perchlorate mass in the Qal and upper portion of the UMCf by the Interceptor well field. It is acknowledged that a small amount of perchlorate is present in groundwater flowing past the Interceptor well field on the west and east sides of the barrier wall, and that underflow beneath the barrier wall within the deeper portion of the UMCf occurs, but at a greatly reduced rate based on low hydraulic conductivities estimated in the 10^{-5} cm/s range. In addition, density-adjusted vertical hydraulic gradients measured at the Site are generally upward, suggesting that any contaminants present in the UMCf that pass beneath the barrier wall will eventually daylight into the alluvium and be captured downgradient at the Athens Road well field. Tronox is proposing additional pumping and evaluation in the Interceptor well field to further increase the contaminant capture and confirm that the barrier wall is not leaking. Specifically, wells M-70, M-71 and M-72 will be pumped and water levels monitored to further confirm the absence of leakage through the barrier wall. Wells I-AA, I-AB, I-W, I-X and I-Y will be hooked up to the recovery system to extract additional groundwater upgradient of the barrier wall and from the recently discovered alluvial channel adjacent to the western edge of the barrier wall.

For the Athens Road well field, previously identified data gaps have been partially addressed. However, installation of additional wells, repair of damaged and/or buried wells, and additional data collection are needed to fully address these data gaps. The primary lines of evidence supporting the effectiveness of capture at the Athens Road well field are the results of numerical modeling and declining downgradient concentrations of perchlorate over time. According to the McGinley and Associates 2007 Modflow study, the Athens Road well field has greater than 99 percent capture efficiency. Decreasing perchlorate concentrations have been consistently observed at monitoring wells downgradient of the Athens Road well field (PC-98R and MW-K5), although a recent slight increase in concentrations, inferred to be the result of a temporary decrease in the pumping rate in the western subchannel wells, will need to be evaluated further. Based on available calculated hydraulic conductivities, the estimated perchlorate mass flux moving toward the Athens Road well field is significantly less than the actual capture rate, suggesting that the available estimates of parameters needed to calculate the perchlorate mass flux are not well constrained. Tronox is proposing additional work to address the remaining data gaps. Several wells buried or destroyed by COH construction activities will be uncovered and/or replaced, including ARP-2, ARP-3, PC-134, PC-135, PC-136 and PC-137. Recovery well ART-7 will be deepened to allow increased pumping from the eastern subchannel. Pumping will also be increased in the western subchannel to improve inward flow in this area. Tronox may consider installing additional monitoring wells between the Athens Road well field and the ARP well line to provide additional data to reduce the uncertainty in the potentiometric contours in the area. These efforts are scheduled for completion by the second quarter of 2010, and the additional data will be evaluated and presented in a revised version of this report.

Due to difficulties obtaining permission from BMI to drill and install monitoring wells outside of an existing easement, fieldwork at the Seep well field has not been completed, and therefore the capture efficiency of the well field has not been calculated. This report will be revised and resubmitted with the Seep well field evaluation when the additional data needed can be collected and analyzed.

In response to an NDEP request, Tronox completed eight deep nested wells in the UMCf at four locations on the Tronox plant-site for the dual purpose of further delineating the vertical extent of contaminant plumes and evaluating vertical hydraulic gradients. The perchlorate concentrations show that the bottom of the perchlorate plume lies between the shallow and deep delineation wells at about 160 feet below the ground surface. Based on available data, there is no chromium plume in the deeper UMCf. The calculated density-adjusted vertical hydraulic gradients from these wells generally demonstrate upward gradients.

5.0 REFERENCES

AECOM 2008, Response to NDEP Comments on Vertical Delineation of Contaminant Plumes and Hydraulic Gradients, September 26, 2008, 4020-023-130.

Driscoll, F.G., 1986, Groundwater and Wells: Johnson Well Division, Saint Paul, Minnesota, 1089 pp. (Well Efficiency Discussion, pp 244-245).

ENSR 2007a, Draft Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Tronox, LLC, Henderson, Nevada: ENSR, Camarillo, California, May 30, 2007, 4020-023-160.

ENSR 2007b, Annual Performance Report for Chromium and Perchlorate, July 2006-June 2007, Submitted in Accordance with Chromium Mitigation Program and Perchlorate Performance Consent Orders: ENSR, Camarillo, California, August 29, 2007, 4020-023-110.

ENSR, 2007c, Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Tronox LLC, Henderson, Nevada: ENSR, Camarillo, California, August 29, 2007, 4020-023-110.

ENSR 2008d, Annual Performance Report for Chromium and Perchlorate, July 2007-June 2008, Submitted in Accordance with Chromium Mitigation Program and Perchlorate Performance Consent Orders: ENSR, Camarillo, California, August 28, 2008, 4020-023-110.

McGinley 2007, Athens Road Well Field Modeling Report – Near BMI Industrial Complex, Henderson, Nevada: McGinley and Associates, Reno, Nevada, June 30, 2007.

NDEP 2007a, Comments on the Tronox Semi-Annual Performance Report for Chromium and Perchlorate, dated February 26, 2007: Nevada Division of Environmental Protection, Las Vegas, Nevada, March 29, 2007.

NDEP 2007b, Response to NDEP Comments of the Tronox Semi-Annual Performance Report Dated February 28, 2007 and the Required Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Henderson, Nevada, Dated May 30, 2007: Nevada Division of Environmental Protection, Las Vegas, Nevada, June 26, 2007.

NDEP 2007c, Response to NDEP Comments of the Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Tronox LLC, Henderson, Nevada, Dated August 29, 2007: Nevada Division of Environmental Protection, Las Vegas, Nevada, October 3, 2007.

NDEP 2007d, Response to NDEP Comments of the Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Tronox LLC, Henderson, Nevada, Dated November 28, 2007: Nevada Division of Environmental Protection, Las Vegas, Nevada, December 11, 2007.

NDEP 2008a, Vertical Delineation of Contaminant Plumes and Hydraulic Gradients, Dated May 19, 2008: Nevada Division of Environmental Protection, Las Vegas, Nevada.

NDEP 2008b, Response to: Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada, July 2007 – June 2008: Nevada Division of Environmental Protection, Las Vegas, Nevada, October 6, 2008

NORTHGATE 2009, Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada, July 2008 – June 2009, Dated August 21, 2009: Northgate Environmental Management, Inc., Oakland, California

TRONOX 2007, Response to Nevada Division of Environmental Protection (NDEP) Comments to the Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox LLC, Henderson, Nevada: Tronox LLC, Henderson, Nevada, November 28, 2007

USEPA 2002, Elements for Effective Management of Operating Pump and Treat Systems, EPA 542-R-02-009: United States Environmental Protection Agency, Washington, D.C., December 2002.

USEPA 2005, Capture Zone Analysis for Pump-and-Treat Systems, EPA NARPM Conference May 24, 2005: United States Environmental Protection Agency, Washington, D.C., May 24, 2005.

TABLES

TABLE 1
Summary of Well Completion and Geotechnical Data, Groundwater Capture and Vertical Gradient Evaluation

WELL NUMBER[1]	AQUIFER UNIT	NORTHING	EASTING	WELL DIAMETER	TOP OF CASING	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	TOTAL WELL DEPTH	ELEVATION TOP OF SCREEN	ELEVATION BOTTOM OF SCREEN	ELEVATION MID-POINT OF SCREEN	WELL LOCATION	Sample Date	CHEMICAL DATA		GROUNDWATER		PHYSICAL PROPERTIES[3]									LITHOLOGY		
														Perchlorate	Total Chromium	Measured DTW	GW Elevation	SAMPLE DEPTH	PORE FLUID SATURATION	POROSITY		DENSITY		MOISTURE CONTENT	EFFECTIVE PERMEABILITY	HYDRAULIC CONDUCTIVITY	FIELD	LAB[2]	Weight Percent Clay and Silt
																			API RP40	API RP40		API RP40		ASTM D2216	ASTM D5084	ASTM D5084			
																ft-toc	ft-msl	ft-bgs	WATER	TOTAL	AIR-FILLED	BULK	GRAIN						
		NAD(SPC)	NAD(SPC)	inches	ft-msl	ft-bgs	ft-bgs	ft-bgs	ft-msl	ft-msl	ft-msl			mg/L	mg/L				(%PV)	%	%	g/cc	g/cc	% (weight)	millidarcy	cm/s			%
BARRIER AND INTERCEPTOR WELL FIELD																													
M-129	Muddy Creek (UMCf)	26720079.636	828,806.426	2	1747.26	20	40	40	1724.48	1704.48	1714.5	East Barrier (Timet)	5/9/08	35.8	0.55	32.76	1714.50	35.5-36							1.10	1.05E-06	Clayey Silt		
													6/2/08	37.0	0.67	31.35	1715.91												
													1/6/09	--	--	31.49	1715.77												
													5/20/09	46.8	0.77	32.31	1714.95												
M-130	Muddy Creek (UMCf)	26719919.700	828,832.009	2	1749.23	20	40	40	1726.55	1706.55	1716.6	East Barrier (Timet)	5/9/08	35.5	0.021	28.12	1721.11	35.5-36							1.01	9.60E-07	Clayey Silt		
													6/2/08	37.8	0.048	28.07	1721.16												
													1/6/09	--	--	27.91	1721.32												
													5/20/09	49.8	0.71	27.92	1721.31												
M-131	Muddy Creek	26719770.566	827158.077	2	1754.13	29	39	40	1722.36	1712.36	1717.4	West Barrier	2/4/09	58.3	0.082	32.54	1721.59												
													5/5/09	60.9	0.082	32.94	1721.19												
M-132	Muddy Creek (UMCf)	26720048.491	828714.609	2	1744.27	79.7	89.7	90	1664.57	1654.57	1659.6	East Barrier	1/17/08	24.0	0.041	27.35	1716.92	60-60.5	91.7	59.6	4.9	1.08	2.68	50.8	2.97	2.87E-06	Sandy Silt	Silt	68.92
													2/5/08	23.2	0.046	27.51	1716.76												
													5/6/08	15.7	<0.01	27.28	1716.99												
													12/10/08	--	--	26.73	1,717.54												
													5/21/09	7.4	0.081	27.50	1,716.77												
M-133	Muddy Creek	26720067.292	828698.608	2	1743.62	60	70	70	1683.62	1673.62	1678.6	East Barrier	5/21/09	12.2	0.69	27.23	1716.39												
M-134	Muddy Creek (UMCf)	26719889.138	827144.353	2	1752.14	60	70	70	1692.14	1682.14	1687.1	West Barrier	1/17/08	124	0.056	34.51	1717.51												
													2/5/08	122	0.079	34.64	1717.50												
													5/11/08	122	0.12	33.22	1718.92												
													12/10/08	--	--	32.72	1719.42												
													5/20/09	123	0.1	34.00	1718.14												
M-135	Muddy Creek	26719890.173	827154.482	2	1751.85	29	39	39	1722.85	1712.85	1717.9	West Barrier	2/4/09	46	0.085	32.98	1718.87												
													5/5/09	43	0.083	33.79	1718.06												
													8/4/09	40	0.085	33.65	1718.20												
M-136	Muddy Creek (UMCf)	26719889.774	827165.342	2	1751.87	80	90	90	1671.87	1661.87	1666.9	West Barrier	1/17/08	168	0.087	29.54	1722.33	62-62.5	89.4	65.1	6.9	0.94	2.68	63.3	3.08	2.91E-06	Clayey Silt	Silt	77.65
													2/5/08	116	0.073	29.77	1722.10												
													5/11/08	109	<0.01	29.16	1722.71												
													12/10/08	--	--	28.82	1723.05												
													5/21/09	117	0.083	29.35	1722.52												
M-157	Alluvium	26719762.920	827120.264	Soil Boring	NA	NA	NA	35	NA	NA	NA	West Barrier	8/20/09	45.2	--	--													
M-158	Alluvium	26719767.620	827137.777	Soil Boring	NA	NA	NA	35	NA	NA	NA	West Barrier	no sample																
I-AA	Muddy Creek	26719770.850	827174.400	6	1753.93	26	46	46	1727.93	1707.93	1717.93	West Barrier (Recovery)	2/3/09	115	0.08	32.45	1721.484												
													5/5/09	114	0.08	32.94	1720.994												
													8/3/09	113	0.07	32.69	1721.244												
I-AB	Muddy Creek (UMCf)	26719790.510	827224.980	6	1753.89	25	45	50	1725.57	1705.57	1715.57	West Barrier (Recovery)	no sample																
VERTICAL DELINEATION WELLS																													
M-149	Muddy Creek (UMCf)	828373.149	26718285.780	2	1796.81	100	120	120	1797.05	1677.05	1737.05	Vertical Delineation Well Adjacent to M-31A	9/16/09	556	0.014	46.57	1750.13												
													10/9/09	501	2.9	--													
													11/4/09	pending	pending	42.62	1754.08												
M-150	Muddy Creek (UMCf)	828059.148	26719569.830	2	1758.86	125	145	145	1631.22	1611.22	1621.22	Vertical Delineation Well Adjacent to M-36	9/18/09	229	<0.01	59.86	1699.53												
													11/6/09			23.87	1735.52												
M-151	Muddy Creek (UMCf)	827643.033	26720826.750	2	1730.64	125	145	145	1602.85	1582.85	1592.85	Vertical Delineation Well Adjacent to M-100	9/25/09	0.07	<0.01	65.15	1665.49												
													11/12/09	pending	pending	17.62	1713.51												
M-152	Muddy Creek (UMCf)	826973.486	26722690.630	2	1698.50	125	145	145	1570.29	1550.29	1560.29	Vertical Delineation Well Adjacent to M-44	9/25/09	181	<0.01	26.36	1671.98												
													11/9/09	pending	pending	24.34	1674.00												
M-153	Muddy Creek (UMCf)	828385.605	26718287.910	2	1796.69	150	170	170	1647.08	1627.08	1637.08	Vertical Delineation Well Adjacent to M-31A	10/9/09	3.1	0.035	--													
													11/5/09	pending	pending	26.62	1770.08												
M-154	Muddy Creek (UMCf)	828047.739	26719568.610	2	1758.78	175	195	195	1581.28	1561.28	1571.28	Vertical Delineation Well Adjacent to M-36	10/3/09	1.6	<0.01	28.12	1731.27												
													11/6/09	pending	pending	14.66	1744.73												
M-155	Muddy Creek (UMCf)	827636.100	26720827.400	2	1730.69	200	220	220	1527.84	1507.84	1517.84	Vertical Delineation Well Adjacent to M-100	10/3/09	0.24	<0.01	--		211-212									sandy silt	clayey silt	83.99
													11/13/09	pending	pending	0.09	1731.22												
M-156	Muddy Creek (UMCf)	26722690.740	826964.224	2	1698.38	175	195	195	1520.32	1500.32	1510.32	Vertical Delineation Well Adjacent to M-44	10/3/09	0.75	<0.01	95.59	1602.75												
													11/11/09	pending	pending	18.46	1679.88												

TABLE 1
Summary of Well Completion and Geotechnical Data, Groundwater Capture and Vertical Gradient Evaluation

WELL NUMBER[1]	AQUIFER UNIT	NORTHING	EASTING	WELL DIAMETER	TOP OF CASING	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	TOTAL WELL DEPTH	ELEVATION TOP OF SCREEN	ELEVATION BOTTOM OF SCREEN	ELEVATION MID-POINT OF SCREEN	WELL LOCATION	Sample Date	CHEMICAL DATA		GROUNDWATER		PHYSICAL PROPERTIES[3]									LITHOLOGY		
														Perchlorate	Total Chromium	Measured DTW	GW Elevation	SAMPLE DEPTH	PORE FLUID SATURATION	POROSITY		DENSITY		MOISTURE CONTENT	EFFECTIVE PERMEABILITY	HYDRAULIC CONDUCTIVITY	FIELD	LAB[2]	Weight Percent Clay and Silt
																			API RP40	API RP40		API RP40		ASTM D2216	ASTM D5084	ASTM D5084			
																ft-toc	ft-msl	ft-bgs	WATER	TOTAL	AIR-FILLED	BULK	GRAIN						
		NAD(SPC)	NAD(SPC)	inches	ft-msl	ft-bgs	ft-bgs	ft-bgs	ft-msl	ft-msl	ft-msl			mg/L	mg/L				(%PV)	%	%	g/cc	g/cc	% (weight)	millidarcy	cm/s			%
ATHENS ROAD																													
ARP-4A	Alluvium (Qal)	26728411.808	829167.886	2	1615.47	17.7	32.7	33	1597.77	1582.77	1590.3	Athens - Downgradient	1/15/09	29.5	--	28.59	1586.88												
													2/11/09	28.4	<0.01	28.64	1586.83												
													3/11/09	28.0	--	28.71	1586.76												
													4/14/09	26.5	--	28.89	1586.58												
													5/12/09	27.4	<0.01	28.96	1586.51												
													6/10/09	25.5	--	29.04	1586.43												
													7/15/09	24.4	--	28.91	1586.56												
													8/10/09	26.0	<0.01	28.64	1586.83												
													9/17/09	28.4	--	28.89	1586.58												
ARP-5A	Alluvium (Qal)	26728458.427	829375.005	2	1616.10	12.7	37.7	38	1603.4	1578.4	1590.9	Athens - Downgradient	1/15/09	24.0	--	31.87	1584.23												
													2/11/09	24.0	0.056	32.15	1583.95												
													3/11/09	24.1	--	32.42	1583.68												
													4/14/09	21.8	--	32.64	1583.46												
													5/12/09	22.5	0.1	32.67	1583.43												
													6/10/09	21.0	--	32.64	1583.46												
													7/15/09	22.6	--	32.71	1583.39												
													8/10/09	24.0	0.0547	33.11	1582.99												
													9/17/09	23.9	--	32.74	1583.36												
ARP-6B	Alluvium (Qal)	26728499.917	829520.516	2	1615.56	27.7	42.7	43	1587.86	1572.86	1580.4	Athens - Downgradient	1/15/09	19.4	--	31.36	1584.20												
													2/11/09	18.6	0.12	31.61	1583.95												
													3/11/09	17.0	--	31.89	1583.67												
													4/14/09	14.6	--	32.09	1583.47												
													5/12/09	15.3	0.1	32.16	1583.40												
													6/10/09	15.5	--	32.11	1583.45												
													7/15/09	15.4	0.113	32.31	1583.25												
													8/10/09	16.1	--	32.59	1582.97												
													9/17/09	18.2	--	32.24	1583.32												
PC-134	Muddy Creek (UMCf)	26728126.415	828776.171	2	1613.35	59.7	69.7	70	1553.65	1543.65	1548.7	Athens - West Subchannel	1/18/08	<0.008	--	--	--												
													2/13/08	<0.008	<0.02	26.14	1587.21												
													5/11/08	0.04	<0.02	25.95	1591.06												
													8/13/08	0.05	<0.01	25.84	1587.51												
													12/10/08	--	--	25.54	1587.81												
PC-135	Alluvium (Qal)	26728123.177	828765.250	2	1612.79	19.7	49.7	50	1593.09	1563.09	1578.1	Athens - West Subchannel	1/18/08	11.2	--	28.71	1584.08	51-51.5	92.2	61	4.8	0.99	2.55	58.2	9.19	8.67E-06	Silty Sand	SiltySand	38.62
													2/13/08	10.7	<0.02	28.72	1584.07												
													6/26/08	--	--	28.55	1588.7												
													8/13/08	9.6	<0.01	28.22	1584.57												
													12/10/08	--	--	28.06	1584.73												
PC-136	Alluvium (Qal)	26728191.374	829517.888	2	1615.08	17.7	37.7	38	1597.38	1577.38	1587.4	Athens - East Subchannel	1/18/08	139	--	30.83	1584.25												
													2/13/08	167	1.2	30.92	1584.16												
													5/14/08	169	4.0	30.86	1584.22												
PC-137	Muddy Creek (UMCf)	26728198.976	829517.568	2	1614.83	59.7	69.7	70	1555.13	1545.13	1550.1	Athens - East Subchannel	1/18/08	0.111	--	28.37	1586.46	61-61.5	89.6	59.9	6.2	1.09	2.73	49.4	1.12	1.05E-06	Silt	Silt	59.03
													2/13/08	0.103	<0.01	28.11	1586.72												
													5/11/08	0.054	<0.01	28.11	1586.72												

DEFINITIONS

--	Not tested or no value reported in the literature reviewed
%	Pecent
%PV	Percent of pore volume
%weight	Percent by weight
API	American Petroleum Institute
ASTM	American Standards Testing Materials
cm/s	centimeters per second
CPT	Cone penetrometer
FEET BGS	Depth in feet below ground surface
g/cc	grams per cubic centimeter (or milliliter)
LAB	Certified Analytical Laboratory (PTS Labs, Santa Fe Springs, California)
mg/kg	Milligrams per kilogram
NA	Not available/applicable

NOTES

(1)	Well borings are shown on Plate 1 of 2007-2008 Annual Performance Report (ENSR, 2008_)
(2)	Laboratory based its determination of soil type based on the 50th percentile (cumulative)
(3)	Laboratory reports are presented in Appendix D of 2007-2008 Annual Performance Report (ENSR, 2008_)
(4)	Comments are from the field notes

TABLE 2
Evaluation of Vertical Hydraulic Gradients

WELL NUMBER[1]	AQUIFER UNIT [2]	WELL LOCATION	NORTHING [3]	EASTING [3]	TOP OF CASING	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	TOTAL WELL DEPTH	ELEVATION TOP OF SCREEN	ELEVATION BOTTOM OF SCREEN	ELEVATION MID-POINT OF SCREEN	Sample Date	LABORATORY DATA		GROUNDWATER				VERTICAL GRADIENT[11]			
													TDS	TEMP (Field)	Measured DTW [7]	Water Density[8]	GW Elevation	Fresh Water Head[10]	DATE		Water Level	Fresh Water Head
															ft-toc	kg/m³	ft-msl	ft-msl	shallow	deep	ft/ft	ft/ft
			NAD	NAD	ft-msl	ft-bgs	ft-bgs	ft-bgs	ft-msl	ft-msl	ft-msl		mg/L	deg C								
BARRIER AND INTERCEPTOR WELL FIELD																						
M-74	Qal	East Barrier	828713.651	26720062.179	1744.380	9.2	38.8	39	1735.18	1705.58	1720.4	1/22/08	5,830 *	21.7 *	29.35	1,002.28	1,715.03	1,715.05				
												2/6/08	5,860	21.7	29.33	1,002.30	1,715.05	1,715.07	**M-74**	**M-133**		
												3/14/08	5,865*	22.5 *	29.35	1,002.12	1,715.03	1,715.05	1/22/08	1/17/08	-0.015 ↑	-0.128 ↑
												5/8/08	5,870	23.6	29.45	1,001.85	1,714.93	1,714.95	2/6/08	2/5/08	-0.008	-0.009
												8/7/08	5,940	25.1	29.82	1,001.52	1,714.56	1,714.57	5/8/08	5/12/08	-0.017	-0.016
												11/5/08	5,640	22.5	29.77	1,001.94	1,714.61	1,714.63	11/5/08	11/6/08	-0.011	-0.013
												12/10/08			29.72		1,714.66	1,705.58				
												5/6/09	5,930	25.5	29.35	1,001.40	1,715.03	1,715.04	5/6/09	5/21/09	-0.001	-0.033
M-132	UMCf (middle)	East Barrier	26720048.491	828714.609	1744.27	80	90	90	1664.27	1654.27	1659.3	1/17/08	2,540	19.1 *	27.35	1,000.35	1,716.92	1,716.94				
												2/5/08	2,890	19.1	27.51	1,000.62	1,716.76	1,716.80				
												5/12/08	2,350	23.6	27.28	999.20	1,716.99	1,716.94	**M-133**	**M-132**		
												12/10/08	2,590 *	20.0 *	26.73	1,000.21	1,717.54	1,717.55				
												5/21/09	1,482	26.8	27.50	997.71	1,716.77	1,716.63	1/17/08	1/17/08	-0.065 ↑	-0.065 ↑
M-133	UMCf (middle)	East Barrier	26720067.292	828698.608	1743.62	60	70	70	1683.62	1673.62	1678.6	1/17/08	3,310	21.4 *	27.96	1,000.45	1,715.66	1,715.68	2/5/08	2/5/08	-0.071	-0.069
												2/5/08	4,800	21.4	28.23	1,001.57	1,715.39	1,715.46	5/12/08	5/12/08	-0.070	-0.063
												5/12/08	6,270	23.8	27.99	1,002.10	1,715.63	1,715.72	12/10/08	12/10/08	-0.129	-0.125
												8/5/08	--	--	--	--	--	--	5/21/09	5/21/09	-0.020	-0.010
												11/6/08	5,900	20.5	28.57	1,002.61	1,715.05	1,715.16				
												12/10/08	5,070 *	20.3 *	28.57	1,002.02	1,715.05	1,715.13				
												5/21/09	5,764	26.2	27.23	1,001.09	1,716.39	1,716.44				
M-134	UMCf (middle)	West Barrier	26719889.138	827144.353	1752.14	60	70	70	1692.14	1682.14	1687.1	1/17/08	2,760	18.0 *	34.51	1,000.74	1,717.63	1,717.66				
												2/5/08	2,670	18.0	34.64	1,000.67	1,717.50	1,717.53				
												5/11/08	2,810 J	24.4	33.22	999.35	1,718.92	1,718.90	**M-135**	**M-134**		
												12/10/08	2,750 *	19.0 *	32.72	1,000.53	1,719.42	1,719.44	1/17/08	1/17/08	-0.013 ↑	-0.014 ↑
												5/20/09	3,000	27.4	34.00	998.68	1,718.14	1,718.09	2/5/08	2/5/08	-0.076	-0.077
M-135	UMCf (shallow)	West Barrier	26719890.173	827154.482	1751.85	29	39	39	1722.85	1712.85	1717.9	1/17/08	3,260	*est.	34.63	1,000.54	1,717.22	1,717.23	5/11/08	5/11/08	-0.007	-0.006
												2/5/08	3,420	20.7	36.69	1,000.69	1,715.16	1,715.16	12/10/08	12/10/08	-0.005	-0.006
												5/11/08	6,620 J	25.0	33.14	999.64	1,718.71	1,718.71	5/5/09	5/20/09	-0.003	-0.001
												8/5/08	3,380	25.0	32.17	999.62	1,719.68	1,719.68				
												11/5/08	3,470	23.2	32.13	1,000.14	1,719.72	1,719.72				
												12/10/08	3,380 *	22.8 *	32.59	1,000.17	1,719.26	1,719.26	**M-134**	**M-136**		
												5/5/09	3,440	24.5	33.79	999.80	1,718.06	1,718.06	1/17/08	1/17/08	-0.232 ↑	-0.241 ↑
M-136	UMCf (middle)	West Barrier	26719889.774	827165.342	1751.87	80	90	90	1671.87	1661.87	1666.9	1/17/08	7,120	19.7 *	29.54	1,003.71	1,722.33	1,722.55	2/5/08	2/5/08	-0.227	-0.221
												2/5/08	1,380	19.7	29.77	998.35	1,722.10	1,722.00	5/11/08	5/11/08	-0.187	-0.183
												5/11/08	1,400 J	23.7	29.16	998.46	1,722.71	1,722.62	12/10/08	12/10/08	-0.179	-0.176
												12/10/08	1,400 *	20.0 *	28.82	999.30	1,723.05	1,723.01	5/20/09	5/21/09	-0.216	-0.213
												5/21/09	1,504	25.6	29.35	998.05	1,722.52	1,722.40				
VERTICAL DELINEATION WELLS																						
M-31A	UMCf (shallow)	850 ft north of Unit 5 Building	828368.371	26718289.578	1796.87	35	55	55	1761.87	1741.87	1751.9	11/4/09	8,300	24.0	43.65	1,003.57	1,753.22	1,753.26	**M-31A**	**M-153**		
																			11/4/09	11/5/09	-0.146 ↑	-0.143 ↑
M-149	UMCf (middle)	850 ft north of Unit 5 Building	828373.149	26718285.780	1796.81	100	120	120	1696.81	1676.81	1686.8	11/4/09	2,800	22.8	42.62	999.74	1,754.19	1,754.17				
																			M-153	**M-149**		
																			11/5/09	11/4/09	-0.317 ↑	-0.311 ↑
M-153	UMCf (middle)	850 ft north of Unit 5 Building	26718287.910	828385.605	1796.69	150	170	170	1646.69	1626.69	1636.7	11/5/09	570	23.6	26.62	997.86	1,770.07	1,769.77				
M-36	UMCf (shallow)	2200 ft north of Unit 5 Building	828069.092	26719556.628	1759.82	20	35	35	1739.82	1724.82	1732.3	11/5/09	15,400	23.4	31.82	1,009.06	1,728.00	1,728.03	**M-36**	**M-154**		
																			11/5/09	11/6/09	-0.102 ↑	-0.099 ↑
M-150	UMCf (middle)	2200 ft north of Unit 5 Building	26719569.830	828059.148	1758.86	125	145	145	1633.86	1613.86	1623.9	11/6/09	590	24.1	23.87	997.75	1,734.99	1,734.71				
																			M-154	**M-150**		
																			11/6/09	11/6/09	-0.182 ↑	-0.179 ↑
M-154	UMCf (middle)	2200 ft north of Unit 5 Building	26719568.610	828047.739	1758.78	175	195	195	1583.78	1563.78	1573.8	11/6/09	540	25.0	14.66	997.48	1,744.12	1,743.67				
M-100	Qal/UMCf	3300 ft north of Unit 5 Building	827659.986	26720820.264	1730.93	19	29	30	1711.93	1701.93	1706.9	11/5/09	1,400	18.1	30.23	999.68	1,700.70	1,700.70	**M-100**	**M-155**		
																			11/5/09	11/13/09	-0.170 ↑	-0.167 ↑
M-151	UMCf (middle)	3300 ft north of Unit 5 Building	26720826.750	827643.033	1730.64	125	145	145	1605.64	1585.64	1595.6	11/12/09	480	22.3	17.62	998.10	1,713.02	1,712.77				
																			M-155	**M-151**		
																			11/13/09	11/12/09	-0.271 ↑	-0.268 ↑

TABLE 2
Evaluation of Vertical Hydraulic Gradients

WELL NUMBER[1]	AQUIFER UNIT [2]	WELL LOCATION	NORTHING [3]	EASTING [3]	TOP OF CASING	DEPTH TO TOP OF SCREEN	DEPTH TO BOTTOM OF SCREEN	TOTAL WELL DEPTH	ELEVATION TOP OF SCREEN	ELEVATION BOTTOM OF SCREEN	ELEVATION MID-POINT OF SCREEN	Sample Date	LABORATORY DATA		GROUNDWATER				VERTICAL GRADIENT[11]			
													TDS	TEMP (Field)	Measured DTW [7]	Water Density[8]	GW Elevation	Fresh Water Head[10]	DATE		Water Level	Fresh Water Head
															ft-toc	kg/m³	ft-msl	ft-msl	shallow	deep	ft/ft	ft/ft
			NAD	NAD	ft-msl	ft-bgs	ft-bgs	ft-bgs	ft-msl	ft-msl	ft-msl		mg/L	deg C								
M-155	UMCf (middle)	3300 ft north of Unit 5 Building	26720827.400	827636.100	1730.69	200	200	220	1530.69	1530.69	1530.7	11/13/09	550	22.8	0.09	998.03	1,730.60	1,730.20				
M-44	Qal	5300 ft north of Unit 5 Building	827005.610	26722699.153	1698.31	5	35	35	1693.31	1663.31	1678.3	11/2/09	8,400	23.1	21.09	1,003.88	1,677.22	1,677.27	M-44 11/2/09	M-156 11/11/09	-0.016 ↑	-0.014 ↑
M-152	UMCf (middle)	5300 ft north of Unit 5 Building	26722690.630	826973.486	1698.50	125	145	145	1573.50	1553.50	1563.5	11/9/09	850	23.9	24.34	998.00	1,674.16	1,673.92	M-156 11/11/09	M-152 11/9/09	-0.115 ↑	-0.112 ↑
M-156	UMCf (middle)	5300 ft north of Unit 5 Building	26722690.740	826964.224	1698.38	175	195	195	1523.38	1503.38	1513.4	11/11/09	680	23.8	18.46	997.89	1,679.92	1,679.55				
ATHENS ROAD																						
PC-134	UMCf (shallow)	Athens Road West	26728126.415	828776.171	1617.01	59.7	69.7	70	1557.31	1547.31	1552.3	1/18/08 2/13/08 5/11/08 8/13/08 12/10/08	1,830 1,780 1,640 J 1,820 --	-- -- 25.1 -- --	-- 26.14 25.95 25.84 25.54 est.	998.64 998.64 998.29	-- 1,590.87 1,591.06 1,591.17 1591.47 est.	-- 1,590.81 1,590.99				
PC-135[12]	Qal	Athens Road West	26728123.177	828765.250	1617.25	19.7	49.7	50	1597.55	1567.55	1582.6	1/18/08 2/13/08 5/11/08 6/26/08 8/13/08 11/11/08	8,500 8,100 -- -- 7,950 --	-- -- -- -- -- --	28.71 28.72 -- 28.55 28.22 28.49	-- -- -- -- -- --	1,588.54 1,588.53 -- 1,588.70 1,589.03 1,588.76	-- -- -- -- -- --	PC-135 2/13/08 6/26/08 8/13/08	PC-134 2/13/08 5/11/08 8/13/08	-0.077 ↑ -0.078 -0.071	-- -- -- --
PC-136[12]	Qal	Athens Road East	26728191.374	829517.888	1615.08	17.7	37.7	38	1597.38	1577.38	1587.4	1/18/08 2/13/08 5/14/08	1,420 7,300 6,920	-- -- --	30.83 30.92 30.86	-- -- --	1,584.25 1,584.16 1,584.22	-- -- --	PC-136 1/18/08 2/13/08 5/14/08	PC-137 1/18/08 2/13/08 5/11/08	-0.059 ↑ -0.069 -0.067	-- -- --
PC-137	UMCf (shallow)	Athens Road East	26728198.976	829517.568	1614.83	59.7	69.7	70	1555.13	1545.13	1550.1	1/18/08 2/14/08 5/11/08	2,950 3,140 2,590 J	-- -- 24.4	28.37 28.11 28.11	 999.18	1,586.46 1,586.72 1,586.72	 1,586.69				

DEFINITIONS

ft/ft	feet per foot
ft-bgs	feet below ground surface
ft-msl	feet above mean sealevel
mg/L	milligrams per liter
NAD	North American Datum
umohs/cm	micromohs per centimeter

NOTES

(1) Wells M-74 and M-132 through M-136 are shown on Figure 2. Wells PC-134 through PC-137 are shown on Figure 8. Wells M-31A, M-36, M-44, M-100 and M-149 through M-156 are shown on Figure

(2) Aquifer units designated by Tronox following the hydrostratigraphic nomenclature provided in the Tronox letter to NDEP dated June 27, 2008 "Proposed Hydrostratigraphic Nomenclature - BMI Complex":
Qal - Alluvium (includes saturated uppermost UMCf)
UMCf - Upper fine-grained Muddy Creek Formation

(3) Survey coordinates as provided in the June 2008 "all wells" database. Wells M-149 to M-156 are yet to be surveyed and are estimates.

(5) Data reported in 2009 should be considered as "PRELIMINARY" (Not Validated). Data validation for these data is not complete. These data will be transmitted as validated in the annual report.

(7) Depth is assumed to be "positive" (vertically down from the measuring point). Those values shown with a "+" indicate distance above the measuring point (up).

(8) Water density estimated following online density calculation (http://www.earthwardconsulting.com/density) and using the water temperature and total dissolved solids concentration reported during sampling.
If temperature or TDS was not reported the average value was used and shown by *.

(10) Fresh water head after Post, V., Looi, H., and Simmons, C., 2007, Using Hydraulic Head Measurments in Variable-Density Ground Water Flow Analyses: Groundwater Volume 45, No.6 November-December 2007 (pages 664-671).

$$h_{fi} = (\rho_i/\rho_f)h_i - [(\rho_i-\rho_f)/(\rho_f)]z_i$$

h_{fi}	(ft)	"fresh water" head
ρ_i	kg/m^3	density at point of measurement
ρ_f	kg/m^3	fresh water density
h_i	(ft)	hydraulic head (point water head, i.e., water level measurement)
z_i	(ft)	elevation head (screen depth)

(11) Vertical gradient estimated as the difference between the groundwater elevations of shallow and deep wells divided by the distance between the mid-point elevations of their screen intervals.

(12) There has not been temperature data collected from well PC-135 and PC-136 since its installation. As such, water density could not be estimate and fresh water head calculated.

TABLE 3
Net Drawdown Calculations for the Interceptor Well Field
September 1987 to May 2009

WELL ID	Elevation TOC (ft above MSL)	9/14/87		5/5/09 to 5/13/09		5/5/09 to 5/13/09
		Depth to Water (ft below TOC)	Water Elevation (ft AMSL)	Depth to Water (ft below TOC)	Water Elevation (ft AMSL)	Net Drawdown (feet)
CLD2-R<	1753.79			30.26	1723.53	
I-AA	1753.93	25.53	1728.40	32.94	1720.99	**7.4**
I-W	1751.50	19.00*	1732.50	30.56	1720.94	**11.6**
I-X	1748.60	20.00*	1728.60	30.56	1718.04	**10.6**
I-Y	1751.40	23.00*	1728.40	29.95	1721.45	**7.0**
M-14A	1760.93	28.55	1732.38	33.11	1727.82	**4.6**
M-18<	1740.48			29.85	1710.63	
M-19	1766.77	25.18	1741.59	35.42	1731.35	**10.2**
M-22A	1759.46	20.50	1738.96	30.31	1729.15	**9.8**
M-25	1759.93	25.69	1734.24	33.58	1726.35	**7.9**
M-36	1759.82	23.47	1736.35	32.3	1727.52	**8.8**
M-37	1761.06	26.15	1734.91	32.24	1728.82	**6.1**
M-38	1759.73	24.04	1735.69	31.37	1728.36	**7.3**
M-39	1761.13	19.75	1741.38	31.72	1729.41	**12.0**
M-55	1750.88	22.11	1728.77	30.30	1720.58	**8.2**
M-56	1750.83	20.94	1729.89	31.65	1719.18	**10.7**
M-57A	1753.44	21.30**	1732.14	30.02	1723.42	**8.7**
M-58	1751.25	18.76	1732.49	30.21	1721.04	**11.5**
M-60	1750.94	20.41	1730.53	32.51	1718.43	**12.1**
M-61##	1746.83	11.74	1735.09			
M-64	1749.76	22.21	1727.55	29.68	1720.08	**7.5**
M-65	1753.91	22.92	1730.99	32.98	1720.93	**10.1**
M-66	1754.24	19.83	1734.41	31.41	1722.83	**11.6**
M-67	1745.91	10.20	1735.71	22.17	1723.74	**12.0**
M-68	1748.72	10.11	1738.61			
M-68	1750.23^			26.65	1723.58	**15.0**
M-69<	1749.75			31.99	1717.76	
M-70<	1748.25			30.55	1717.70	
M-71<	1747.04			34.08	1712.96	
M-72<	1746.49			31.91	1714.58	
M-73<	1741.14			29.15	1711.99	
M-74<	1744.38			29.35	1715.03	
M-78	1751.50	22.83	1728.67	32.71	1718.79	**9.9**
M-79<	1742.53			28.33	1714.20	
M-80<	1746.04			31.58	1714.46	
M-81A<	1744.16			34.48	1709.68	
M-83<	1742.36			27.44	1714.92	
M-84<	1741.03			27.78	1713.25	
M-85##	1742.52					
M-86##	1744.23					
M-87<	1744.13			37.36	1706.77	
M-88<	1739.35			30.75	1708.60	
M-89	1766.19	28.39#	1737.80	33.38	1732.81	**5.0**
M-129<	1747.26			32.31	1714.95	
M-130<	1749.23			27.92	1721.31	
M-131<	1754.13			32.94	1721.19	
M-135<	1751.85			33.79	1718.06	

DEFINITIONS

#	**Extrapolated from contouring**
##	**Well destroyed**
*	**Extrapolated from Interceptor WF cross section**
**	**Depth of Water from M-14, 17, 22 and 57**
^	**Reconstructed and resurveyed**
<	**Well only used to map potentiometric surface (Plate 1)**
AMSL	**Above Mean Sea Level**
ft	**feet**
TOC	**Top of Casing**

TABLE 4
Groundwater Underflow and Mass Flux Condition - May 2009
Interceptor Well Field

ALLUVIUM								
CELL ID [1]	**M-131**	**I-L**	**M-55**	**I-X**	**I-T**	**I-Z**	**CLD2-R**	**TRAVERSE TOTAL**
Cell Width (ft)	80	160	170	170	60	560	100	**1,300**
Cell Height (ft) [2]	0.8	1.2	2.9	5.1	1.0	4.0	8.0	
Cell Area (A) (ft^2)	60	192	493	867	60	2240	130	**3,982**
K (gpd/ft2) [3]	972	972	972	972	972	972	972	
Q (gpd) (Q = KiA) [4]	1,166	3,732	9,584	16,854	1,166	43,546	2,527	**77,410**
Q (gpm)	0.8	2.6	6.7	11.7	0.8	30.2	1.8	**54.6**
ClO4 mg/L (May 2009)	114[9]	1588[10]	766[11]	1260[12]	1890[13]	882[14]	9.7	
ClO4 (lbs/day)	1.1	49.5	61.6	176.9	18.1	319.6	0.2	**627**
MUDDY CREEK - ENDS OF BARRIER WALL								
CELL ID [1]	**M-131**						**M-130**	
	West End						East End	
Cell Width (ft)	300						160	
Cell Height (ft) [2]	100						100	
Cell Area (A) (ft^2)	30000						16000	
K (gpd/ft2) [5]	0.6						0.6	
Q (gpd) (Q = KiA) [4]	360						192	**552**
Q (gpm)	0.3						0.1	**0.4**
ClO4 mg/L (May 2009)	250*						25	
ClO4 (lbs/day)	0.8						0.4	**1.2**
MUDDY CREEK - UPFLOW								
CELL ID	**MC-Undiff**							**TRAVERSE TOTAL**
Cell Width East-West (ft)	1,600							**1,600**
Cell Length North-South (ft) [6]	1,200							
Cell Area (A) (ft^2)	1,920,000							
K (gpd/ft2) [7]	0.06							
Q (gpd) (Q = KiA) [8]	8,064							
Q (gpm)	5.6							**5.6**
ClO4 mg/L (May 2009)	1046[15]							
ClO4 lbs/day	70.3							**70.3**
TOTAL GPM								**60.6**
TOTAL ClO4 (lbs/day)								**698**

NOTES

(1) **Cell ID is well name in center of cell - locations shown on Figure 2. Cell width was centered on these borings/wells**

(2) **Cell height is saturated thickness of alluvium**

(3) **Hydraulic conductivity = ave. from well M-27 slug test (1,496 gpd/ft2) + ave. of six other M-series Qal slug tests (449 gpd/ft2)**

(4) **Hydraulic conductivity is estimated at ten-times the vertical hydraulic conductivity measured in Muddy Creek Fm - see note (7)**

(5) **Hydraulic Gradient (i) is 0.02 ft/ft**

TABLE 4
Groundwater Underflow and Mass Flux Condition - May 2009
Interceptor Well Field

(6)	**Since Muddy Creek upflow is near vertical the horizontal dimension = length of "daylighting" into Qal**
(7)	**Vertical hydraulic conductivity measured in Muddy Creek Fm cores from M-132 and M-136**
(8)	**Vertical hydraulic gradient calculated and average taken from well sets M-74, 132, 133 and M-134, 135, 136**
(9)	**Concentration of I-AA**
(10)	**Average concentration of I-L, I-R and I-S**
(11)	**Concentration of I-M**
(12)	**Average concentration of I-F and I-N**
(13)	**Concentration of I-T**
(14)	**Average concentration of I-I, I-J, I-K, I-P, I-O and I-Z**
(15)	**Average concentration of perchlorate captured**

DEFINITIONS

*	**Average concentration from contouring; measured concentration in M-131 was 60.9 mg/L**
A	**Area**
ClO4	**Perchlorate**
ft	**feet**
ft^2	**feet squared**
gpd	**gallons per day**
gpd/ft^2	**gallons per day per foot squared**
gpm	**gallons per minute**
i	**gradient**
K	**hydraulic conductivity**
lbs/day	**pounds per day**
mg/L	**milligrams per liter**
Q	**flow**

TABLE 5
Net Drawdown Calculations for the Athens Road Well Field
April 2002 to May 2009

WELL ID	Elevation TOC (ft above MSL)	4/30/02		5/4/09 to 5/13/09		5/4/09 to 5/13/09
		Depth to Water (ft below TOC)	Water Elevation (ft AMSL)	Depth to Water (ft below TOC)	Water Elevation (ft AMSL)	Net Drawdown (feet)
ARP-1	1613.32	16.18	1597.14	23.99	1589.33	**7.8**
ARP-2#	1612.79	15.90	1596.89			
ARP-3#	1612.17	16.26	1595.91			
ARP-4A	1615.47	20.50*	1594.97	28.96	1586.51	**8.5**
ARP-5A	1616.10	22.20*	1593.89	32.67	1583.43	**10.5**
ARP-6B	1615.56	22.03*	1593.53	32.16	1583.40	**10.1**
ARP-7	1613.20	19.63	1593.57	30.17	1583.03	**10.5**
ART-1	1614.47	15.46	1599.01	23.93	1590.54	**8.5**
ART-2	1617.10	18.05	1599.05			**P**
ART-2A	1616.81	17.86	1598.95	26.72	1590.09	**8.9**
ART-3	1617.94	18.30	1599.64	30.55	1587.39	**12.3**
ART-3A	1617.60	17.96	1599.64			**P**
ART-4	1617.46	19.13	1598.33	28.79	1588.67	**9.7**
ART-4A	1617.46	19.13	1598.33			**P**
ART-5#	1614.06	17.85	1596.21			
ART-6	1615.31	19.09	1596.22	31.48	1583.83	**12.4**
ART-7	1615.38	19.21	1596.17			**P**
ART-7A	1614.78	18.61	1596.17	31.83	1582.95	**13.2**
ART-8	1617.69	18.75	1598.94			**P**
ART-8A	1617.10	18.16	1598.94	27.70	1589.40	**9.5**
ART-9	1615.06					**P**
L635	1620.94	13.93	1607.01	15.55	1605.39	**1.6**
L637	1621.60	9.70	1611.90	NR	NR	
MW-K4	1614.96	19.91	1595.05	27.95	1587.01	**8.0**
PC-12	1616.37	19.89	1596.48	28.79	1587.58	**8.9**
PC-17#	1617.00	18.14	1598.86			
PC-18	1618.47	19.44	1599.03	28.38	1590.09	**8.9**
PC-55	1617.19	17.89	1599.30	26.13	1591.06	**8.2**
PC-101R	1618.12	19.41	1598.71	28.26	1589.86	**8.9**
PC-122	1617.39	21.28*	1596.11	31.97	1585.42	**10.7**
PC-123	1626.44	21.77*	1604.67	22.95	1603.49	**1.2**
PC-135#	1617.25	18.00*	1599.25			
PC-136#	1615.08	19.30*	1595.78			

DEFINITIONS

#	**Well buried**
*	**Extrapolated from Contouring**
AMSL	**Above Mean Sea Level**
ft	**feet**
NR	**No reading**
P	**Pumping well on 5/11/09**
TOC	**Top of Casing**

TABLE 6
Groundwater Underflow and Mass Flux Condition - May 2009
Athens Road Well Field Traverse

ALLUVIUM											
CELL ID (1)	PC55	ART2	ART8	ART3	ART4	ART6	ART9	ART7	PC122	PC122 EAST	**TRAVERSE TOTAL**
Cell Width (ft)	100	75	75	75	180	75	50	80	70	100	880
Cell Height (ft) (2)	25.5	27	22	15	15	2	8	9	4.5	2	
Cell Area (A) (ft2)	2,550	2,025	1,650	1,125	2,700	150	400	720	315	200	
Aquifer parameters (K) from well ……..	ART1	ART2	ART8	ART3	ART4	ART6	ART9	ART7	ART7	ART7	
K (gpd/ft2)	219	2662	1225	398	561	1122	1048	2431	2431	2431	
Q (gpd) (Q = KiA) (3)	7,818	75,468	28,298	6,269	21,206	2,356	5,869	24,504	10,721	6,807	**163,969**
Q (gpm)	5	52	20	4	15	2	4	17	7	5	**131**
ClO4 mg/L (May 2009)	0.81	72.0	238	326	375	163	341	138	11.0	5e	
ClO4 lbs/day	0.05	45	56	17	66	3	17	28	1	0.3	**234**

MUDDY CREEK - UNDERFLOW				
CELL ID (1)		PC-13		
Cell Width (ft) (4)		1160		1,160
Cell Height (ft) (5)		40		
Cell Area (A) (ft2)		46400		
Aquifer parameters (K) from well ……..		Ave PC-135 and PC-137		
K (gpd/ft2) (6)		1.03		
Q (gpd) (Q = KiA) (3)		669		**669**
Q (gpm)		0.46		**0.46**
ClO4 mg/L (May 2008) (7)		4.9		
ClO4 lbs/day		0.027		**0.027**
TOTAL GPM				**131**
TOTAL ClO4 lbs/day				**234**

DEFINITIONS

A	**Area**
ClO4	**Perchlorate**
e	**estimate**
e*	**estimate from April 1998**
*****	**concentration from May 2008**
ft	**feet**
ft^2	**feet squared**
gpd	**gallons per day**
gpd/ft^2	**gallons per day per foot squared**
gpm	**gallons per minute**
i	**gradient**
K	**hydraulic conductivity**
lbs/day	**pounds per day**
mg/L	**milligrams per liter**
Q	**flow**

NOTES

(1)	**Cell ID is well or soil boring name - locations shown on Figure 8**
(2)	**Cell height is saturated thickness of alluvium (May 2009)**
(3)	**Hydraulic Gradient (i) is 0.014 ft/ft**
(4)	**Length of capture zone**
(5)	**Average thickness of UMCf to bottom of wells PC-134 and PC-137**
(6)	**Hydraulic conductivity estimated at ten-times the average vertical K from PC-135 and PC-137 (see Table 1)**
(7)	**Average ClO4 from PC-134 and PC-137**

FIGURES

\\Ng-oak1\NG-GIS\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\fig_1_location_map_PHB.mxd Last updated 12/21/2009 1:54:37 PM

1 inch = 2,000 feet
1:24,000
2,000 1,000 0
Feet

INSET B
500 250 0
Feet

INSET C
500 250 0
Feet

INSET A
RECHARGE TRENCHES
BARRIER WALL
500 250 0
Feet

Las Vegas Wash
SEEP PUMPING STATION
INSET C
SEEP WF
ATHENS ROAD WF
INSET B
INTERCEPTOR WF
INSET A
PITTMAN LATERAL
Sunset Road
Pabco Road
Boulder Highway
Lake Mead Parkway
RECHARGE TRENCHES
BARRIER WALL
T. 21 S.
T. 22 S.
R. 62 E.
R. 63 E.
R62E
R63E

LEGEND
- Groundwater Well
- New Well or Boring
- A — A' Cross Section Line
- Seep Pumping Station

LAND OWNERSHIP
- BMI
- Chemstar
- Pioneer
- Timet
- Tronox

SHEET NUMBER: 1	FIGURE NUMBER: 1	

LOCATION MAP
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
1:24,000	12/22/09	2027

DESIGNED BY:	REVISIONS			
E. Krish	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
NGEM				
CHECKED BY:				
NGEM				
APPROVED BY:				
NGEM				

northgate environmental management, inc.
TRONOX
http://www.ngem.com

827000 827300 827600 827900 828200 828500 828800

26720300 26720000 26719700 26719400 26719100

GROUNDWATER RECHARGE TRENCHES

GROUNDWATER BARRIER WALL

M-57A M-64 M-65 M-66 M-67 M-68 M-69 M-70 M-71 M-72 M-73 M-74 M-79 M-80 M-81A M-83 M-84 M-85 M-86 M-87 M-88 M-18 M-61 M-130 M-129 M-132 M-133 CLD2-R

M-135 M-136 M-134 M-158 M-131 M-157 M-154 M-150 M-36 M-38 M-25 M-22A M-39 M-89 M-19

I-A I-AA I-AB I-B I-C I-D I-E I-F I-G I-H I-I I-J I-K I-L I-M I-N I-O I-P I-Q I-R I-S I-T I-U I-V I-W I-X I-Y I-Z

AP-5 POND

AP-1 POND

AP-2 POND

AP-4 POND

C-1 POND 10

1740 1760 1770 1780

Legend

- Boring (Installed 2009)
- Monitoring Well (Installed 2009)
- Recovery Well (Installed 2009)
- Monitoring Well (Installed 2007)
- Recovery Well (Installed 2007)
- Abandoned Recovery Well
- Monitoring Well
- Recovery Well
- Recharge Trench
- Barrier Wall
- Pond
- Topographic Contour

1 inch = 150 feet
1:1,800
150 75 0
Feet

northgate environmental management, inc.
http://www.ngem.com
TRONOX

REVISIONS:	NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY: | DRAWN BY: | CHECKED BY: | APPROVED BY:

INTERCEPTOR WELL FIELD
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	12/22/09	2027.01

FIGURE NUMBER: **2**

SHEET NUMBER: 1

\\Ng-oak1\NG-GIS\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\Figure_2_New_Wells_Interceptor_WF.mxd Last updated 12/16/2009 12:01:40 AM

Water and Chemical Movement

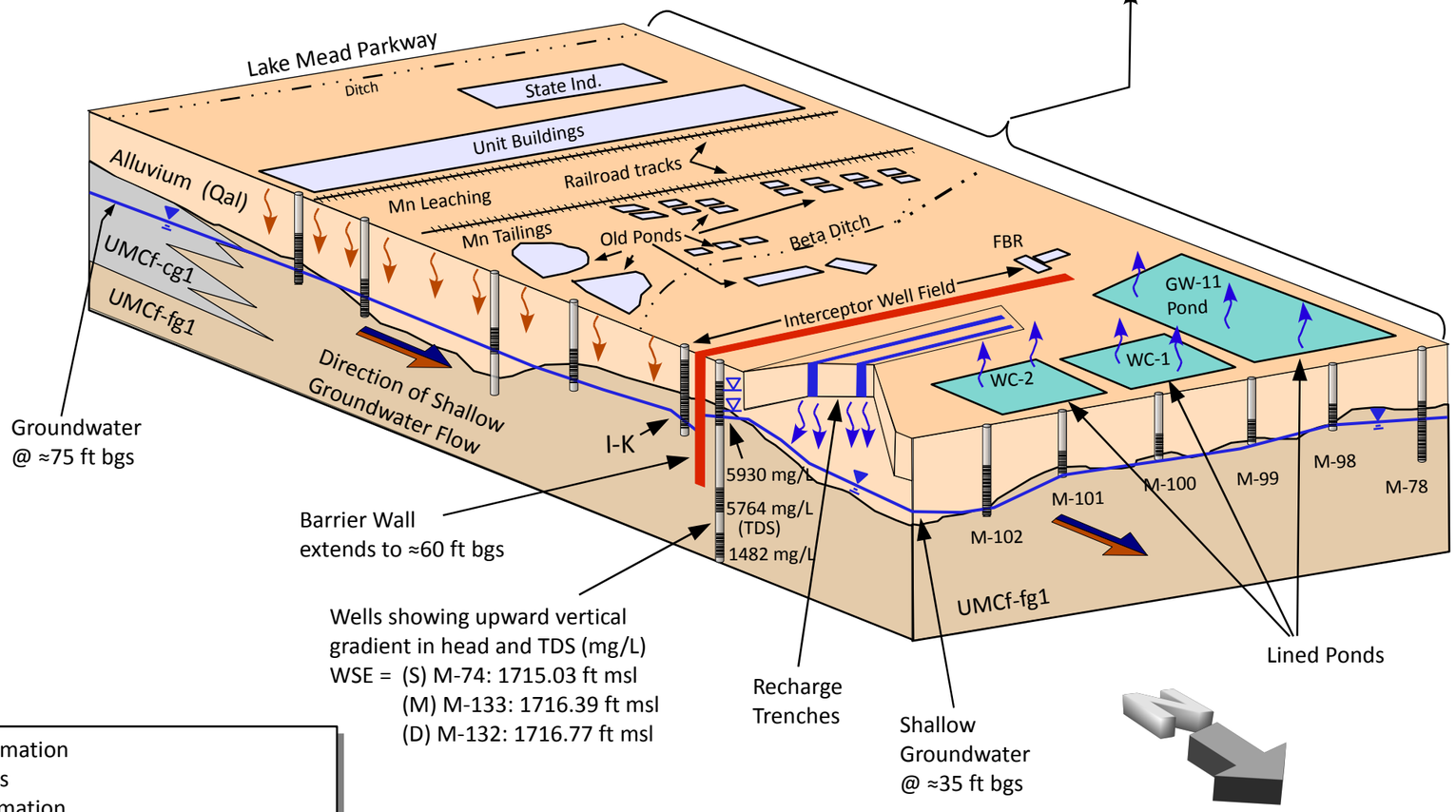
Water Infiltration

Water and Chemical Infiltration

Pond Evaporation

Potential Contaminant Source Areas (69 LOUs identified)

- •Unit Building operations
- •Manufacturing activities
- •Spills and leaks from storage activities
- •Leaks from underground and above ground pipelines
- •Leaks from underground tanks
- •Spills from above ground tanks
- •Infiltration from surface impoundments
- •Infiltration from ditches
- •Overtopping from surface impoundments
- •Incidental sills from roasting operations
- •Airborne dispersion of asbestos
- •Leaching from non hazardous waste pile
- •Spills along Railroad lines
- •Impacted surface soil blowing off site



UMCf-cg1 – Muddy Creek Formation
First fine-grained facies
UMCf-fg1 – Muddy Creek Formation
First coarse-grained facies

WSE = water surface elevation
ft msl – feet above mean sea level
ft bgs – feet below ground surface

(S) Shallow well
(M) Middle well
(D) Deep well

Figure 3

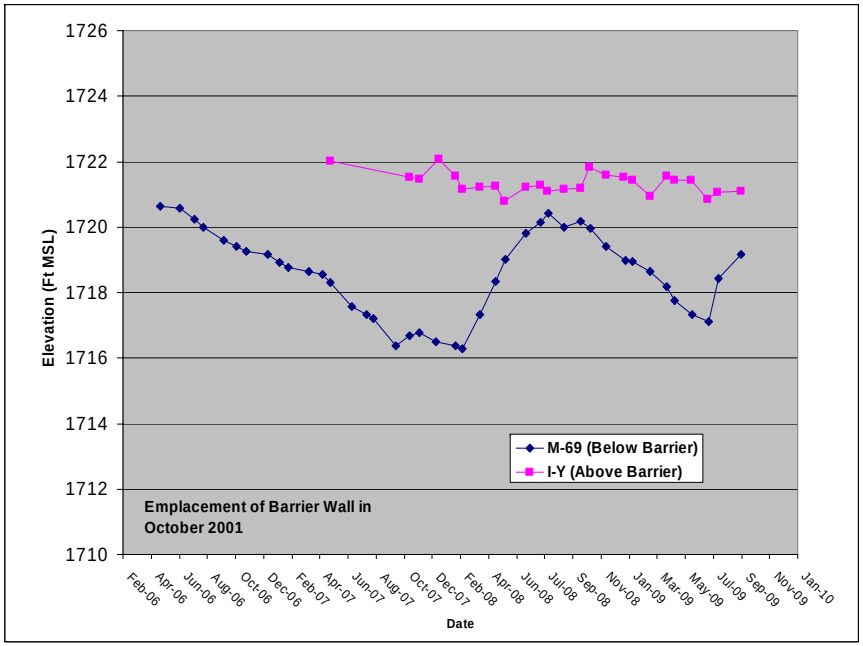
Interceptor Well Field Block Diagram
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility, Henderson Nevada

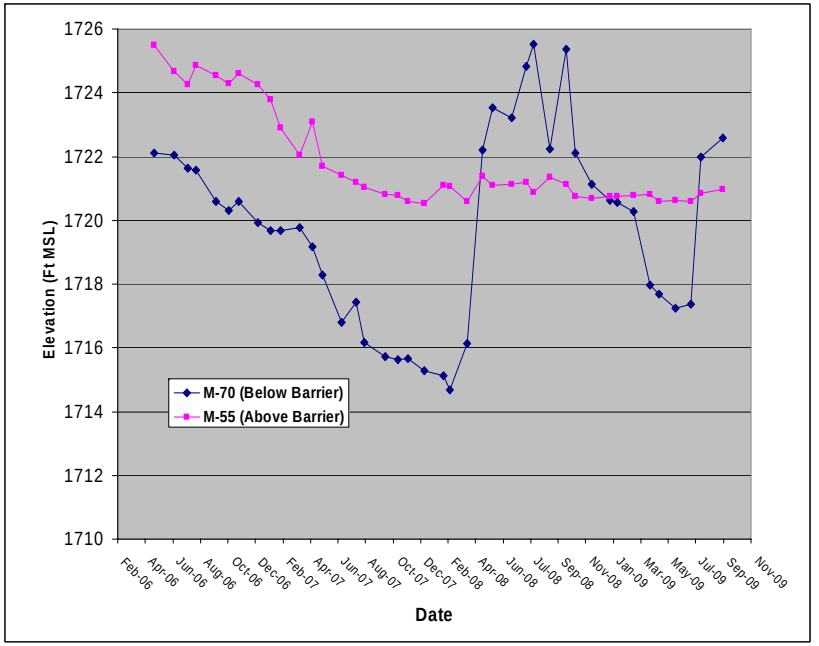
Data from May 2009
(Not to Scale)

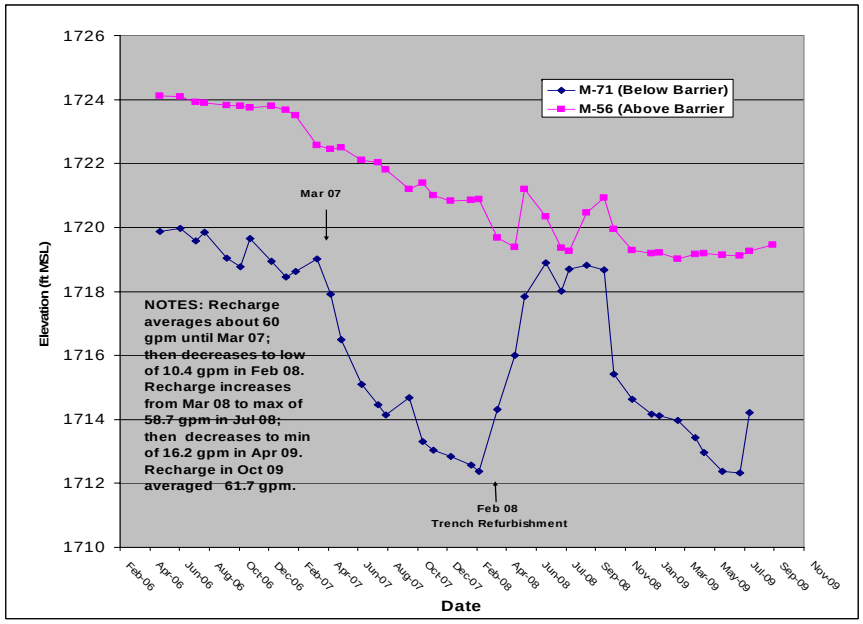
northgate environmental management, inc.

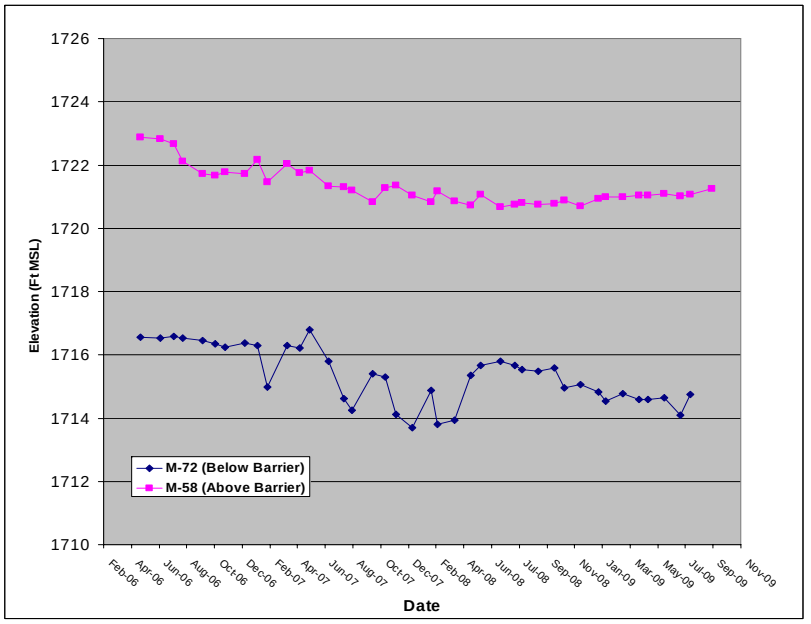
Figure 4: Hydrograph Pairs across the Barrier Wall

Tronox LLC, Henderson, Nevada









827000 827300 827600 827900 828200 828500 828800

26720300 26720000 26719700 26719400 26719100

GROUNDWATER RECHARGE TRENCHES

GROUNDWATER BARRIER WALL

A — A'

M-14A 1727.82
M-25 1726.35
M-36 1727.52
M-37 1728.82
M-38 1728.36
M-39 1729.41
M-57A 1723.42
M-64 1720.08
M-65 1720.93
M-66 1722.83
M-67 1723.74
M-68 1723.58
M-69 1717.76
M-70 1717.7
M-71 1712.96
M-72 1714.58
M-73 1711.99
M-74 1715.03
M-78 1718.79
M-79 1714.2
M-80 1714.46
M-81A 1709.68
M-83 1714.92
M-84 1713.25
M-86
M-87 1706.77
M-88 1708.6
M-89 1732.81
M-129 1714.95
M-130 1721.31
M-131 1721.19
M-132
M-133
M-134
M-135 1718.06
M-136
M-150
M-154
M-157
M-158
M-18 1710.63
M-19 1731.35
M-22A 1729.15
M-55 1720.58
M-58 1721.04
M-60 1718.43
M-61
CLD2-R 1723.53
I-A 1720.99
I-A-R
I-AA
I-AB
I-B
I-C
I-D
I-E
I-F
I-G
I-H
I-I
I-J
I-K
I-L
I-M
I-N
I-P
I-Q
I-R
I-S
I-T
I-U
I-V
I-W 1720.94
I-X 1718.04
I-Y 1721.45
I-Z

1710 1715 1720 1725 1730 1735 1740 1760 1770 1780

AP-1 POND
AP-2 POND
AP-4 POND
AP-5 POND
C-1 POND
10
6

LEGEND

1730.05	Groundwater Elevation (ft)
1725	Potentiometric Surface Contour (ft) (Dashed where approximate or inferred)
	Direction of Groundwater Flow
A — A'	Cross Section, Figure
●	Monitor Well
▲	Recovery Well
△	Abandoned Recovery Well
NR	No Reading

1 inch = 150 feet
1:1,800
150 75 0 Feet

J:\TronoxGIS\mxd\2008-groundwater report\Net_Drawdown_Interceptor_WF-2008.mxd

northgate environmental management, inc.
http://www.ngem.com
TRONOX

REVISIONS: NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
E. Krish	T. McAdam	E. Krish	S. Bilodeau

POTENTIOMETRIC SURFACE AT THE INTERCEPTOR WELL FIELD, MAY 2009
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	12/22/09	2027.01

FIGURE NUMBER: **5**

SHEET NUMBER: 1

827000 827300 827600 827900 828200 828500 828800

26720300 26720000 26719700 26719400 26719100

GROUNDWATER RECHARGE TRENCHES

GROUNDWATER BARRIER WALL

A — A'

M-88 M-87 M-86 M-85 M-84 M-83 M-81A M-80 M-79 M-18 NR M-129 M-133 M-74 M-132 M-73 M-72 M-71 M-70 M-69 M-134 M-136 M-135 M-61 NR I-K NR CLD2-R NR M-130 NR M-68 15 M-67 12 M-66 11.6 M-65 10.1 M-64 7.5 M-57A 8.7 M-55 8.2 M-39 12 M-25 7.9 M-38 7.3 M-150 NR M-36 8.8 M-154 NR M-22A 9.8 M-37 6.1 M-14A 4.6 M-89 5 M-19 10.2

I-A NR I-AA 7.4 I-AB NR I-B NR I-C NR I-D NR I-E NR I-F NR I-G NR I-H NR I-I NR I-J NR I-L NR I-M NR I-N NR I-O NR I-P NR I-Q NR I-R NR I-S NR I-T NR I-U NR I-V NR I-W 11.6 I-X 10.6 I-Y 7 I-Z NR I-A-R NR

M-131 NR M-157 NR M-158 NR M-56 10.7 M-58 11.5 M-60 12.1 M-78 9.9

1740 1760 1770 1780

8 10 12 14 6

AP-5 POND AP-1 POND AP-2 POND AP-4 POND C-1 POND

LEGEND

12.0	Groundwater Elevation (ft)
10	Feet of Net Drawdown (Dashed where approximate or inferred)
A — A'	Cross Section, Figure
●	Monitor Well
▲	Recovery Well
△	Abandoned Recovery Well
NR	No Reading

* September 1987 data taken from wells M14, M17, M22, M57

Drawdown in I-W, X, and Y extrapolated from September 1987 water levels

1 inch = 150 feet
1:1,800
150 75 0
Feet

M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\Plate_2-Net_Drawdown_Interceptor_WF.mxd

northgate environmental management, inc.
http://www.ngem.com
TRONOX

REVISIONS: NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
E. Krish	T. McAdam	E. Krish	S. Bilodeau

NET DRAWDOWN AT THE INTERCEPTOR WELL FIELD
SEPTEMBER 1987 TO MAY 2009
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility
Henderson, Nevada

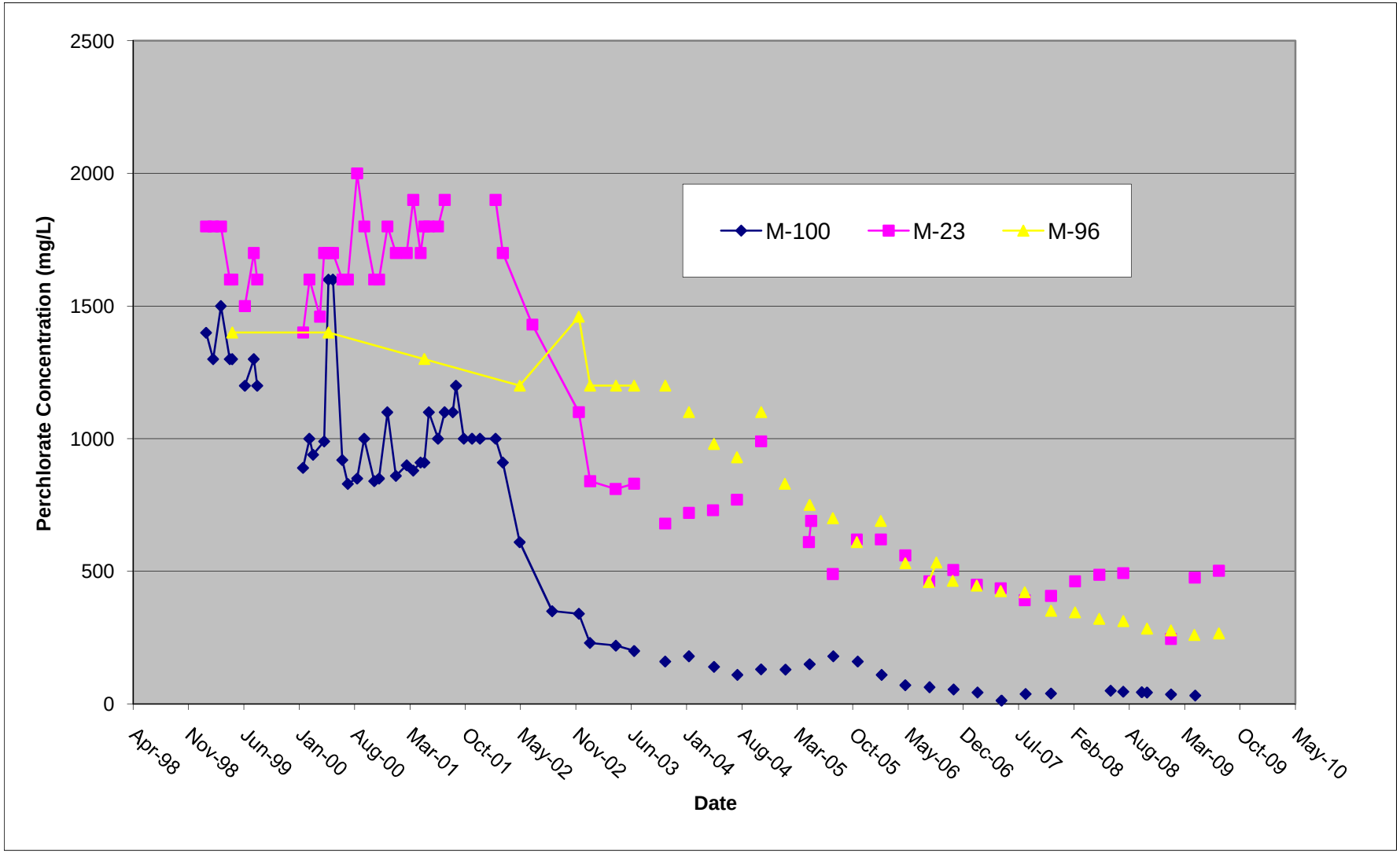
SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	12/22/09	2027.01

FIGURE NUMBER:
6

SHEET NUMBER:
1

Figure 7: Perchlorate Concentrations Downgradient of Interceptor Well Field Trend Graph, May 2003 to August 2009

Tronox LLC, Henderson, Nevada



1: 2,400

1 inch = 200 feet

200 100 0 200 Feet

Grid: Stateplane, Nevada East Zone, NAD83, Feet

828000 828400 828800 829200 829600 830000 830400

26729000 26728700 26728400 26728100 26727800 26727500 26727200

1610 1615 1620 1625 1630 1640

B — B'

ARP-1 ARP-2 ARP-3 MW-K4 ARP-4A ARP-5A ARP-6B ARP-7

ART-1A ART-1 PC-134 PC-135 ART-2 PC-18 PC-17 ART-4 PC-19 PC-55 ART-8 ART-3 ART-4A ART-8A

PC-136 PC-137 ART-5 ART-6 ART-9 ART-7 PC-122 PC-12 ART-7A

PC-10

L-639 L-637 L-635

PC-123

LEGEND

- Monitor Well
- Recovery Well
- Abandoned Recovery Well
- Monitoring Well (Installed 2007)

M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\Plate_2-Net_Drawdown_Interceptor_WF.mxd

northgate environmental management, inc.

http://www.ngem.com

TRONOX

REVISIONS: NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
E. Krish	NGEM	E. Krish	NGEM

INSTALLED WELLS AT THE ATHENS ROAD WELL FIELD

Interim Groundwater Capture Evaluation and Vertical Delineation Report

Tronox Facility

Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	12/22/09	2027.01

FIGURE NUMBER:

8

SHEET NUMBER:

1

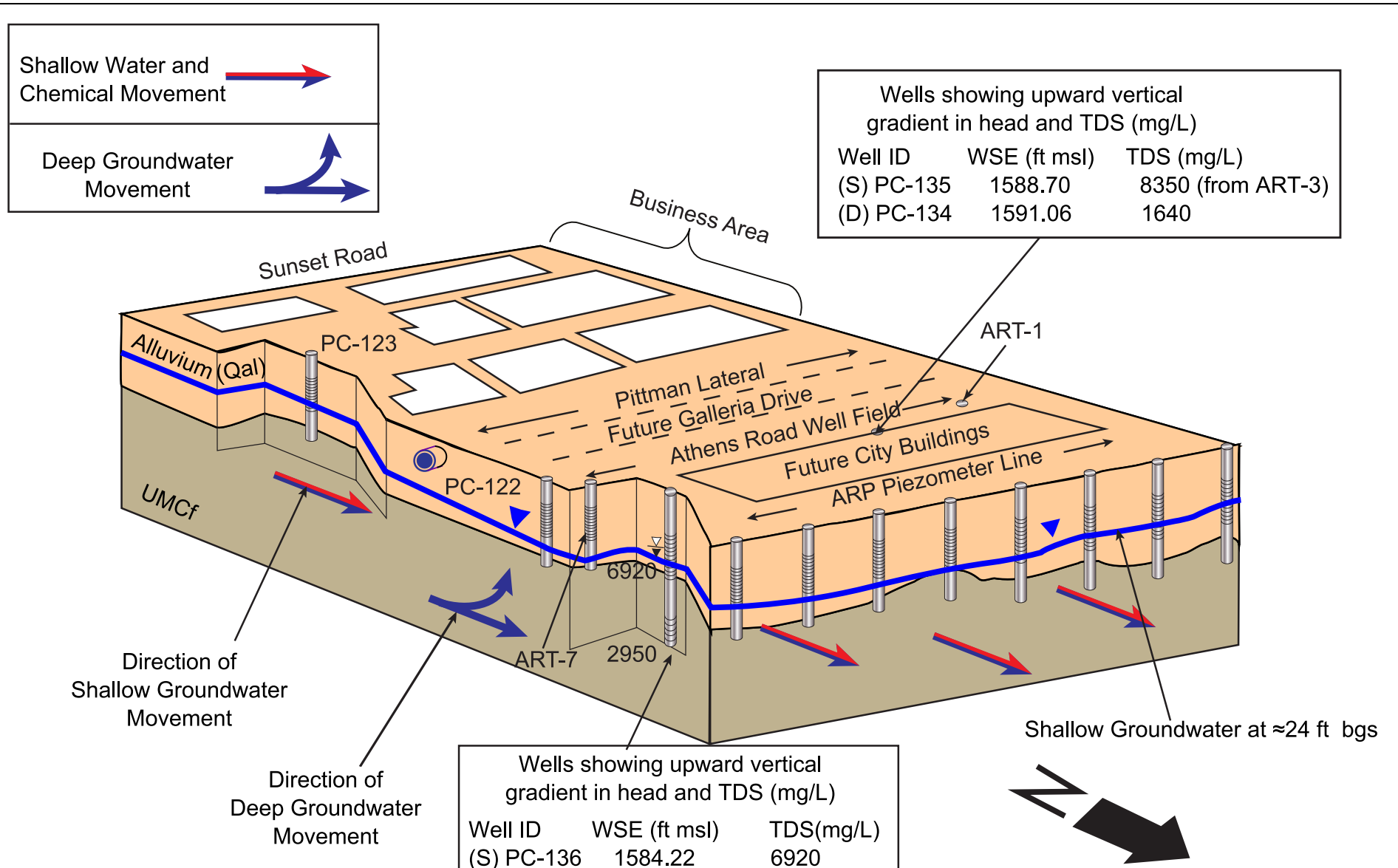


Figure 9

Athens Road Well Field Block Diagram
Tronox LLC, Henderson, Nevada

Data from May 2008
(Not to Scale)

northgate
environmental management, inc.

1: 2,400

1 inch = 200 feet

200 100 0 200 Feet

Grid: Stateplane, Nevada East Zone, NAD83, Feet

828000 828400 828800 829200 829600 830000 830400

26729000 26728700 26728400 26728100 26727800 26727500 26727200

1580 1585 1590 1595 1605 1610 1615 1620 1625

ARP-1 1589.33
ARP-2
ARP-3
MW-K4 1587.01
ARP-4A 1586.51
ARP-5A 1583.43
ARP-6B 1583.4
ARP-7 1582.41

ART-1 1590.54
ART-1A
PC-18 1590.09
ART-8A 1589.4
PC-101R 1589.86
PC-134
PC-135
ART-3 1587.39
ART-4 1588.67
PC-19
PC-55 1591.06
ART-2 1590.09
ART-2A
ART-5
PC-17
ART-3A
ART-4A

PC-137
PC-136
ART-6 1583.83
ART-7
PC-122 1585.42
ART-5
PC-12 1587.58
ART-9
ART-7A 1582.95

B
B'

PC-10

L-639
L-637
L-635 1605.39

PC-123 1603.49

ART WELL FIELD

Consists of ART-series (ART 1) and adjacent "Buddy Wells" (ART 1A-4A, 7A, 8A)

As of May 10, 2009 pumping wells are ART - 2, 3A, 4A, 7, 8 and 9.

LEGEND

- 1605.39 — Groundwater Elevation (ft)
- 1610 — Potentiometric Surface Contour (ft) (Dashed where approximate or inferred)
- Depression in groundwater surface
- Direction of Groundwater Flow
- B — B' — Cross Section, Figure
- ● Monitor Well
- ▲ Recovery Well
- △ Abandoned Recovery Well
- NR — No Reading
- Pittman Lateral
- Unsaturated Alluvium

northgate environmental management, inc.

http://www.ngem.com

TRONOX

REVISIONS: NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
E. Krish	NGEM	E. Krish	NGEM

POTENTIOMETRIC SURFACE ATHENS ROAD WELL FIELD
MAY 2009
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	12/22/09	2027.01

FIGURE NUMBER:

10

SHEET NUMBER:

1

M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\Plate_2-Net_Drawdown_Interceptor_WF.mxd

1: 2,400

1 inch = 200 feet

200 100 0 200 Feet

Grid: Stateplane, Nevada East Zone, NAD83, Feet

828000 828400 828800 829200 829600 830000 830400

26729000 26728700 26728400 26728100 26727800 26727500 26727200

B — B'

ARP-1 7.8
ARP-2 NR
ARP-3 NR
MW-K4 8
ARP-4A 8.5
ARP-5A 10.5
ARP-6B 10.1
ARP-7 10.5
ART-1A NR
ART-1 8.5
ART-2A 8.9
ART-2 NR
PC-101R 8.9
PC-134 NR
PC-17 NR
PC-135 NR
ART-8 NR
ART-8A 9.5
ART-3 12.3
ART-4 9.7
ART-4A NR
PC-19
PC-18 8.9
PC-55 8.2
ART-5 NR
PC-137 NR
PC-136 NR
ART-6 12.4
PC-12 8.9
ART-9 NR
ART-7 NR
ART-7A 13.2
PC-122 10.7
PC-10
L-639
L-637 NR
L-635 1.6
PC-123 1.2

1605 1610 1615 1620 1625 1630

2 4 6 8 10 12

ART WELL FIELD

Consists of ART-series (ART 1) and adjacent "Buddy Wells" (ART 1A-4A, 7A, 8A)

As of May 11, 2009 pumping wells are ART - 2, 3A, 4A, 7, 8 and 9.

LEGEND

12.0	Groundwater Elevation (ft)
6	Feet of Net Drawdown (Dashed where approximate or inferred)
B — B'	Cross Section, Figure
●	Monitor Well
▲	Recovery Well
△	Abandoned Recovery Well
NR	No Reading
- - -	Pittman Lateral
	Unsaturated Alluvium

northgate environmental management, inc.

http://www.ngem.com

TRONOX

REVISIONS: NO:	DESCRIPTION:	DATE:	BY:

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
E. Krish	NGEM	E. Krish	NGEM

NET DRAWDOWN ATHENS ROAD WELL FIELD

APRIL 2002 TO MAY 2009

Interim Groundwater Capture Evaluation and Vertical Delineation Report

Tronox Facility

Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	12/22/09	2027.01

FIGURE NUMBER:

11

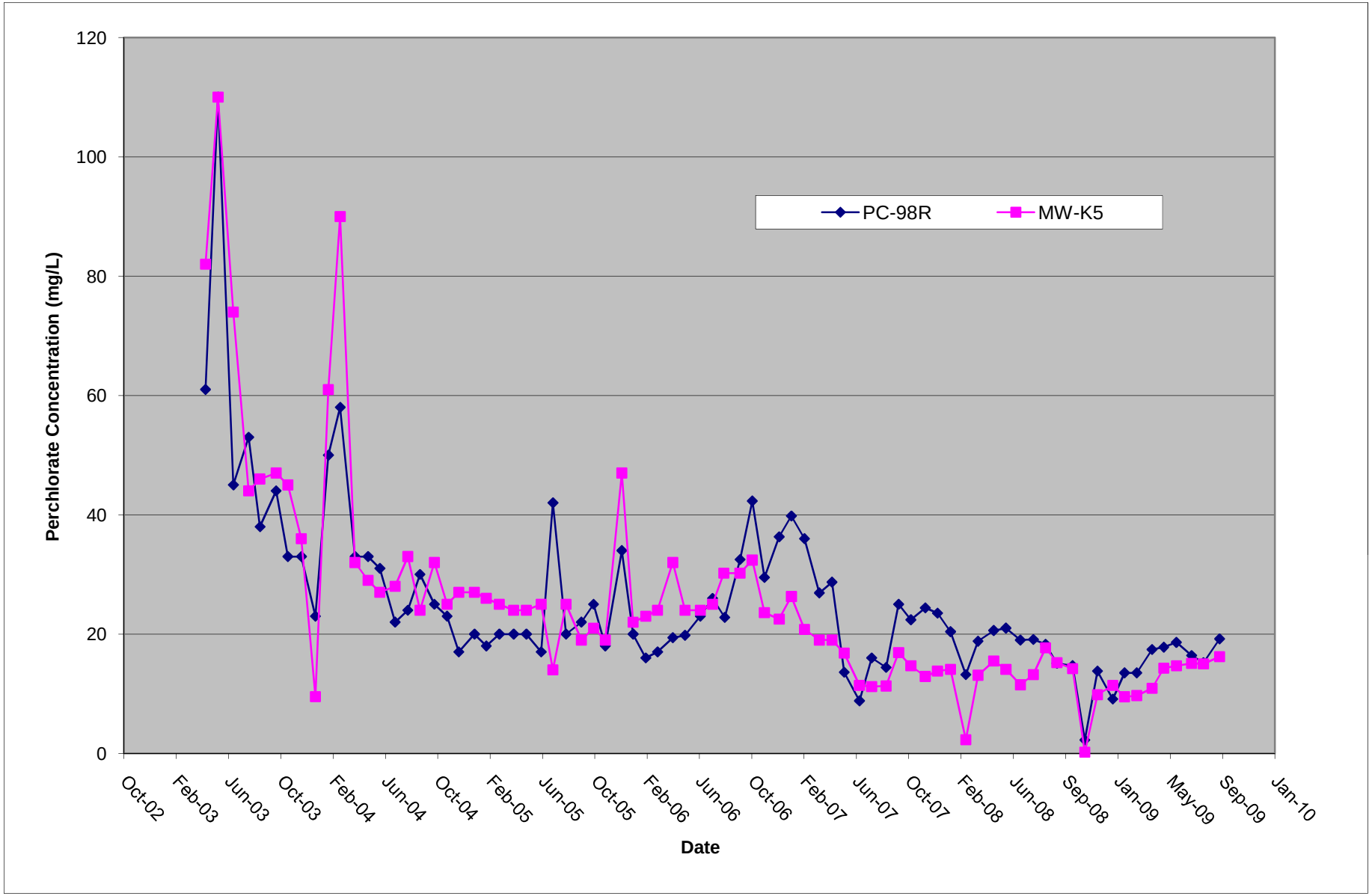
SHEET NUMBER:

1

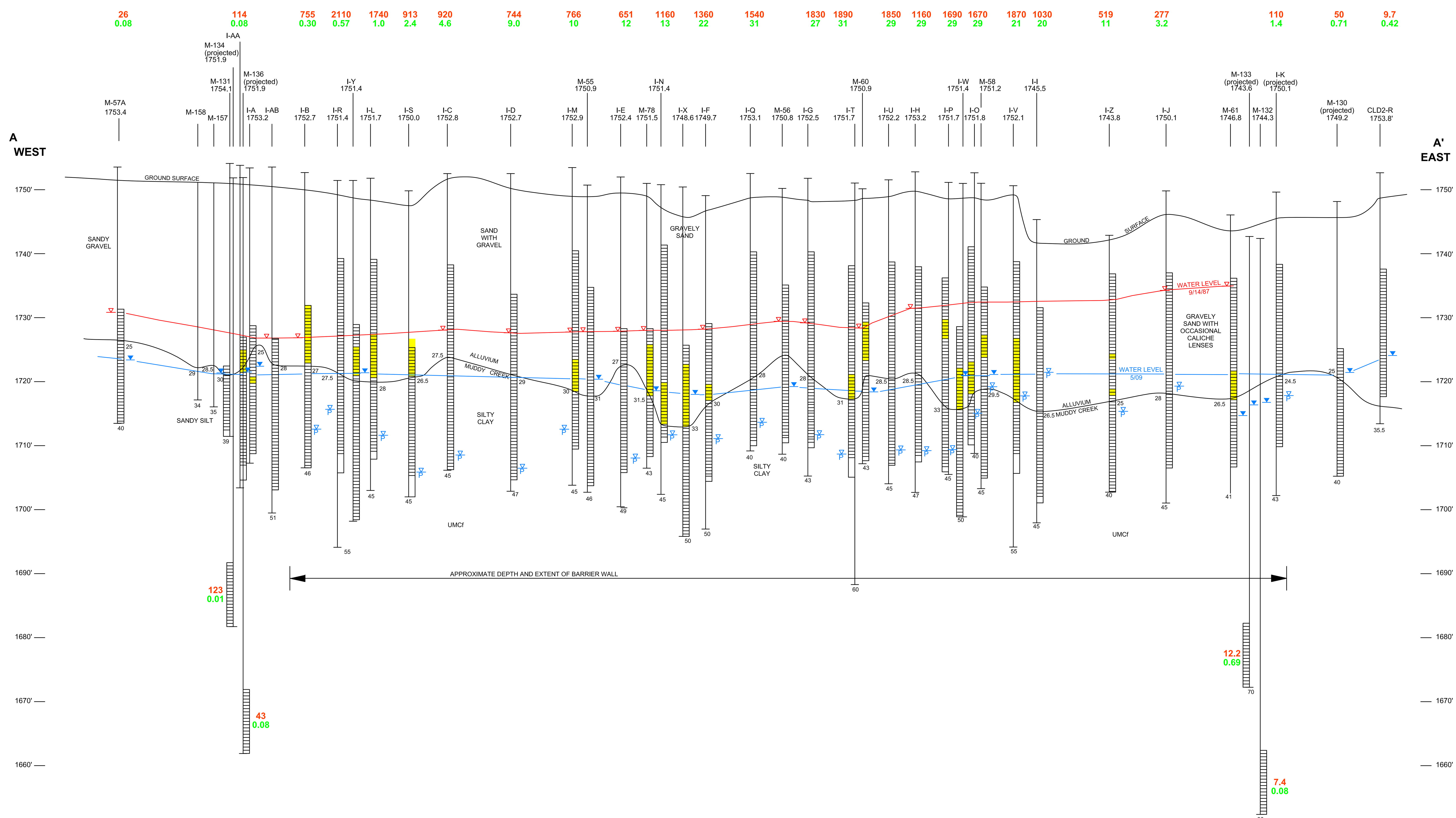
M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\Plate_2-Net_Drawdown_Interceptor_WF.mxd

Figure 12: City of Henderson WRF Well Perchlorate Trend Graph - May 2003 to August 2009

Tronox LLC, Henderson, Nevada



PLATES



LEGEND

1750.0' TOP OF CASING ELEVATION

SCREENED INTERVAL
(D) DEEP
(M) MIDDLE
(S) SHALLOW

CALICHIFIED ZONE

BLANK CASING

ALLUVIUM-MUDDY CREEK FM CONTACT (FT BGS)
UMCf - UPPER MUDDY CREEK FORMATION

TOTAL DEPTH (FT BGS)

STATIC WATER LEVEL PRIOR TO INITIAL PUMPING

GROUNDWATER LEVELS MEASURED MAY 2009

PUMPING WELL, MAY 2009

1.9 PERCHLORATE CONCENTRATION AS OF MAY 2009 (mg/L) ND <0.004 mg/L

1.9 TOTAL CHROMIUM CONCENTRATION AS OF MAY 2009 (mg/L) ND <0.01 mg/L

VERTICAL SCALE IN FEET 10' 5' 0'
HORIZONTAL SCALE IN FEET 0' 50' 100'

northgate environmental management, inc.
http://www.ngem.com
TRONOX

REVISIONS
NO.: DESCRIPTION: DATE: BY:

DESIGNED BY: E. Krish
DRAWN BY: NGEM
CHECKED BY: NGEM
APPROVED BY: NGEM

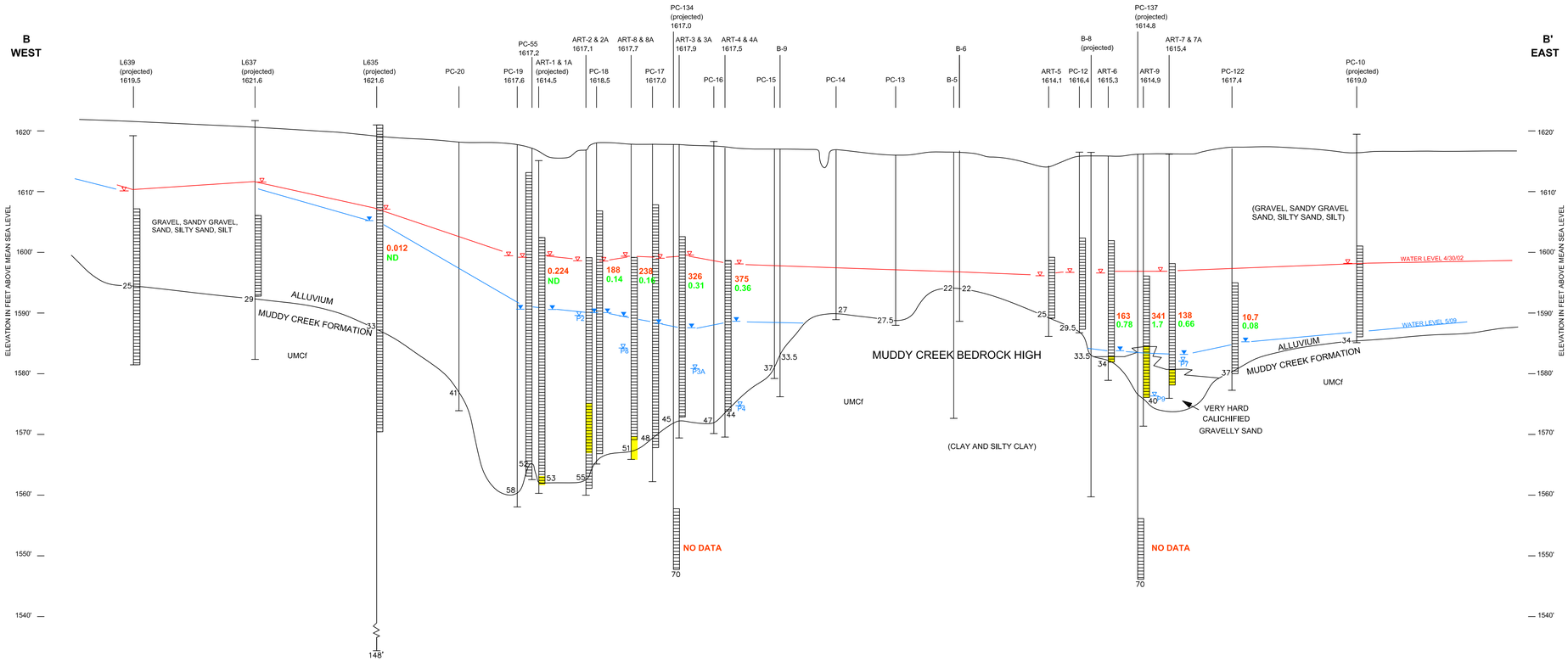
WEST - EAST HYDROGEOLOGIC CROSS SECTION A-A' INTERCEPTOR WELL FIELD MAY 2009

Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility, Henderson, Nevada

PROJECT NUMBER: 2027.02
DATE: 12/22/09
SCALE: as noted

PLATE NUMBER: 1
SHEET NUMBER: X

M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\AutoCAD_Figures\Plates - GW Cross Sections.dwg Layout: AA Interceptor WF User: oleg Dec 22, 2009 - 3:10pm



LEGEND

- 1750.0' — TOP OF CASING ELEVATION
- SCREENED INTERVAL (D) DEEP (M) MIDDLE (S) SHALLOW
- CALICHIFIED ZONE
- BLANK CASING
- 40' — ALLUVIUM-MUDDY CREEK FM CONTACT (FT BGS); UMCf - UPPER MUDDY CREEK FORMATION
- 57 — TOTAL DEPTH (FT BGS)
- STATIC WATER LEVEL PRIOR TO INITIAL PUMPING
- GROUNDWATER LEVELS MEASURED MAY 2009
- PUMPING WELL AND WELL NAME, MAY 2009
- 1.9 — PERCHLORATE CONCENTRATION AS OF MAY 2009 (mg/L) ND <0.004 mg/L
- 1.9 — TOTAL CHROMIUM CONCENTRATION AS OF MAY 2009 (mg/L) ND <0.01 mg/L

VERTICAL SCALE IN FEET: 10' 5' 0'
HORIZONTAL SCALE IN FEET: 0' 50' 100'

northgate environmental management, inc.
http://www.ngem.com
TRONOX

REVISIONS
DESCRIPTION:
DATE:
BY:
NO.:

DESIGNED BY: E. Krish
DRAWN BY: NGEM
CHECKED BY: NGEM
APPROVED BY: NGEM

WEST - EAST HYDROGEOLOGIC CROSS SECTION B-B'
ATHENS ROAD WELL FIELD
MAY 2009
Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility, Henderson, Nevada

SCALE: as noted
DATE: 12/22/09
PROJECT NUMBER: 2027.02

PLATE NUMBER: **2**

SHEET NUMBER: X

M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\AutoCAD_Figures\Plates - GW Cross Sections.dwg Layout: BB Athens Rd wf User: dleg Dec 22, 2009 - 3:09pm

SOUTH - NORTH HYDROGEOLOGIC CROSS SECTION C-C'

Interim Groundwater Capture Evaluation and Vertical Delineation Report
Tronox Facility, Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
as noted	12/22/09	2027.02

PLATE NUMBER: 3

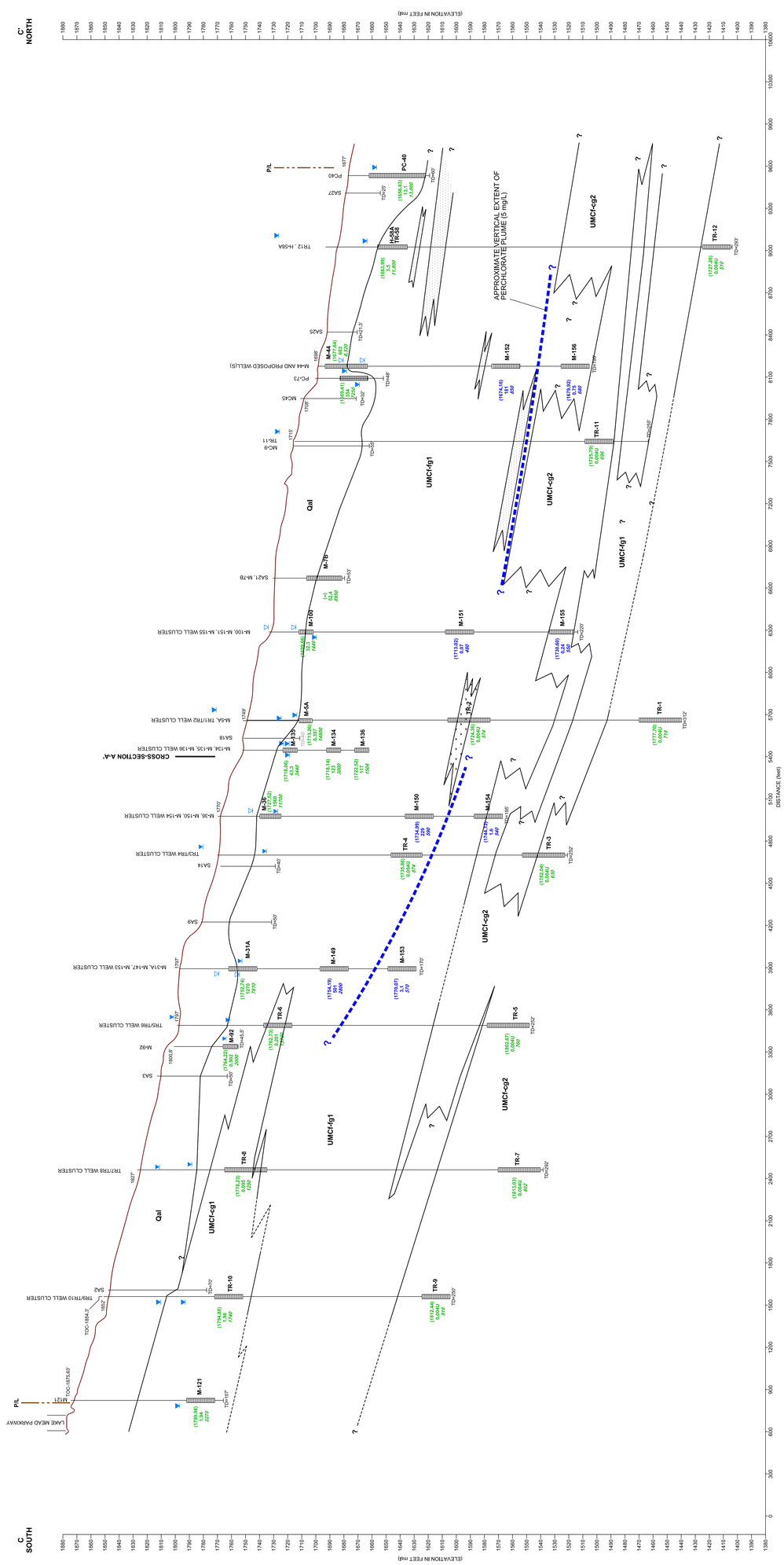
SHEET NUMBER: X

DESIGNED BY:	REVISIONS			
E. Krish	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
NGEM				
CHECKED BY:				
NGEM				
APPROVED BY:				
NGEM				

northgate
environmental management, inc.

TRONOX

http://www.ngem.com



M:\Projects\EDMS\01_Projects\Tronox\Perchlorate\2009_CZE\AutoCAD_Figures\cross section CC.dwg Layout: Layout1 User: oleg Dec 22, 2009 - 2:58pm

APPENDIX A

NDEP AND TRONOX CORRESPONDENCE

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

6/29 Digital to ECA Doc. Dist.

June 26, 2007

JUN 28 2007

Ms. Susan Crowley
Tronox LLC
PO Box 55
Henderson, Nevada 89009

Re: **Tronox LLC (TRX)**
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection Response to:
Response to NDEP Comments of the Tronox Semi-Annual Performance Report dated February 28, 2007 and the Required Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Henderson, Nevada dated May 30, 2007

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's report/work plan identified above and has provided comments in Attachment A. It is requested that TRX resubmit this document with annotated response to comments **by July 31, 2007**. It is suggested that TRX discuss these issues with the NDEP prior to resubmittal.

If there are any questions, please do not hesitate to contact me.

Sincerely,

Shannon Harbour, P.E.
Staff Engineer
Bureau of Corrective Actions
Special Projects Branch
NDEP-Las Vegas Office

CC: Jim Najima, NDEP, BCA, Carson City
Brian Rakvica, NDEP, BCA, Las Vegas
Todd Croft, NDEP, BCA, Las Vegas
Keith Bailey, Tronox, Inc, PO Box 268859, Oklahoma City, Oklahoma 73126-8859
Sally Bilodeau, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727
Barry Conaty, Akin, Gump, Strauss, Hauer & Feld, L.L.P., 1333 New Hampshire Avenue, N.W., Washington, D.C. 20036
Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009
Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street, San Francisco, CA 94105-3901
Rob Mrowka, Clark County Comprehensive Planning, PO Box 551741, Las Vegas, NV, 89155-1741
Ranajit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801
Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011
Mark Paris, Landwell, 875 West Warm Springs, Henderson, NV 89011
Craig Wilkinson, TIMET, PO Box 2128, Henderson, Nevada, 89009-7003
Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015
George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409
Nick Pogoncheff, PES Environmental, 1682 Novato Blvd., Suite100, Novato, CA 94947
Lee Erickson, Stauffer Management Company, P.O. Box 18890, Golden, CO 80402
Chris Sylvia, Pioneer Americas LLC, PO Box 86, Henderson, Nevada 89009
Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, CA 95209
Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island, WA 98110
Paul Hackenberry, Hackenberry Associates, LLC, 550 W. Plumb Lane B425, Reno, Nevada 89509

Attachment A

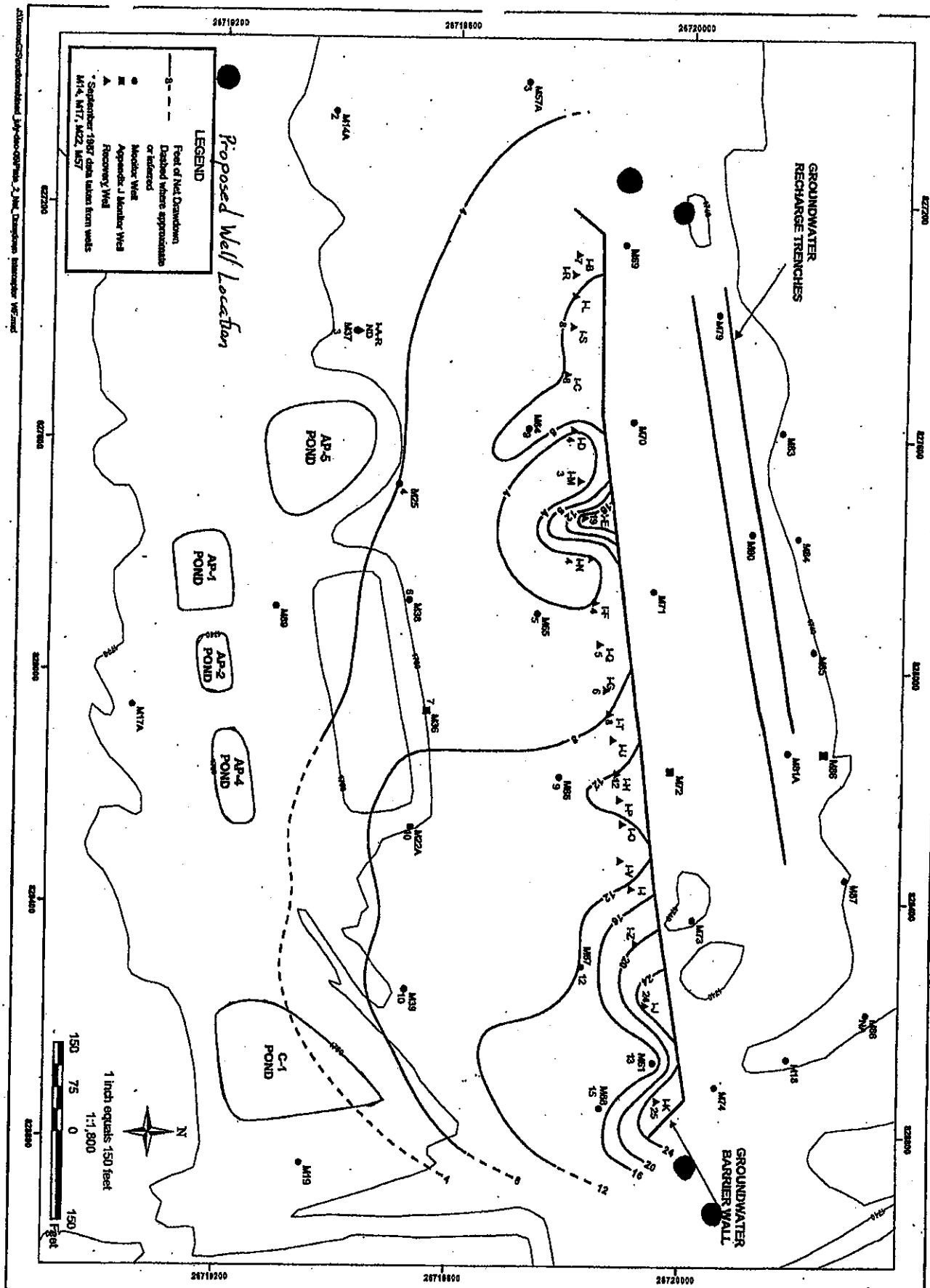
1. General comment, the subject work plan must be signed by a CEM per NAC 459.9719.
2. General comment, the Flow Budgets presented herein could be improved by calculating the estimated groundwater flow at one or more cross sectional areas and comparing these values to the volume of groundwater extracted at the respective well field.
3. General comment, TRX must discuss the relationship between perchlorate, hexavalent chromium and other Site-related chemicals. Some portions of the plume which contain high TDS water may migrate in a fashion that is atypical (due to density gradients or other reasons).
4. General Comment, TRX must include a map(s) illustrating the proposed locations of piezometers and groundwater monitoring wells.
5. Section I, page 1 of 7, footnote #1, the NDEP recommends adding the following reference: Capture Zone Analysis for Pump-and-Treat Systems, EPA NARPM Conference May 24, 2005.
6. Section I, page 2 of 7, 2nd paragraph, 2nd bullet, "Demonstration of overlapping cones of depression via flow nets both in plan view and vertical cross section." This is not included in EPA (2002) reference as a line of evidence. The EPA (2005) clearly indicates that drawdown (cone of depression) and capture zone are not the same. The capture zone and cone of depression will only be the same if background hydraulic gradient is zero. However, given the geometry of the line of extraction wells within and extending across a mapped paleochannel, the NDEP acknowledges that overlapping cones of depression can be a line of evidence. This comment is applied to a number of Sections of the report and will not be repeated.
7. Section II, page 2 of 7, Capture Zone, TRX indicates that the barrier wall was designed "to provide a physical barrier to groundwater migration across the width of the identified perchlorate plume." It is important to frame this discussion in terms of concentration because it is obvious that the lower concentration portions of the perchlorate plume are not being captured.
8. Section II, page 2 of 7, Flow Budget, TRX needs to support the argument about upward hydraulic gradient with on-site data including both water level elevation and water quality. In addition, TRX states "Current capture rates (70 gpm) are double those before the wall was installed." Please note that the rate of capture is irrelevant when the upgradient flow rate is unknown.
9. Section II, page 3 of 7, 1st paragraph 2nd sentence, Flow Budget, please provide the calculations and input parameters.
10. Section II, page 3 of 7, 2nd and 3rd paragraphs, last sentences, Flow Budget, the NDEP has the following comments:
    a. The NDEP requests that this statement be supported with the installation of at least two monitoring wells at both locations as illustrated in Figure 1 (see following comment) to measure gradient. Flow may then be calculated using these newly installed monitoring wells and M69 (west side) and M74 (east side).
    b. Please note that the NDEP is including Figure 1 as example of possible well locations for comment clarity. TRX may propose different well locations.
    c. TRX should include a map illustrating the proposed locations of the monitoring wells. This comment applies to other portions of the work plan as well.
    d. TRX states "the volume of groundwater migrating around the...end of the barrier wall is estimated to be less than 1 gpm." It is not evident how this number was derived and what concentration applies to the 1 gpm number. Based on the data provided by TRX and others, the NDEP believes that a >1 mg/l plume impacts the northern 50% of the TIMET property. The source of this plume appears to be TRX.

11. Section II, page 3 of 7, 4th paragraph, Flow Budget, TRX must provide basis for this evaluation, i.e., calculations and input parameters.
12. Section II, page 3 of 7, Downgradient Concentration Declines over Time, water from Lake Mead is likely 0.010 mg/L or less based on historical analysis. Thus, the expansion of a zone containing less than 100 mg/L could occur through dilution alone by the addition of low perchlorate concentration water regardless whether the extraction wells were achieving capture at the rate in which TRX describes.
13. Section II, page 3 of 7, Downgradient Concentration Declines over Time, please delete the last two sentences from this paragraph because the addition of low perchlorate concentration water invalidates the analysis.
14. Section II, page 4 of 7, Proposed Additional Evaluation, 1st bullet, as noted above, the NDEP is not sure what this will prove because low perchlorate concentration water from Lake Mead is being injected downgradient of these wells.
15. Section II, page 4 of 7, Proposed Additional Evaluation, 3rd bullet, the NDEP requests three shallow (water table) monitoring wells at each end of the barrier wall to evaluate effectiveness of the barrier. (See also comment above.)
16. Section II, page 4 of 7, Proposed Additional Evaluation, 5th bullet, the NDEP requires contouring water level elevation excluding the use of pumping water levels from extraction wells. TRX may propose a method to estimate water levels for pumping wells taking into account well losses (inefficiency). Alternately, TRX could install piezometers in this area.
17. Section II, page 4 of 7, Proposed Additional Evaluation, the NDEP suggests that TRX consider installation of monitoring wells in a north south line along the TIMET-TRX border to delineate the extent of the plume in this area. Alternately, TRX could utilize some existing TIMET wells if they are adequate. Based upon the recently completed TIMET CSM the concentrations of perchlorate at TIMET range from 0.069 mg/l (along Lake Mead Parkway) to a high of 4.3 mg/l on the western side of the TIMET property (well CLD1-R).
18. Section II, page 4 of 7, Performance Evaluation, TRX should examine the concentration versus time trend graphs for the Athens Road well field. The NDEP notes that no appreciable change can be discerned from September 2001 to the most current quarterly report. The NDEP acknowledges that some of the declines may be obscured by the scale of the Figure. In any case, TRX should discuss these trends specifically and present Figures which are legible and appropriately scaled. In addition, TRX should discuss these concentrations versus time trend graphs in relation to the estimated travel times of the remedial system. For example, discuss the concentrations in the Athens Road well field from the time of the installation of the slurry wall until the present time and then explain why the concentrations are not declining. It appears to the NDEP that some portion of the 100 mg/l perchlorate plume is not being captured on-Site.
19. Section II, page 5 of 7, Athens Road Extraction Gallery, Flow Budget, the NDEP requires TRX to provide the calculations and input parameters before the NDEP will comment on the results of the calculations.
20. Section II, page 5 of 7, Athens Road Extraction Gallery, Overlapping Cones of Depression, see comment above regarding overlapping cones of depression. The 11 foot drawdown reported for ART-3 in the *Semi-Annual Performance Report for Chromium and Perchlorate* dated February 6, 2007 may be the result of well inefficiency.
21. Section II, page 5 of 7, Athens Road Extraction Gallery, Inward Flow, the NDEP does not agree that inward flow is demonstrated by the Potentiometric Surface Map, Fourth Quarter 2006. West of the TMCf high the groundwater elevation contours and data as posted on the map show a gradient south to north, *i.e.*, towards the wash. East of the TMCf high there is insufficient data to support the closed (depression)

contour as drawn on the map. No groundwater elevation data have been reported between the closed 1590 contour and the 1590 contour to the north to indicate a higher water level. An alternative way to map this data could include connecting the 1590 depression contour with the same 1590 contour to the north.

22. Section II, page 5 of 7, Athens Road Extraction Gallery, Proposed Additional Evaluation, 2nd bullet, unless the "available and accessible monitor wells along the width of Athens Road" lie between the ART-series and ARP-series wells there may still not be adequate groundwater level data to demonstrate inward flow. It may be necessary to install one or more well pairs to the ART "buddy" wells to achieve this purpose. If well pairs are installed NDEP should review and approve the location for these wells.
23. Section II, page 5 of 7, Numerical Modeling, this discussion has no references and hence cannot be verified by the NDEP. In addition, the NDEP noted that the numerical modeling completed previously (but not referenced in this report) does not demonstrate the 97.5% capture purported by TRX.
24. Section II, page 6 of 7, Seep Area Collection System, Flow Budget, no flow budget is presented or referenced in this section. The NDEP requires a flow budget calculation to be presented or referenced.
25. Section II, page 6 of 7, Seep Area Collection System, Overlapping Cones of Depression, see comment above. In addition, the NDEP does not believe that overlapping cones of depression have been demonstrated to exist in this area.
26. Section II, page 6 of 7, Seep Area Collection System, it is not clear to the NDEP that full capture in the Seep Area is warranted or feasible. The goals for this area should be discussed and a capture zone should be agreed upon. It is evident that the remedial system can be optimized in this well field and others.

Figure 1



SHEET NUMBER:	1
PLATE NUMBER:	2

NET DRAWDOWN AT THE INTERCEPTOR WELL FIELD
SEPTEMBER 1987 TO NOVEMBER 2006
Semi-Annual Performance Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
NTS	January 2007	04020-023-110

ENSR | AECOM
ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.ENSR.AECOM.COM

DESIGNED BY:	REVISIONS:			
E. Krish	NO:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
T. McAdam				
CHECKED BY:				
E. Krish				
APPROVED BY:				
D. Gary				

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA

Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

10/4/07 Digital to ECA Document Distribution

October 3, 2007

OCT - 4 2007

Susan Crowley
Tronox LLC
PO Box 55
Henderson, Nevada 89009

Re: **Tronox LLC (TRX)**
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection Response to:
Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox Extraction Systems, Tronox LLC, Henderson, Nevada
Dated August 29, 2007

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's Work Plan identified above and provides comments in Attachment A. The NDEP has received and reviewed the aforementioned Deliverable and finds that the Deliverable is acceptable. Please note that the comments provided below should be reviewed and incorporated into the capture zone evaluation report. It is requested that TRX review the comments below and schedule a meeting with the NDEP by **October 31, 2007.** This meeting can be in-person or via telephone.

Please contact the undersigned with any questions at sharbour@ndep.nv.gov or (702) 486-2850 x 240.

Sincerely,

Shannon Harbour, P.E.
Staff Engineer III
Bureau of Corrective Actions
Special Projects Branch
NDEP-Las Vegas Office

SH:bar:sh

CC: Jim Najima, NDEP, BCA, Carson City
Brian Rakvica, NDEP, BCA, Las Vegas
Keith Bailey, Environmental Answers, 3229 Persimmon Creek Drive, Edmond, OK 73013
Sally Bilodeau, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727
Barry Conaty, Akin, Gump, Strauss, Hauer & Feld, L.L.P., 1333 New Hampshire Avenue, N.W., Washington, D.C. 20036
Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009
Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street, San Francisco, CA 94105-3901
Rob Mrowka, Clark County Comprehensive Planning, PO Box 551741, Las Vegas, NV, 89155-1741
Ranajit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801
Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011
Mark Paris, Landwell, 875 West Warm Springs, Henderson, NV 89011
Craig Wilkinson, TIMET, PO Box 2128, Henderson, Nevada, 89009-7003
Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015
George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409
Nick Pogoncheff, PES Environmental, 1682 Novato Blvd., Suite100, Novato, CA 94947
Lee Erickson, Stauffer Management Company, P.O. Box 18890, Golden, CO 80402
Chris Sylvia, Pioneer Americas LLC, PO Box 86, Henderson, Nevada 89009
Michael Bellotti, Olin, PO Box 248 1186 Lower River Road, Charleston TN 37310-0248
Curt Richards, Olin, PO Box 248 1186 Lower River Road, Charleston TN 37310-0248
Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, California 95209
Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island, WA 98110
Paul Hackenberry, Hackenberry Associates, LLC, 550 W. Plumb Lane B425, Reno, Nevada 89509

Attachment A

1. General comment: TRX interchangeably uses the terms "slurry wall" and "barrier wall" in the text and figures of the Work Plan. Please resolve this terminology in future Deliverables.
2. General comment: the NDEP did not note the reference of any standard operating procedures (SOPs) in the Work Plan. Please provide references for all applicable, approved SOPs by **October 24, 2007**. If new SOPs are needed please forward them to the NDEP as soon as possible for review.
3. General comment, please discuss if any hydraulic testing will be conducted in the wells that are proposed to be installed (e.g.: slug testing or pump testing) **at the meeting referenced in the cover letter.**
4. Section 2.1.1, Performance Evaluation, Flow Budget, the NDEP has the following comments (please note that these comments are also applicable to Appendix B):
    a. TRX states that "The presumed upward flow of groundwater is further enhanced by the pumping upgradient of the barrier. Given this enhancement to upward flow, it would be anticipated that perchlorate mass if present within the upper portion of the Muddy would be locally influenced in the vicinity of the barrier and interceptor well field." The first sentence starts with a presumption about upward flow and the second sentence starts with the upward flow as a "given." Please clarify what is meant by this statement and if this refers to the unconfined portion of the Muddy Creek formation or the confined portions.
    b. TRX states that the "Groundwater in the Muddy Creek, subsequently "dammed up" behind the groundwater barrier wall…" Please provide a cross-section of the Interceptor Well Field including the as-built dimensions of the barrier wall for a comparison of well depths versus the depth of the barrier wall and the depths of the geologic units.
    c. TRX states that the "Groundwater flowing vertically and "daylighting" from the Muddy Creek upwards into the incised alluvial channels up-gradient from the slurry wall. The third flow element is included in the budget, since the estimates of flow from the alluvium and Muddy Creek dammed behind the barrier do not adequately account for the water being pumped at the interceptor well field. The calculations and input parameters are provided in Appendix B." If this is truly a vertical flow component then the hydraulic conductivity used should not be the same as the horizontal hydraulic conductivity. Vertical hydraulic conductivity is typically several orders of magnitude less than horizontal hydraulic conductivity. It is suggested that TRX collect this data as part of the implementation of the Work Plan. **Please discuss this matter with the NDEP at the meeting referenced in the cover letter.**
    d. Please consider that the existence of water dammed up behind the barrier wall and water mounded in the "dead zone" may produce a downward gradient into the Muddy Creek formation.
    e. Please consider that the density of the water may produce a downward gradient into the Muddy Creek formation.
    f. Please consider installing several co-located wells which are screened in the various portions of the unconfined aquifer (e.g.: the Quaternary alluvium; the transition zone; and the Tertiary Muddy Creek formation). **Please discuss this matter with the NDEP at the meeting referenced in the cover letter.**

g. Please develop a block diagram for each well field which demonstrates the relationships between the water bearing zones and utilizes existing gradients and density data. If sufficient information is not available to develop these block diagrams the scope of work for this Work Plan should be revised. **Please discuss this matter with the NDEP at the meeting referenced in the cover letter.**

5. Section 2.1.1, Performance Evaluation, Downgradient Concentration Declines over Time, the NDEP has the following comments:
   a. The NDEP does not believe that the recharge water is "totally" responsible for the expansion of the area containing less than100 mg/L perchlorate but a contributing factor. Incremental analysis using either concentrations or pumping rates does not adequately demonstrate what is responsible for the expanding area of < 100 mg/L perchlorate. The NDEP suggests that this analysis requires a mass balance approach.
   b. TRX calculated the percent decrease of the perchlorate concentration downgradient of the barrier wall from approximately 1,000 mg/L in July 1998 to less than 100 mg/L currently. TRX then used this percent decrease to determine that a maximum of 6 gpm of 1,000 mg/L perchlorate could be flowing around the barrier wall. This calculation assumes that the groundwater concentration for perchlorate flowing around the barrier wall is 1,000 mg/L. Please discuss this assumption. As part of this discussion, TRX should consider the groundwater containing less than 10 mg/l and 25 mg/l which is traveling around the east and west ends of the barrier wall, respectively. This groundwater could certainly contribute to the expansion of the less than 100 mg/l zone of perchlorate.
   c. TRX states that "clean Lake Mead water" is injected for infiltration to the area north of the barrier wall. Please quantify what is meant by "clean". There is an incremental concentration of perchlorate in Lake Mead water which has varied over time. For clarity it would be helpful to understand this range of inputs.
   d. Additionally see Appendix A, RTC 12 below.
6. Section 2.1.3, Data Gaps and Proposed Additional Evaluation, the NDEP has the following comments:
   a. In the second bullet, TRX proposes the installation of two monitoring wells at the east and west ends of the barrier wall to demonstrate the existence of an upward gradient from the MCFf to the alluvium. As noted above, the NDEP additionally suggests that core samples should be collected and tested for vertical hydraulic conductivity from the proposed monitoring wells to be installed in the Tertiary Muddy Creek formation (TMCf). The assessed vertical hydraulic conductivity should then be substituted into Table B-1 for the "Muddy Creek Upflow" to be used for calculations.
   b. In the last paragraph of section, TRX states that "Though not a data gap…" The NDEP believes that a data gap does exist in this area; however, the NDEP does acknowledge that proposed monitoring wells IM-2 and IM-4 are being installed to address the data gap to the west of the barrier wall and that the purpose for installing proposed extraction well, IEX-1, is for remediation and not necessarily for additional characterization.
7. Section 2.2, Athens Road Well Field, the NDEP has the following comments:
   a. In this Section and throughout the Work Plan, TRX refers to the model completed by the NDEP's contractor, however, TRX does not recognize all of the data gaps identified by the model. Examples follow.

b. The model states "Perchlorate concentration data for key well positions do not appear to indicate complete ARF capture is being achieved. The results of this analysis are not consistent with the results of the particle tracking exercise described above, which indicated that all particle pathways end at extraction well locations, and that "complete capture" is achieved."
c. The Model also states "Additional modeling efforts beyond those described herein, pending the discovery of significantly different data, may include expanding the model to three dimensions (e.g., simulating interaction between Qal and MCf or the Muddy Creek transition zone). Also, calibration of the current solute transport model may be warranted in the case of modified project objectives (e.g., more precise evaluation of mass removal efficiency is deemed necessary).
d. Another noted limitation of the model was stated as "Given the large hydraulic conductivity contrast between the Qal and MCf, groundwater flow and solute transport are inferred to be largely dominant in the alluvium. However, some degree of communication is presumed to occur."

8. Section 2.2.1, Performance Evaluation, Overlapping Cones of Depression, TRX states that "Overlapping cones of depression are evident from data collected from adjacent piezometers and monitoring wells, indicating that the well field has developed a capture zone sufficient to encompass the width of the plume in this area." Please note that drawdown does not equal capture. The NDEP suggests that it would be more accurate to state "Overlapping cones of depression are evident from data collected from adjacent piezometers and monitoring wells, indicating that the well field has developed an area of drawdown sufficient to encompass the width of the plume in this area."
9. Table 1, the NDEP requests that TRX prepare and submit cross-sections which present the proposed locations and depths of the new wells relative to existing wells, geologic units and saturated thicknesses. Please provide this at the meeting referenced in the cover letter.
10. Appendix A, the NDEP has the following comments:
    a. Response to comment (RTC) 12, the NDEP has the following comments:
        i. The NDEP acknowledges TRX's RTC but please note that the RTC does not rebut the implication that dilution could also be a factor in the concentration decline.
        ii. In Section 2.1.1 Performance Evaluation, Flow Budget, TRX states that "The slurry wall, installed in 2001, has dramatically improved groundwater capture. Current capture rates of about 65 gpm are double those before the wall was installed." Please reconcile the above-statement with RTC 12.
        iii. Additionally see comments above for Section 2.1.1.
    b. RTC 14, TRX proposes to "mine" wells M-70 and M-71 by pumping contaminated groundwater from the "dead zone" north of the barrier wall allowing the injected Lake Mead water to "migrate further into this area and assist in lowering the groundwater concentrations via flushing or dilution. In Section 2.1.3, TRX proposes to pump wells M-70 and M-71 and monitor the perchlorate concentration over time to "demonstrate the slurry wall is continuous and does not leak significantly along its length". The NDEP does not understand that if TRX is expecting the infiltration of Lake Mead water into this area, thereby reducing the contaminant concentrations, how pumping M-70 and M-71 will demonstrate the integrity of the barrier wall.

Please explain if the injection of Lake Mead water will be halted during these pump tests. Please clarify. **This matter must be discussed at the meeting requested in the cover letter.**

11. Appendix B, the NDEP has the following comments:
    a. Table B-1, as noted previously, the NDEP does not agree with the use of a horizontal hydraulic conductivity to calculated vertical flow.
    b. Table B-2, the NDEP noted that the electronic version provided with the original document included a duplicate of Table B-1 instead of Table B-2. Please provide a corrected electronic version of this Work Plan to the NDEP by **October 24, 2007**.
12. Appendix C, the NDEP has the following comments:
    a. TRX states that "… Lake Mead water containing very low concentrations of total chromium and perchlorate has moved a sufficient distance in the groundwater to a monitor well…" Please quantify what is meant by "very low concentrations of total chromium and perchlorate" and "sufficient distance".
    b. In Table C-1, TRX reports groundwater velocities ranging from 1.1 ft/d to 12.3 ft/d. Please discuss if separate groundwater velocities should be calculated for the alluvium, alluvial channels, and the inter-channel areas.
    c. The NDEP requests that the seepage velocity be calculated using hydraulic parameters for comparison. It is requested that TRX also collect physical parameter data in applicable geologic units during the implementation of this Work Plan (e.g.: dry bulk density, specific gravity, etc.). **Please discuss this matter with the NDEP at the meeting referenced in the cover letter.**

TRONOX

Susan Crowley
Staff Environmental Specialist

(702) 651-2234
Fax (405) 302-4607
Susan.crowley@tronox.com

November 28, 2007

Ms. Shannon Harbour, P.E.
Nevada Division of Environmental Protection
2030 East Flamingo Road, Suite 230
Las Vegas, Nevada 89119-0818

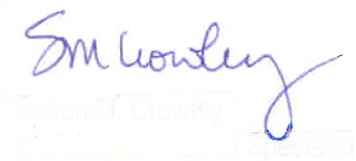
Subject: Response to Nevada Division of Environmental Protection (NDEP) Comments to the Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox LLC, Henderson, Nevada

Dear Ms. Harbour:

Tronox LLC (Tronox) has undertaken an Environmental Conditions Assessment (ECA) as directed by the Nevada Division of Environmental Protection (NDEP). On August 29, 2007, Tronox provided a revised work plan to NDEP outlining our approach to evaluate the effectiveness of groundwater systems at the Henderson site. On October 3, 2007, NDEP provided comments to the draft work plan, which were subsequently discussed in during a conference call between NDEP and Tronox on November 14, 2007. Attached is our annotated response to the October 3 NDEP comments, which incorporate the discussions of our conference call. Additionally, Tronox initiated the proposed field program to evaluate groundwater capture on November 25, 2007 following verbal approval from NDEP received during the conference call.

Additionally, per our discussions, attached is an electronic copy of the August 29, 2007 revised work plan in Adobe format which has been revised to include the corrected tables in Appendix B. Please contact me at (702) 651-2234 if you have any comments or questions concerning this correspondence.

Sincerely,



Susan M. Crowley
Staff Environmental Specialist

Overnight Mail

Attachment: As stated
CC: See attached Distribution List

Tronox response to October 3, 2007 NDEP comments on Capture Work Plan dated August 29, 2007

NDEP Comment

1. General comment: TRX interchangeably uses the terms "slurry wall" and "barrier wall" in the text and figures of the Work Plan. Please resolve this terminology in future Deliverables.

Tronox Response

The term "barrier wall" will be used in future documents.

NDEP Comment

2. General comment: the NDEP did not note the reference of any standard operating procedures (SOPs) in the Work Plan. Please provide references for all applicable, approved SOPs by **October 24, 2007**. If new SOPs are needed please forward them to the NDEP as soon as possible for review.

Tronox Response

The Standard Operating Procedures applicable to the work proposed are identified below and are provided in the BRC Field Sampling and Standard Operating Procedures – BMI Common Areas, Clark County, Nevada, ERM-West, Incorporated, Sacramento, California and Montgomery-Watson Harza, Sacramento, California, August 2007:

SOP-1 Drilling Methods
SOP-2 Groundwater Monitoring Well Design
SOP-3 Groundwater Monitoring Well Development
SOP-4 Aquifer Testing
SOP-5 Water Sampling and Field Measurements
SOP-6 Sampling Management and Shipping
SOP-10 Surveying
SOP-13 Operating and Calibration Procedures – Field Equipment
SOP-14 Field Documentation
SOP-15 Field Logbook
SOP-17 Soil Logging
SOP-20 Filter Pack and Well Screen Slot Size Determination
SOP-23 Split Spoon Sampling
SOP-31 Drilling Equipment Decontamination
SOP-34 Investigative Derived Waste (IDW) Management

NDEP Comment

3. General comment, please discuss if any hydraulic testing will be conducted in the wells that are proposed to be installed (e.g.: slug testing or pump testing) **at the meeting referenced in the cover letter**.

Tronox Response

As discussed during our November 14, 2007 conference call, Tronox will evaluate the vertical permeability of the Muddy Creek Formation with ASTM 5084 using a constant head method. A soil sample will be collected from the Muddy Creek Formation at the following proposed wells at both the Interceptor and Athens Road Well Fields:

M-129 (IM-1)
M-130 (IM-2)
M-134 (IM-5b)
M-136 (IM-6b)
PC-134 (AM-1a)
PC-136 (AM-2a)

The locations of these wells are shown on the revised figures attached to this document. Please note the change in the nomenclature and the reference to the prior well identification in parentheses.

NDEP Comment

4. Section 2.1.1, Performance Evaluation, Flow Budget, the NDEP has the following comments (please note that these comments are also applicable to Appendix B):
    a. TRX states that "The presumed upward flow of groundwater is further enhanced by the pumping upgradient of the barrier. Given this enhancement to upward flow, it would be anticipated that perchlorate mass if present within the upper portion of the Muddy would be locally influenced in the vicinity of the barrier and interceptor well field." The first sentence starts with a presumption about upward flow and the second sentence starts with the upward flow as a "given." Please clarify what is meant by this statement and if this refers to the unconfined portion of the Muddy Creek formation or the confined portions.
    b. TRX states that the "Groundwater in the Muddy Creek, subsequently "dammed up" behind the groundwater barrier wall…" Please provide a cross-section of the Interceptor Well Field including the as-built dimensions of the barrier wall for a comparison of well depths versus the depth of the barrier wall and the depths of the geologic units.
    c. TRX states that the "Groundwater flowing vertically and "daylighting" from the Muddy Creek upwards into the incised alluvial channels up-gradient from the slurry wall. The third flow element is included in the budget, since the estimates of flow from the alluvium and Muddy Creek dammed behind the barrier do not adequately account for the water being pumped at the interceptor well field. The calculations and input parameters are provided in Appendix B." If this is truly a vertical flow component then the hydraulic conductivity used should not be the same as the horizontal hydraulic conductivity. Vertical hydraulic conductivity is typically several orders of magnitude less than horizontal hydraulic conductivity. It is suggested that TRX collect this data as part of the implementation of the Work Plan. **Please discuss this matter with the NDEP at the meeting referenced in the cover letter.**
    d. Please consider that the existence of water dammed up behind the barrier wall and water mounded in the "dead zone" may produce a downward gradient into the Muddy Creek formation.
    e. Please consider that the density of the water may produce a downward gradient into the Muddy Creek formation.
    f. Please consider installing several co-located wells which are screened in the various portions of the unconfined aquifer (e.g.: the Quaternary alluvium; the transition zone; and the Tertiary Muddy Creek formation). **Please discuss this matter with the NDEP at the meeting referenced in the cover letter**.
    g. Please develop a block diagram for each well field which demonstrates the relationships between the water bearing zones and utilizes existing gradients and density data. If sufficient information is not available to develop these block diagrams the scope of work for this Work Plan should be revised. **Please discuss this matter with the NDEP at the meeting referenced in the cover letter.**

Tronox Response

a. The statement refers to the unconfined portion of the Muddy Creek formation and upward gradients are believed to be present. The work proposed under the Capture workplan will generate data to evaluate vertical gradients in the Muddy Creek.

b. Figure 2 of the Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada, July 2006 – June 2007 is a cross section of the Interceptor well field and includes the dimensions of the barrier wall for a comparison of well depths versus the depth of the barrier wall and the depths of the geologic units. This figure was also provided for the conference call on November 14, 2007 and is attached as Figure 6 to this document.

c. As discussed during the conference call of November 14, 2007, vertical gradients and hydraulic conductivity will be evaluated through the installation of nested wells M-133, M-134, M-135, M-136, PC-134, PC-135, PC-136 and PC-137, which will be installed at various depths within the Muddy Creek Formation. The approximate depth and completion of the

proposed wells that will be installed as part of the Capture Zone evaluation are shown on the attached hydrogeologic cross sections (see Figures 6, 7 and 8).

d. *Tronox will consider the potential for a downward gradient induced from groundwater mounded behind the barrier wall. Though as discussed during the November 14, 2007 conference call, the nested monitor wells proposed under the capture evaluation workplan will provide data to further evaluate this potential hydrologic condition and hypothesized potential downward vertical gradient suggested by NDEP.*
e. *Please see the response to comment 4d above.*
f. *Two nested monitoring well sets (M-133/M134 and M135/M136) have already been proposed to be screened at different levels of the Muddy Creek formation. Well M-74 on the east side of the barrier wall will serve as the alluvial well in the M-133/134 set whereas M-132 on the western side of the barrier wall will serve as the alluvial well in the M-135/136 set. Tronox has not observed a "Transition Zone" (i.e., reworked Muddy Creek Formation) in the Interceptor well field area.*
g. *As discussed during the November 14, 2007 conference call, block diagrams consistent to those provided via email by NDEP on November 14, 2007, will be prepared from the data gathered during the Capture Zone evaluation.*

NDEP Comment

5. Section 2.1.1, Performance Evaluation, Downgradient Concentration Declines over Time, the NDEP has the following comments:
    a. The NDEP does not believe that the recharge water is "totally" responsible for the expansion of the area containing less than100 mg/L perchlorate but a contributing factor. Incremental analysis using either concentrations or pumping rates does not adequately demonstrate what is responsible for the expanding area of < 100 mg/L perchlorate. The NDEP suggests that this analysis requires a mass balance approach.
    b. TRX calculated the percent decrease of the perchlorate concentration downgradient of the barrier wall from approximately 1,000 mg/L in July 1998 to less than 100 mg/L currently. TRX then used this percent decrease to determine that a maximum of 6 gpm of 1,000 mg/L perchlorate could be flowing around the barrier wall. This calculation assumes that the groundwater concentration for perchlorate flowing around the barrier wall is 1,000 mg/L. Please discuss this assumption. As part of this discussion, TRX should consider the groundwater containing less than 10 mg/l and 25 mg/l which is traveling around the east and west ends of the barrier wall, respectively. This groundwater could certainly contribute to the expansion of the less than 100 mg/l zone of perchlorate.
    c. TRX states that "clean Lake Mead water" is injected for infiltration to the area north of the barrier wall. Please quantify what is meant by "clean". There is an incremental concentration of perchlorate in Lake Mead water which has varied over time. For clarity it would be helpful to understand this range of inputs.
    d. Additionally see Appendix A, RTC 12 below.

Tronox Response

a. *The analysis provided in the revised work plan was to demonstrate, through a simple mass balance, that the mass of perchlorate getting around the slurry wall is only a very small fraction of the mass flowing toward the barrier wall.*
b. *This calculation assumes a concentration of 1,000 mg/L based on the June 2007 average perchlorate concentration in the Interceptor Well Field. The calculation was presented to help quantify the maximum mass of perchlorate that could be getting around the barrier wall. Tronox has proposed an additional recovery well at the west end of the barrier wall to improve capture. In addition, Tronox will be installing observation wells at both the east and west ends of the barrier wall to determine the nature of groundwater flow at the ends of the barrier wall. In the Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada, July 2006 – June 2007 the average perchlorate concentration in the well field for June 2007is 1079 mg/L.. Tronox has considered the*

contribution of the groundwater containing less than 10 mg/L and 25 mg/L which is traveling around the east and west ends of the barrier wall, respectively.

c. "Clean Lake Mead water" refers to water obtained from Lake Mead which has not been processed or re-used within the BMI complex. It comes directly from the lake to the City of Henderson's reservoir and then is piped directly to the BMI companies, including the Tronox facility. This water is now less than 5 ug/L perchlorate. The perchlorate concentration has been below 6 ug/L since January 2006 and below 10 ug/L since November 2003.

d. The NDEP Comments on Appendix A, RTC 12 are provided below.

NDEP Comment

6. Section 2.1.3, Data Gaps and Proposed Additional Evaluation, the NDEP has the following comments:
    a. In the second bullet, TRX proposes the installation of two monitoring wells at the east and west ends of the barrier wall to demonstrate the existence of an upward gradient from the MCFf to the alluvium. As noted above, the NDEP additionally suggests that core samples should be collected and tested for vertical hydraulic conductivity from the proposed monitoring wells to be installed in the Tertiary Muddy Creek formation (TMCf). The assessed vertical hydraulic conductivity should then be substituted into Table B-1 for the "Muddy Creek upflow" to be used for calculations.
    b. In the last paragraph of section, TRX states that "Though not a data gap…" The NDEP believes that a data gap does exist in this area; however, the NDEP does acknowledge that proposed monitoring wells IM-2 and IM-4 are being installed to address the data gap to the west of the barrier wall and that the purpose for installing proposed extraction well, IEX-1, is for remediation and not necessarily for additional characterization.

Tronox Response

a. As noted under comment No. 3 above, core samples will be collected and tested for vertical permeability by ASTM Method 5084.

b. The NDEP comment has been noted and Tronox agrees.

NDEP Comment

7. Section 2.2, Athens Road Well Field, the NDEP has the following comments:
    a. In this Section and throughout the Work Plan, TRX refers to the model completed by the NDEP's contractor; however, TRX does not recognize all of the data gaps identified by the model. Examples follow.
    b. The model states "Perchlorate concentration data for key well positions do not appear to indicate complete ARF capture is being achieved. The results of this analysis are not consistent with the results of the particle tracking exercise described above, which indicated that all particle pathways end at extraction well locations, and that "complete capture" is achieved."
    c. The Model also states "Additional modeling efforts beyond those described herein, pending the discovery of significantly different data, may include expanding the model to three dimensions (e.g., simulating interaction between Qal and MCf or the Muddy Creek transition zone). Also, calibration of the current solute transport model may be warranted in the case of modified project objectives (e.g., more precise evaluation of mass removal efficiency is deemed necessary).
    d. Another noted limitation of the model was stated as "Given the large hydraulic conductivity contrast between the Qal and MCf, groundwater. However, some degree of communication is presumed to occur."

Tronox Response

a. Tronox recognizes that data gaps exist at the Athens Road Well Field as discussed in the McGinley and Associates Report (June 30, 2007) and during their presentation at the Desert Research Institute on November 7, 2007. Tronox believes that the numerical model provides

important lines of evidence showing capture at Athens Road, but, also acknowledges that additional wells are required to evaluate inward flow.

b. *Tronox will be installing monitor wells downgradient of ART recovery wells in both the eastern and western subchannels in order to establish inward flow, further supporting the effectiveness of up to 95% for the capture system at Athens Road. Tronox agrees that the analog modeling done by NDEP's contractor is not consistent with the results of their particle tracking exercise which indicated complete capture.*
c. *Tronox does not believe that this is a data gap. Expanding the modeling into a third dimension would not likely provide significantly different results, as the contrast in horizontal hydraulic conductivity between the alluvium and Muddy Creek Formation would be several orders of magnitude. As noted, by McGinley and Associates in their report and during the November 7, 2007 presentation, while the solute model was not calibrated, the approach taken provided a reasonable evaluation of the mass flux and capture for the well field. Tronox believes that the additional wells proposed in the work plan to evaluate inward flow will serve along with the numerical modeling results to provide sufficient lines of evidence that capture is being achieved at Athens Road.*
d. *Since "vertical hydraulic conductivity is typically several orders of magnitude less that the horizontal hydraulic conductivity" (see NDEP Comment 4c, above) and that flow and solute transport are inferred to be largely dominant in the alluvium. To evaluate vertical flux, as noted in Comment No. 3 above, soil cores will be tested for vertical permeability from the Muddy Creek Formation and nested wells are proposed to evaluate vertical gradients at the Athens Road Well Field.*

NDEP Comment

8. Section 2.2.1, Performance Evaluation, Overlapping Cones of Depression, TRX states that "Overlapping cones of depression are evident from data collected from adjacent piezometers and monitoring wells, indicating that the well field has developed a capture zone sufficient to encompass the width of the plume in this area." Please note that drawdown does not equal capture. The NDEP suggests that it would be more accurate to state "Overlapping cones of depression are evident from data collected from adjacent piezometers and monitoring wells, indicating that the well field has developed an area of drawdown sufficient to encompass the width of the plume in this area."

Tronox Response

Tronox acknowledges this statement, though in the June 26, 2007 letter commenting on the Tronox Groundwater Capture Work Plan, the NDEP Comment 6 says regarding EPA lines of evidence and capture zones, "However, given the geometry of the line of extraction wells within and extending across a mapped paleochannel, the NDEP acknowledges that overlapping cones of depression can be a line of evidence".

NDEP Comment

9. Table 1, the NDEP requests that TRX prepare and submit cross-sections which present the proposed locations and depths of the new wells relative to existing wells, geologic units and saturated thicknesses. Please provide this at the meeting referenced in the cover letter.

Tronox Response

Tronox provided draft cross sections for the November 14, 2007 conference call with NDEP. These sections have been revised showing the corrected nomenclature for the well identification and are provided as Figures 6, 7 and 8 (attached). In addition, the plan-view maps provided in the work plan have also been revised to reflect the corrected nomenclature and are also attached.

NDEP Comment

10. Appendix A, the NDEP has the following comments:
    a. Response to comment (RTC) 12, the NDEP has the following comments:

i. The NDEP acknowledges TRX's RTC, but please note that the RTC does not rebut the implication that dilution could also be a factor in the concentration decline.
ii. In Section 2.1.1 Performance Evaluation, Flow Budget, TRX states that "The slurry wall, installed in 2001, has dramatically improved groundwater capture. Current capture rates of about 65 gpm are double those before the wall was installed." Please reconcile the above-statement with RTC 12.
iii. Additionally see comments above for Section 2.1.1.

b. RTC 14, TRX proposes to "mine" wells M-70 and M-71 by pumping contaminated groundwater from the "dead zone" north of the barrier wall allowing the injected Lake Mead water to "migrate further into this area and assist in lowering the groundwater concentrations via flushing or dilution. In Section 2.1.3, TRX proposes to pump wells M-70 and M-71 and monitor the perchlorate concentration over time to "demonstrate the slurry wall is continuous and does not leak significantly along its length". The NDEP does not understand that if TRX is expecting the infiltration of Lake Mead water into this area, thereby reducing the contaminant concentrations, how pumping M-70 and M-71 will demonstrate the integrity of the barrier wall. Please explain if the injection of Lake Mead water will be halted during these pump tests. **Please clarify. This matter must be discussed at the meeting requested in the cover letter.**

Tronox Response

a.i Tronox certainly agrees that dilution can be a factor in the concentration decline.

a.ii. The text was meant to demonstrate that the groundwater flow getting around the barrier wall is only a very small fraction of the groundwater flow flowing toward the barrier wall and captured by the Interceptor Well Field.

a.iii. Comments regarding Section 2.1.1 have been responded to above.

b. As discussed during the November 14, 2007 conference call, injection of Lake Mead water will not be halted during the proposed tests, though the recent decline in flow and pending replacement of the infiltration trenches will likely produce a short period of reduced influence from the injected Lake Mead water. The text of the workplan will be revised to clarify the purpose and expected outcome of the activities proposed in this area. As discussed, weekly water levels and groundwater samples will be collected to from these wells to monitor performance. It is proposed that onsite screening level analysis of the water samples could be performed by Tronox to track the progress of water mining.

NDEP Comment

11. Appendix B, the NDEP has the following comments:
    a. Table B-1, as noted previously, the NDEP does not agree with the use of a horizontal hydraulic conductivity to calculated vertical flow.
    b. Table B-2, the NDEP noted that the electronic version provided with the original document included a duplicate of Table B-1 instead of Table B-2. Please provide a corrected electronic version of this Work Plan to the NDEP by **October 24, 2007**.

Tronox Response

a. As noted previously, TRX will collect cores and test for vertical hydraulic conductivity.

b. The corrected "electronic" version of the Work Plan is provided in the attached CD.

NDEP Comment

12. Appendix C, the NDEP has the following comments:
    a. TRX states that "… Lake Mead water containing very low concentrations of total chromium and perchlorate has moved a sufficient distance in the groundwater to a monitor well…" Please quantify what is meant by "very low concentrations of total chromium and perchlorate" and "sufficient distance".
    b. In Table C-1, TRX reports groundwater velocities ranging from 1.1 ft/d to 12.3 ft/d. Please discuss if separate groundwater velocities should be calculated for the alluvium, alluvial channels, and the inter-channel areas.

c. The NDEP requests that the seepage velocity be calculated using hydraulic parameters for comparison. It is requested that TRX also collect physical parameter data in applicable geologic units during the implementation of this Work Plan (e.g.: dry bulk density, specific gravity, etc.). Please discuss this matter with the NDEP at the meeting referenced in the cover letter.

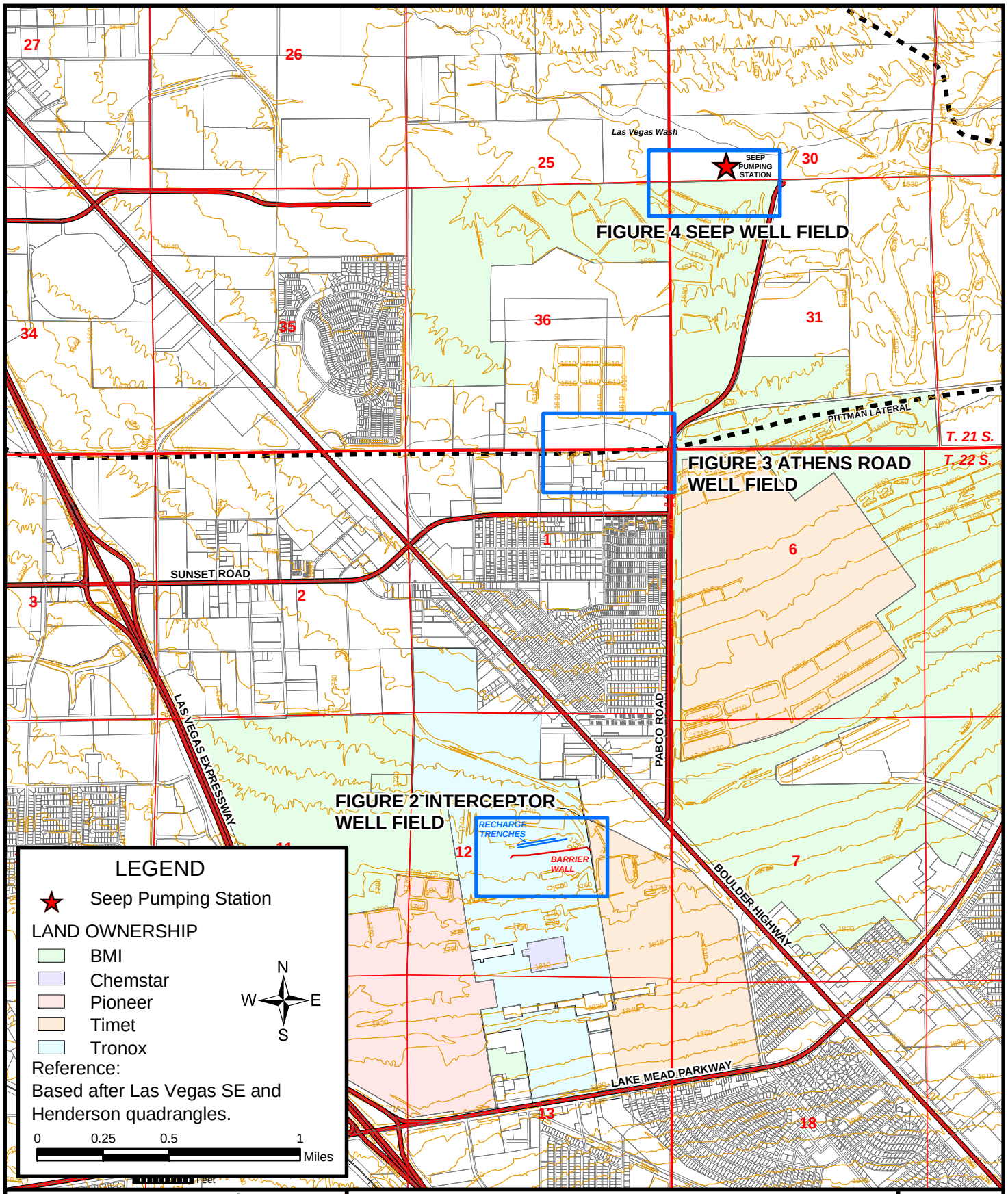
Tronox Response

a. *"Very low concentrations" are those concentrations that are present in the injected Lake Mead water which have ranged up to 24 µg/L though most recently equate to less than 6 ug/l perchlorate and less than 50 ug/l total chromium concentrations. Perchlorate in the injected water is several orders of magnitude lower than historic concentrations down-gradient of the barrier wall. "Sufficient distance" is the distance from the monitor wells used in the evaluation and the on-site recharge trenches.*
b. *The bulk of the estimated groundwater velocities generated from both the perchlorate and total chromium decline curves fall within the 1 to 4 ft/day range and the most common velocity estimates is between 1 and 2 ft/day. The highest (11.4 and 12.3 ft/day for perchlorate and total chromium, respectively), and the lowest (0.9 ft/day for perchlorate) estimates were found to be data outliers. TRX therefore does not think that separate groundwater velocities should be calculated for the alluvium, alluvial channels, and the inter-channel areas.*
c. *Hydraulic conductivity values listed in Appendix B, Tables B-1, B-2, and B-3 were utilized to calculate average and high/low groundwater seepage velocities for the alluvium. The seepage velocity calculations utilized an average gradient of 0.015 and an average porosity of 0.20. The groundwater seepage velocity values for the Interceptor well area (Table B-1), Sunset Road traverse (Table B-2), and Seep(Table B-3) are as follows:*

    - *Interceptor well area: K= 453 gpd/ft^2* ***v= 4.5 ft/day***
    - *Sunset Road traverse: K= 565 gpd/ft^2 (average of 10 wells)* ***v= 5.7 ft/day*** *(note: the highest velocity was 9.3 ft/day and the lowest was 2.4 ft/day)*
    - *Seep traverse: K= 6547 gpd/ft^2 (average of 8 wells)* ***v= 65 ft/day*** *(note: the highest velocity was 341 ft/day and the lowest was 1 ft/day)*

In addition, hydraulic conductivities were taken from onsite well testing conducted in 1986 prior to installation of the initial Interceptor wells. These wells (7) had an average K= 577 gpd/ft^2 and a calculated seepage velocity of 5.8 ft/day. The highest calculated velocity was 15.5 ft/day and the lowest was 0.5 ft/day.

These seepage velocity values compare well with the groundwater velocity data listed in Table C-1 of Appendix C (0.9 – 12.3 ft/day).



ENSR | AECOM

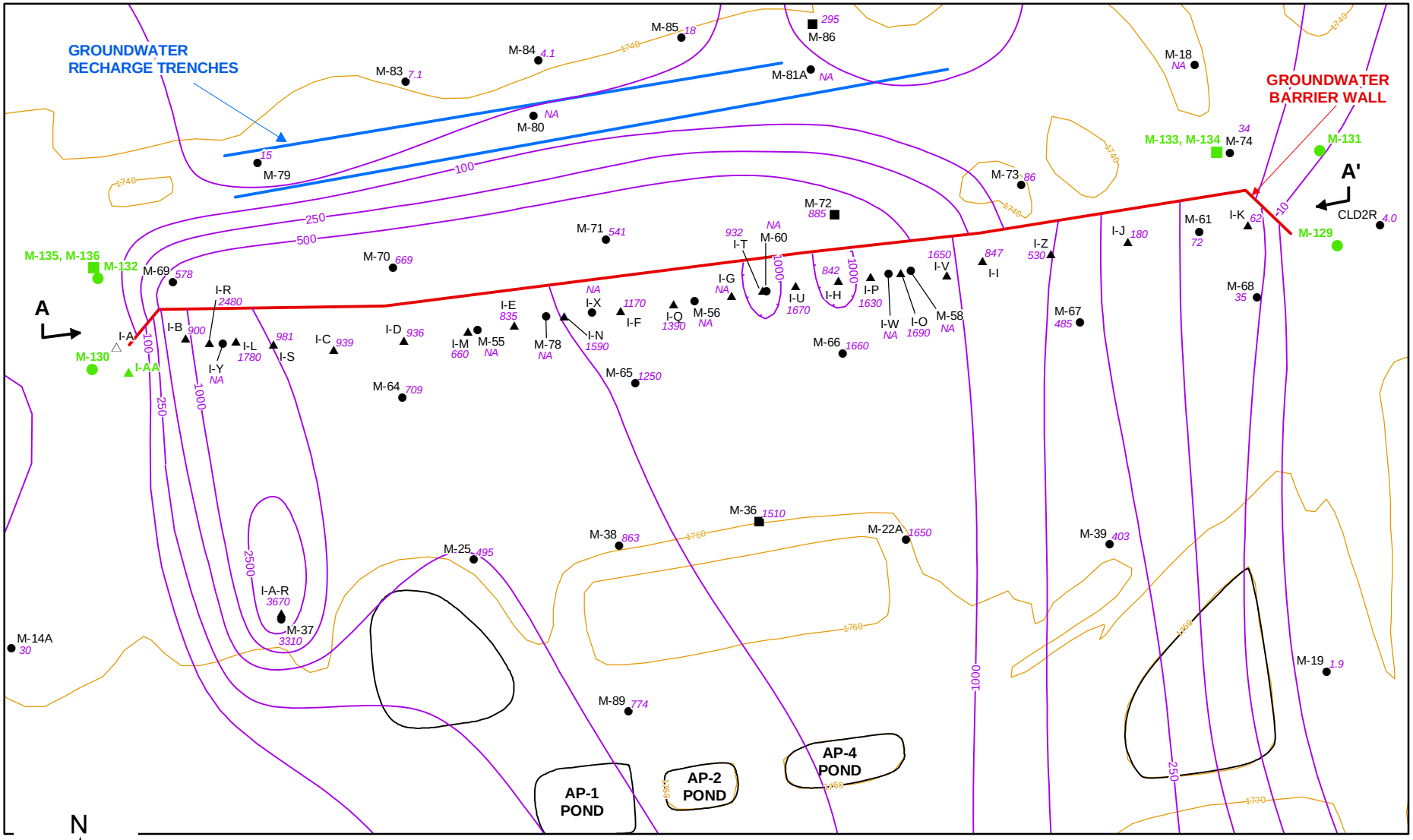
ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP:/WWW.ENSR.AECOM.COM

LOCATION MAP

Capture Zone Work Plan
Tronox Facility
Henderson, Nevada

FIGURE NUMBER:
1

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
M. Scop	8/27/2007	04020-023-160	X



SEE FIGURE 5 FOR EXPANDED LEGEND ELEMENTS

ENSR | AECOM

ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP:/WWW.ENSR.AECOM.COM

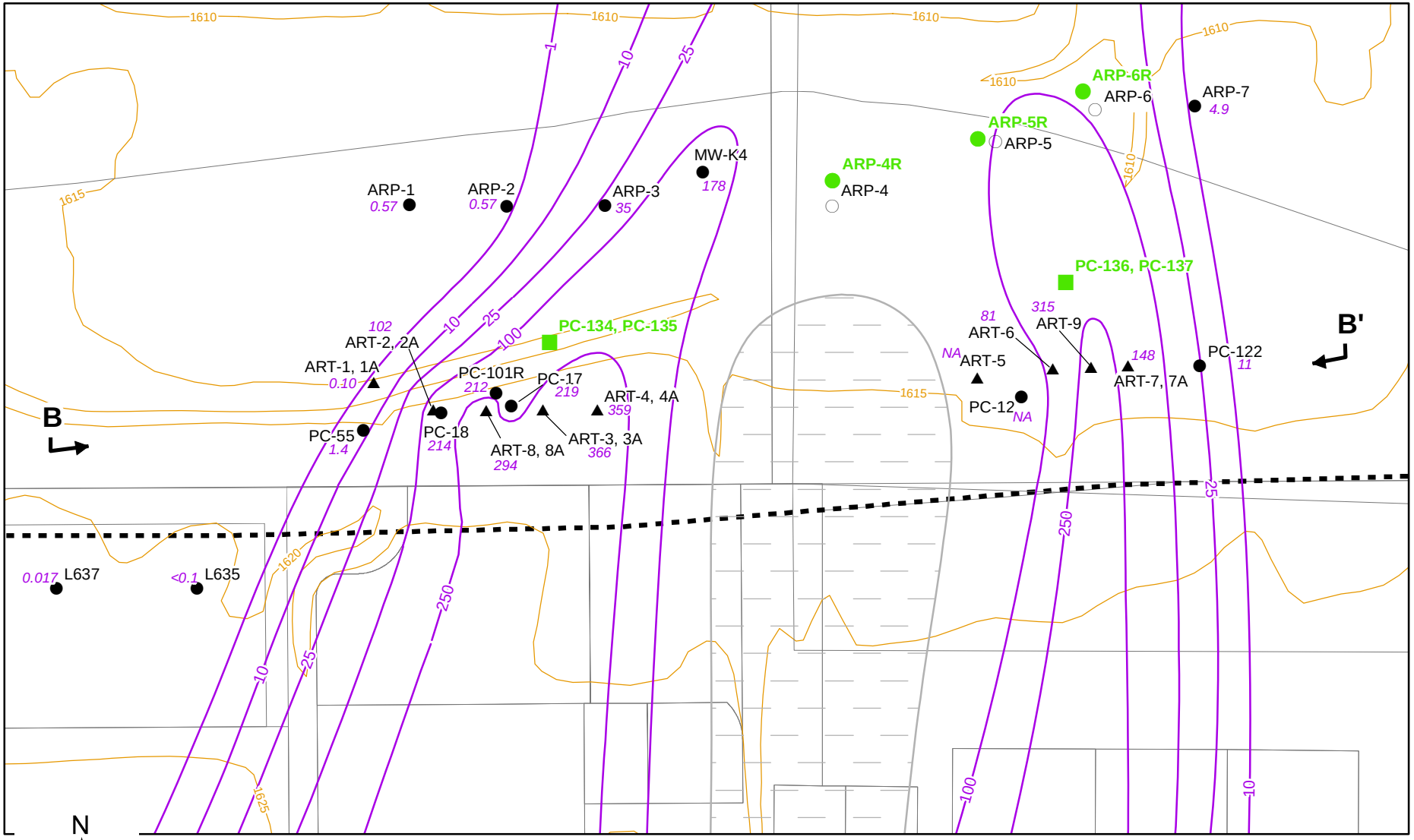
PROPOSED WELLS AT THE INTERCEPTOR WELL FIELD

Capture Zone Work Plan
Tronox Facility
Henderson, Nevada

FIGURE NUMBER:
2

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
M. Scop	8/27/2007 Rev-1 11/21/07	04020-023-160	X

J:\TronoxGIS\mxd\task-160\Interceptor_WF.mxd



N
W E
S

0 50 100 200 300 400
Feet

SEE FIGURE 5 FOR EXPANDED LEGEND ELEMENTS

ENSR | AECOM

ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP:/WWW.ENSR.AECOM.COM

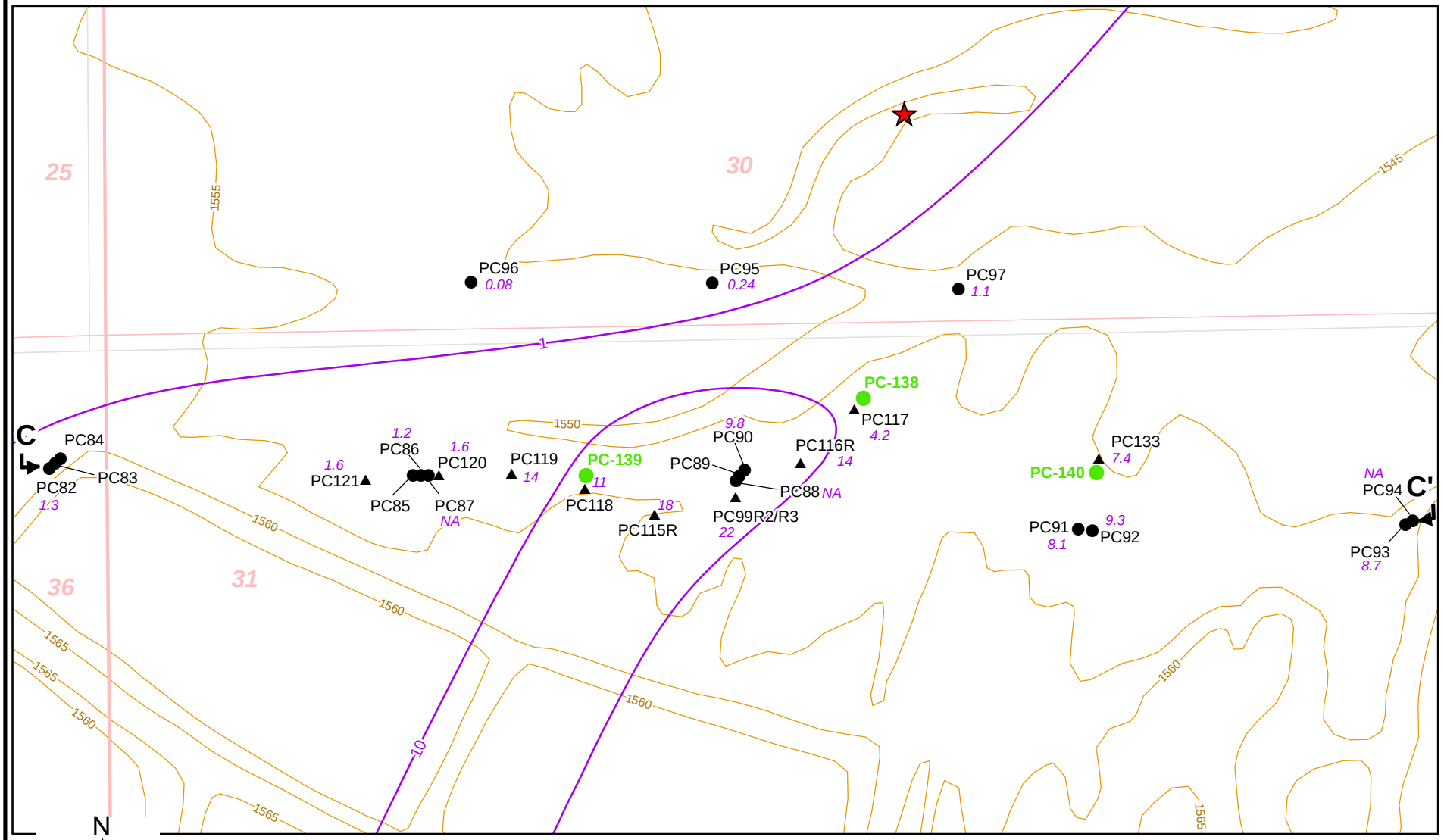
PROPOSED WELLS AT THE ATHENS ROAD WELL FIELD

Capture Zone Work Plan
Tronox Facility
Henderson, Nevada

FIGURE NUMBER: 3

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
M. Scop	8/27/2007 Rev-1 11/21/07	04020-023-160	X

J:\TronoxGIS\mxd\task-160\Athens_Road_WF.mxd



ENSR | AECOM

ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP:/WWW.ENSR.AECOM.COM

PROPOSED WELLS AT THE SEEP WELL FIELD

Capture Zone Work Plan
Tronox Facility
Henderson, Nevada

FIGURE NUMBER: 4

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
M. Scop	8/27/2007 Rev-1 11/26/07	04020-023-160	X

LEGEND

- Monitoring Well
- Appendix J Monitoring Well
- Recovery Well
- Abandoned Monitoring Well
- Abandoned Recovery Well
- Proposed Monitor Well
- Proposed Nested Monitoring Well
  Wells will be installed either one bore hole or in seperate boreholes at in close proximity to one another.
- Proposed Recovery Well
- PC-139 — Well Identification, Two IDs are Provided for Nested Well Locations.
- Seep Pumping Station

15 — Perchlorate Concentration (mg/L)
May 2007 (ENSR 2007b, Plate 7)

Perchlorate Contour (mg/L)
(Dashed where approximate)
May 2007 (ENSR 2007b, Plate 7)

Closed Perchlorate Contour (mg/L)
Concentrations are lower inside relative to surrounding values
May 2007 (ENSR 2007b, Plate 7)

Unsaturated Alluvium

1760 — Topographic Contour Line

A — A' — Line of Hydrogeologic Cross Section
(see figures 6, 7 & 8)

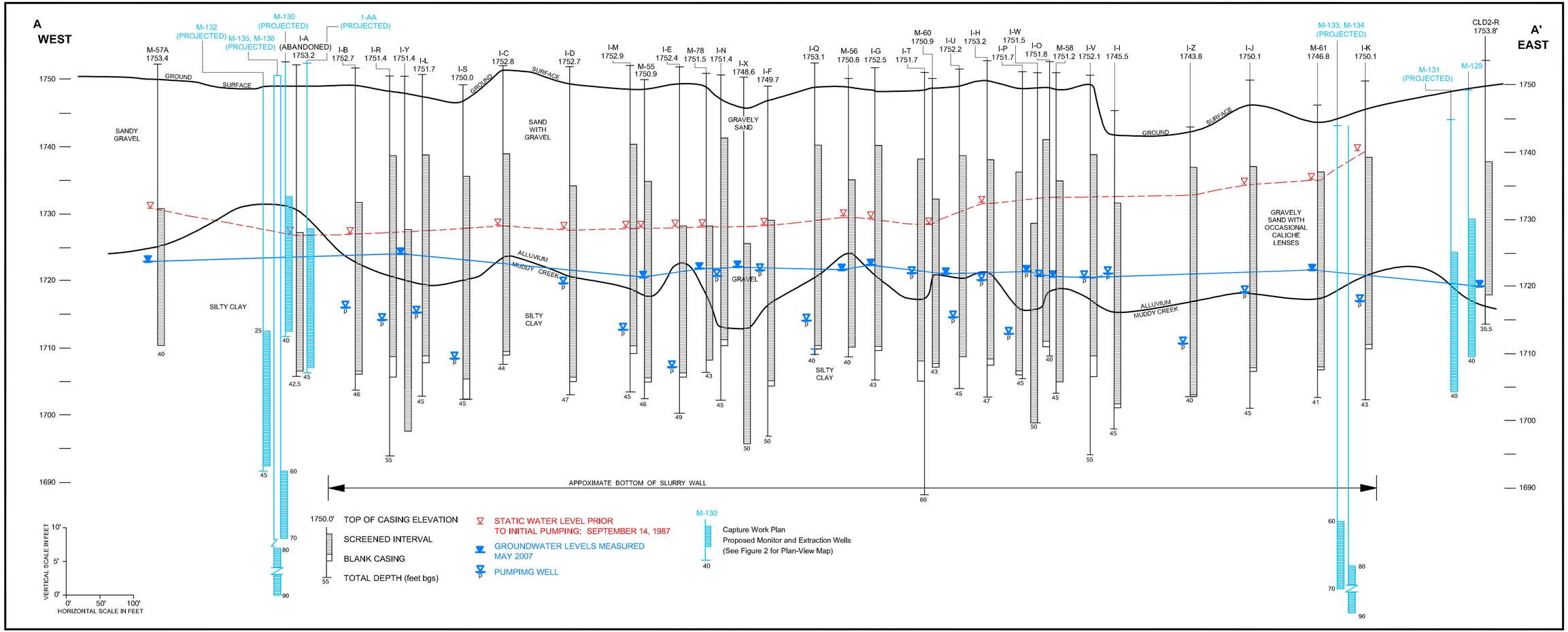
ENSR | AECOM
ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP:/WWW.ENSR.AECOM.COM

EXPANDED LEGEND ELEMENTS

Capture Zone Work Plan
Tronox Facility
Henderson, Nevada

FIGURE NUMBER: 5

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
M. Scop	8/27/2007 Rev-1 11/26/07	04020-023-160	X



DESIGNED BY:	E. Krish
DRAWN BY:	M. Scop
CHECKED BY:	M. Flack
APPROVED BY:	M. Flack

ENSR | AECOM
ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.ENSR-AECOM.COM

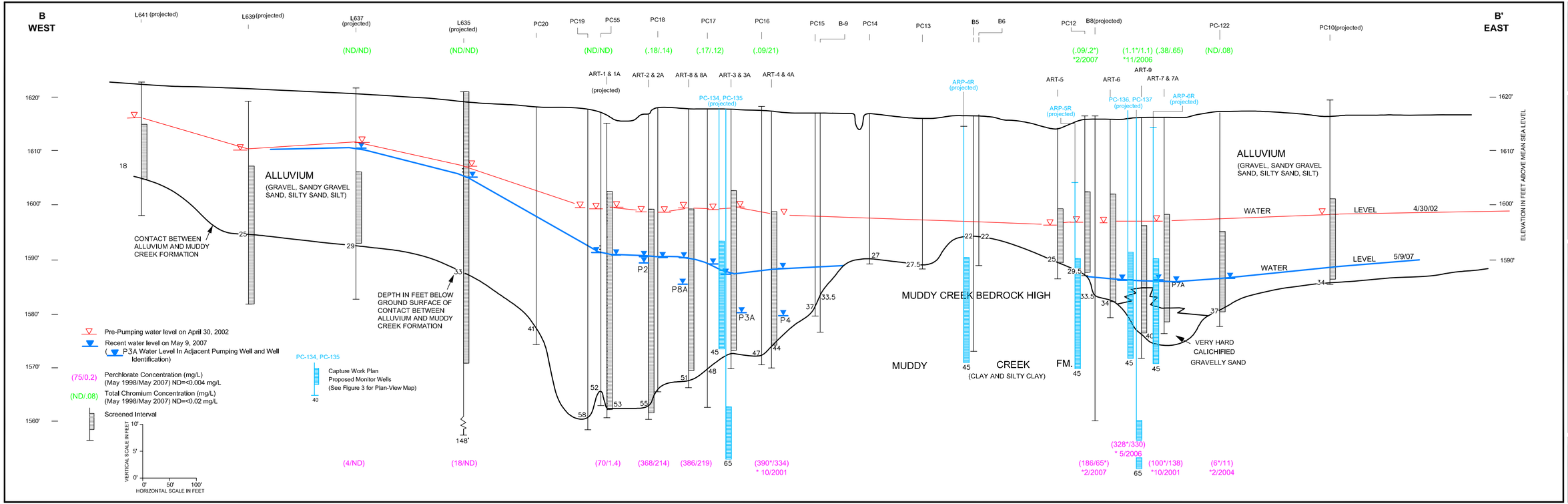
WEST - EAST HYDROGEOLOGIC CROSS SECTION A-A' INTERCEPTOR WELL FIELD

Proposed Monitoring Wells
Capture Zone Workplan
Tronox Facility, Henderson, Nevada

SCALE:	as noted
DATE:	7/19/2007 Rev: 12/5/07
PROJECT NUMBER:	04020-023-160

FIGURE NUMBER: **6**

SHEET NUMBER: X



DESIGNED BY: E. Krish
DRAWN BY: M. Scop
CHECKED BY: M. Flack
APPROVED BY: M. Flack

ENSR | AECOM
ENSR CORPORATION
1220 AVENIDA ACASO
LAS VEGAS, NEVADA 89120
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.ENSR.AECOM.COM

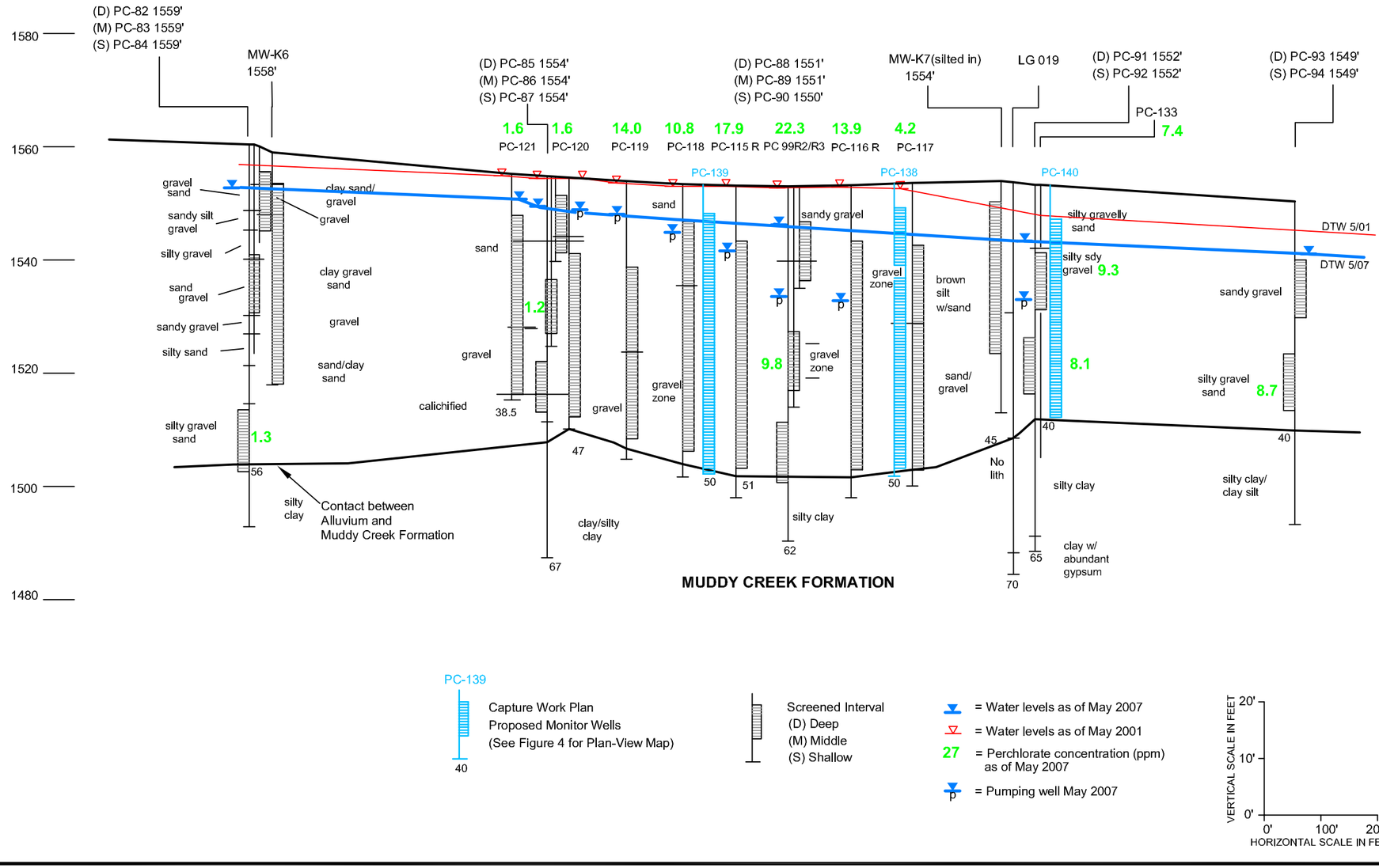
WEST - EAST HYDROGEOLOGIC CROSS SECTION A-A'
ATHENS ROAD WELL FIELD
Proposed Monitoring Wells
Capture Zone Workplan
Tronox Facility, Henderson, Nevada

PROJECT NUMBER: 04200423-160
DATE: 12/7/2007
SCALE: as noted

FIGURE NUMBER: 7
SHEET NUMBER: X

C
WEST

C'
EAST



PC-139
40
Capture Work Plan
Proposed Monitor Wells
(See Figure 4 for Plan-View Map)

Screened Interval
(D) Deep
(M) Middle
(S) Shallow

= Water levels as of May 2007

= Water levels as of May 2001

27 = Perchlorate concentration (ppm) as of May 2007

= Pumping well May 2007

VERTICAL SCALE IN FEET
20'
10'
0'
0' 100' 200'
HORIZONTAL SCALE IN FEET

FILENAME:

DESIGNED BY:	E. Krish
DRAWN BY:	M. Scop
CHECKED BY:	M. Flack
APPROVED BY:	M. Flack

ENSR | AECOM
ENSR CORPORATION
1220 AVENIDA ACASO
CAMARILLO, CALIFORNIA 93012
PHONE: (805) 388-3775
FAX: (805) 388-3577
WEB: HTTP://WWW.ENSR.AECOM.COM

WEST - EAST HYDROGEOLOGIC CROSS SECTION C-C'
SEEP WELL FIELD

Proposed Monitoring Wells
Capture Zone Workplan
Tronox Facility, Henderson, Nevada

PROJECT NUMBER:	04020-023-160
DATE:	7/19/2007 Rev-1 1/27/07
SCALE:	as noted

FIGURE NUMBER:
8

SHEET NUMBER:
X

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

12-14-07 Digital to ECA Document Distribution

DEC 13 2007

December 11, 2007

Susan Crowley
Tronox LLC
PO Box 55
Henderson, Nevada 89009

Re: **Tronox LLC (TRX)**
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection Response to:
Response to Nevada Division of Environmental Protection (NDEP) Comments to the Revised Work Plan to Evaluate Effective Groundwater Capture at Tronox LLC, Henderson, Nevada
Dated November 28, 2007

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's response to comments identified above and finds that the document is acceptable with the following exceptions noted for the administrative record: (Please note that nothing further is required by the NDEP for this Deliverable.)

- General comment, the NDEP recognizes that the new wells PC-134 and PC-135 are located within the highest concentration area. The NDEP believes that providing monitor wells at this one location on the western lobe of the paleochannel will provide the minimum amount of data to demonstrate inward flow. Please note that after collecting and analyzing the data from this location, TRX may find it necessary to install an alluvial well to the west of PC-134 to provide more data for gradient mapping and groundwater elevation contouring for the western lobe of the paleochannel and/or to the east of PC-136 for the eastern lobe of the paleochannel.
- TRX Response to NDEP comment #3, please note that the NDEP's comment requested information on the type of hydraulic testing that TRX was proposing and was not specific to vertical hydraulic conductivity.
- TRX response to NDEP comment #8.c, the NDEP does acknowledge their June 26, 2007 comment that "overlapping cones of depression can be a line of evidence" for demonstrating groundwater capture. However, the June 26, 2007 comment also stated that "The capture zone and cone of depression will only be the same if background hydraulic gradient is zero." Also, the NDEP did not state that overlapping cones equate to capture in the June 26, 2007 comments. Given the current data set at Athens Rd Well Field; the drawdown data indicate capture while more importantly the groundwater elevation maps do not have closed contours indicating inward flow from down gradient. Please note that TRX has drawn the contour map

for the eastern lobe of the channel to show a closed contour but the elevation data on the map do not support that interpretation.

Please contact the undersigned with any questions at sharbour@ndep.nv.gov or (702) 486-2850 x 240.

Sincerely,

Shannon Harbour, P.E.
Staff Engineer III
Bureau of Corrective Actions
Special Projects Branch
NDEP-Las Vegas Office

SH:bar:sh

CC: Jim Najima, NDEP, BCA, Carson City
Brian Rakvica, NDEP, BCA, Las Vegas
Keith Bailey, Environmental Answers LLC, 3229 Persimmon Creek Drive, Edmond, OK 73013
Sally Bilodeau, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727
Barry Conaty, Akin, Gump, Strauss, Hauer & Feld, L.L.P., 1333 New Hampshire Avenue, N.W., Washington, D.C. 20036
Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009
Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street, San Francisco, CA 94105-3901
Rob Mrowka, Clark County Comprehensive Planning, PO Box 551741, Las Vegas, NV, 89155-1741
Ranajit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801
Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011
Mark Paris, Landwell, 875 West Warm Springs, Henderson, NV 89011
Craig Wilkinson, TIMET, PO Box 2128, Henderson, Nevada, 89009-7003
Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015
George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409
Nick Pogoncheff, PES Environmental, 1682 Novato Blvd., Suite100, Novato, CA 94947
Lee Erickson, Stauffer Management Company, P.O. Box 18890, Golden, CO 80402
Stan Smith, Olin Chlor Alkali, PO Box 86, Henderson, Nevada 89009
Michael Bellotti, Olin Corporation, PO Box 248 1186 Lower River Road, Charleston TN 37310-0248
Curt Richards, Olin Corporation, PO Box 248 1186 Lower River Road, Charleston TN 37310-0248
Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, California 95209
Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island, WA 98110
Paul Hackenberry, Hackenberry Associates, LLC, 550 W. Plumb Lane B425, Reno, Nevada 89509
Brian Giroux, McGinley and Associates, 425 Maestro Drive, Suite 202, Reno, NV 89511

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

October 6, 2008

Susan Crowley
Tronox LLC
PO Box 55
Henderson, Nevada 89009

Re: **Tronox LLC (TRX)**
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection (NDEP) Response to:
Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada, July 2007 – June 2008
Dated August 25, 2008

Dear Ms. Crowley,

The NDEP has received and reviewed TRX's Annual Report identified above and provides comments in Attachment A. TRX should provide an annotated response-to-comments (RTC) letter as part of the next Annual Report submittal with the following exceptions:

- Appendix B – Groundwater (GW) Capture Evaluation, TRX should respond to the comments in Attachment A for this appendix in a separate RTC that should be included in a Revised GW Capture Evaluation submitted as a stand-alone document. Please advise the NDEP **by October 13, 2008** regarding the schedule for this resubmittal.

- Appendix E – Data Validation Summary Report (DVSR), TRX should resubmit the DVSR for this Annual Report **by November 7, 2008** that addresses the comments provided in Attachment A. This may also be addressed as a stand-alone submittal.

Please contact the undersigned with any questions at sharbour@ndep.nv.gov or (702) 486-2850 extension 240.

Sincerely,

Shannon Harbour, P.E.
Staff Engineer III
Bureau of Corrective Actions
Special Projects Branch
NDEP-Las Vegas Office

SH:bar:sh

CC: Jim Najima, NDEP, BCA, Carson City
Brian Rakvica, NDEP, BCA, Las Vegas
Keith Bailey, Environmental Answers LLC, 3229 Persimmon Creek Drive, Edmond, OK 73013
Sally Bilodeau, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727
Barry Conaty, Holland & Hart LLP, 975 F Street, N.W. Suite 900, Washington, D.C. 20004
Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009
Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street, San Francisco, CA 94105-3901
Ebrahim Juma, DAQEM, PO Box 551741, Las Vegas, NV, 89155-1741
Ranajit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801
Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011
Mark Paris, Landwell, 875 West Warm Springs, Henderson, NV 89011
Craig Wilkinson, TIMET, PO Box 2128, Henderson, Nevada, 89009-7003
Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015
George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409
Nick Pogoncheff, PES Environmental, 1682 Novato Blvd., Suite100, Novato, CA 94947
Lee Erickson, Stauffer Management Company, P.O. Box 18890, Golden, CO 80402
Michael Bellotti, Olin Corporation, 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312
Curt Richards, Olin Corporation, 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312
Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, California 95209
Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island, WA 98110
Paul Hackenberry, Hackenberry Associates, LLC, 550 W. Plumb Lane B425, Reno, NV 89509
Dave Gratson, Neptune and Company, 1505 15th Street, Suite B, Los Alamos, NM 87544

Attachment A

1. Section 2.0, page 2-1, TRX stated that "January/February 2008" data from TIMET was used to base the potentiometric surface in Plate 2; however, Appendix A includes May 2008 data from the TIMET wells. Please clarify whether January/February 2008 data was used and if it was, please justify its use over the May 2008 data.
2. Section 2.1, page 2-1, last paragraph, NDEP has the following comments:
   a. TRX stated that eight pumping wells were "turned off until static water levels were reached." Please list which wells were turned off.
   b. TRX used the term "section" in the paragraph when referring to Figure 2: East-West Hydrogeologic Cross Section. Please use the term "cross-section" in future reporting.
   c. TRX stated that "Recent installation of new wells on both ends of the barrier wall has affirmed the presence of inter-channel Muddy Creek ridges at both ends of the barrier wall. The tops of these bounding ridges are shown in the section to be above the adjacent potentiometric surface – separating the saturated alluvium at TIMET well CLD2-R from Interceptor well I-K on the east." Please discuss the implications of this statement as it relates to contaminant fate and transport.
   d. TRX uses the term "subparallel" to describe narrow alluvial channels separated by Muddy Creek ridges. Please define this term and provide discussion on the significance of these channels.
3. Section 2.2, page 2-3, 1st paragraph, TRX states that the Athens Road Well Field wells with the most subsidence are identified. Please clarify where these wells are identified.
4. Section 3.3, page 3-4, 2nd paragraph, the text in this paragraph is not consistent with Figure 10. Please revise either the text or the figure as appropriate for consistency.
5. Figures, NDEP has the following comments:
   a. Figure 2, NDEP has the following comments:
      i. TRX should include perchlorate and chromium concentration data for all wells sampled on the referenced date on this figure. Please address this comment in future submittals.
      ii. TRX should submit a separate figure of this cross-section that indicated which wells were shut-down between June 2 – 4, 2008, as stated in the last paragraph on page 2-1, with the resulting groundwater elevations measured as a result of this test for comparison.
   b. Figure 3, TRX should include perchlorate and chromium concentration data for all wells sampled on the referenced date on this figure. Please address this comment in future submittals.
   c. Figure 6, the current scale of this figure renders the data useless. Please revise the scale of the figure to improve readability in future submittals.
   d. Figure 10, text in 2nd paragraph on page 3-4 is not consistent with this figure. Please revise either the text or the figure as appropriate for consistency.
   e. Figure 11, the timeframe referenced in this figure should correspond with timeframe referenced on the report (i.e. July 2007 – June 2008). Please revise in future submittals.
   f. Figure 21, this figure referenced a Figure 21a that is not included in this report. Please correct this in future submittals.
6. Plates, NDEP has the following comments:

a. General comment, Plates should include data collected from the AMPAC and BRC wells shown on the Plates. Please include in future submittals.
b. General comment, Plates should at a minimum include all of the wells shown in the cross-sections (Figures 2 – 4). (e.g. Wells L639 and L641 are included in Figure 3 but are not shown on the Plates.)
c. Plate 2, NDEP has the following comments:
   i. General comment, this plate is not consistent with the Appendix A table. Please address this comment in future submittals.
   ii. Contours, TRX should note that dashed lines should be used only when there is not enough data presented due to well spacing, etc. Otherwise, if there is sufficient well data, the contour lines should be presented as a solid line. TRX should review the contour lines presented in this plate especially on the southern portion of the facility.
   iii. Inset B, it appears that 5-foot intervals were used in this Inset for the potentiometric surface contour lines. NDEP noted that there were several instances where additional contour lines should have been included using a 5-foot interval. Please add contour lines as appropriate to address this comment in future submittals.

7. Appendix A, TRX should provide the data for all wells posted on the figures and plates in this appendix. (e.g. Most of the TIMET wells posted on Plates 1 - 5 do not have data listed in this table.)
8. Appendix B, NDEP has the following comments:
   a. General comment, all Annual Performance Report (July 2007 – June 2008) data and figures referenced in the Appendix B GW Capture Evaluation should be included in revised stand-alone submittal. (Any comments made on these figures in this letter should be addressed in the Revised GW Capture Evaluation.)
   b. Section 1.2, page 1-2, 3rd bullet, the NDEP does not support the use of well pairs; please provide 3-point gradient solutions.
   c. Section 2.0, general comment, TRX should provide a schedule **by October 13, 2008** for all additional work proposed in this section to address the identified data gaps.
   d. Section 2.1.1, page 2-2, 1st Data Gap, Results, NDEP has the following comments:
      i. TRX should additionally include potential leakage under the barrier wall to this data gap.
      ii. 1st paragraph, please clarify whether there a reference figure or analysis to demonstrate that the mound dissipated. If none is provided, then please provide a figure or analysis to demonstrate that the mound dissipated.
      iii. 2nd paragraph, please provide a map or data to support the conclusion that "the barrier wall has negligible leakage."
      iv. This section and all similar sections need to consider and discuss the density of the water relative to vertical gradients. This comment will not be repeated for the remaining sections.
      v. Section 2.1.1, page 2-3, 2nd Data Gap, Results, 3rd paragraph, please clarify whether groundwater density is a factor in regards to groundwater head in the calculations for vertical groundwater gradient. TRX should discuss this point and support discussion with data in the Revised GW Capture Evaluation. (Please note that this comment should be applied to other areas of this document as appropriate.)

e. Section 2.1.1, page 2-4, 3rd Data Gap, 1st paragraph, TRX states that the "theoretical pumping rates for most of the wells were improved". Please discuss whether actual observed pumping rates improved in these wells.
f. Section 2.1.1, page 2-4, 4th Data Gap, Results, NDEP has the following comments,
   i. 2nd paragraph, TRX stated that, "The results from well I-T provided adequate drawdown data in adjacent observation wells to estimate the pumping well efficiency, which was estimated to be about 84 percent." Based on the calculation provided in Attachment B, the pumping well efficiency is about 20 percent. Please review the data and calculations for resubmittal in the Revised GW Capture Evaluation.
   ii. 2nd paragraph, TRX states that, "The absence of drawdown beyond 20 to 25 feet is likely a function (of) well spacing..." Drawdown during an aquifer test is not a function of well spacing. Please remove the text in future submittals.
   iii. 3rd paragraph, NDEP does not concur that this data gap has been addressed based on the results presented in Attachment E to the GW Capture Evaluation. One of the four tests presented was successful and the one successful test was incorrectly analyzed. Please review the data and calculations for resubmittal in the Revised GW Capture Evaluation.
   iv. 3rd paragraph, TRX states "In the future, additional distance drawdown testing will be considered..." It is not clear what is precluding TRX from completing this work; please provide a schedule for implementation.
   v. 3rd paragraph, last sentence, TRX states that "Well efficiency data derived from the testing of well I-T will be used to contour pumping data from this well." TRX should note that the well efficiency for well I-T was calculated incorrectly. Please review the data and calculations for resubmittal in the Revised GW Capture Evaluation.
g. Section 2.1.2, page 2-5, Capture Zone, TRX states, "...the barrier wall and Interceptor well field is stopping the downgradient flow of perchlorate above 35 mg/L on the east end and 120 mg/L on the west end." The data on Plate 4, Inset B do not support this conclusion for the west end. Please review the Plate and associated data to address this comment.
h. Section 2.1.2, page 2-5, Capture Zone, TRX states that "Considering this average concentration up gradient of the barrier wall..." As commented in previous document responses, NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
i. Section 2.1.2, page 2-5, flow budget, it is suggested that TRX install wells within the Muddy Creek formation to address potential underflow issues and to refine the flow budget.
j. Section 2.1.2, page 2-7, Downgradient Concentration Declines over Time, one of the reasons that NDEP requested wells at the east and west ends of the barrier wall was so that flow at both ends of the barrier could be calculated; and thus, calculations could be made on a mass basis. Furthermore, concentration versus time series graphs are requested to present and discuss concentration declines over time.
k. Section 2.1.2, page 2-7, Overlapping Cones of Depression, please provide a map at the scale of Plate 1 for groundwater elevation and contour.
l. Section 2.1.4, page 2-8, Data Gaps, TRX should be include an additional data gap that discusses the upper most water bearing zone (water table) flow around the eastern and

western ends of the barrier wall using data from the new wells. If there is insufficient data for this, then TRX should propose additional wells for this purpose.

m. Section 2.2, page 2-8, last paragraph, 2nd bullet, TRX should note that McGinley recommended five new wells be installed. Please revise the text accordingly.
n. Section 2.2.1, page 2-9, 1st Data Gap, Results, TRX should discuss groundwater density as an influencing factor in regards to groundwater head. Please revise the text accordingly and support the discussion with data.
o. Section 2.2.1, page 2-10, 1st paragraph, the referenced Plate 2 (in the GW Capture Evaluation) shows the net drawdown. Please provide a groundwater elevation map at the same scale as the GW Capture Evaluation Plate 2.
p. Section 2.2.2, page 2-10, Capture Zone, NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
q. Section 2.2.2, page 2-10, Flow Budget, the analysis and discussion herein do not meet the EPA (2005) capture zone evaluation requirement. The EPA referenced document indicates that groundwater flow be calculated via Darcy's law and the results are compared to actual flow rate. Please revise the text and calculations accordingly.
r. Section 2.2.2, page 2-10, Overlapping Cones of Depression, TRX should note that there is very limited control for constructing the drawdown contours as drawn on Plate 2. Please discuss this in the Revised GW Capture Evaluation.
s. Section 2.2.2, page 2-11, Downgradient Concentration Declines over Time, both PC-98R and MW-K5 appear asymptotic (Figures 24 and 24A, Annual Remedial Performance Report). Please review and evaluate the long term trends and revise the text accordingly in the Revised GW Capture Evaluation.
t. Section 2.2.3, page2-11, Data Gaps and Proposed Additional Evaluation, this section is incomplete. Please review the above-comments to assist in identifying additional data gaps. The text of the Revised GW Capture Evaluation should be revised accordingly.
u. Section 2.3, page 2-11, last paragraph, please note that NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
v. Section 2.3.1, page 2-12, Overlapping Cones of Depression, please provide a map at the scale of Plate 1 for groundwater elevation and contour.
w. Section 2.3.1, page 2-12, Downgradient Concentration Declines over Time, NDEP has the following comments:
    i. 1st sentence, please note that NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
    ii. 2nd sentence, TRX should note that this section references concentration declines over time; mass is related to concentration but also includes flow. Please revise the Revised GW Capture Evaluation as necessary to clarify the difference in these two concepts.
x. Section 3.0, page 3-1, please update this section based on the comments contained in this letter.
y. Figure 3, please discuss how the represented vertical gradients relate to density driven flow. This comment also applies to Figures 5 and 7.
z. Tables, NDEP has the following comments:

i. Table 1, NDEP has the following comments:
   1. TRX should note that NDEP has recommended ASTM methods for all physical property analysis.
   2. In the following columns where two or more methods are listed, please clarify which method was used and whether the two methods are the same.
      a. Moisture Content – ASTM D2216 and API RP 40
      b. Effective permeability – ASTM D5084, API RP 40, and USEPA 9100 (Please note that TRX response (dated Nov. 28, 2007) to NDEP Comment #6 indicates that the ASTM method would be employed for the analysis.)
      c. Hydraulic conductivity ASTM D5084, API RP 40, and USEPA 9100

ii. Table 3, TRX should provide the TDS concentrations for these wells and determine whether there are density effects that may influence the calculated vertical gradients. Please revise the Revised GW Capture Evaluation accordingly.

iii. Table 4, the NDEP has the following comments:
   1. NDEP did not observe that mass flux calculations were completed in this table. Please include these calculations in the Revised GW Capture Evaluation.
   2. TRX should additionally include data east of I-Z.

aa. Attachment A, NDEP and TRX Correspondence, NDEP has the following comments:
   i. TRX should note that NDEP's Response (dated December 12, 2007) to TRX's *Response to Nevada Division of Environmental Protection (NDEP) Comments to the Revised Work Plan to Evaluate Effective Groundwater Capture* at Tronox LLC, Henderson, Nevada (dated November 28, 2007) was not included in this attachment. Please include this letter in the Revised GW Capture Evaluation.
   ii. TRX's November, 20, 2007 response-to-comments (RTC), RTC 8, TRX should note that NDEP has previously indicated that overlapping cones of depression need to include the text as indicated in the NDEP Comment #8. The difficulty with utilizing drawdown to indicate capture zone is that drawdown does not include the prevailing hydraulic gradient in its calculation. Drawdown and capture only coincide when the prevailing hydraulic gradient is zero. In the case of the Athens Road Well Field an argument could be made, if the gradient is sufficiently flat, that the paleochannel geometry, extraction well locations, and overlapping cones of depression combine to form one line of evidence.

bb. Attachment D, please provide the survey data for wells M-129 and M-130 in the Revised GW Capture Evaluation.

cc. Attachment E, Distance Drawdown Data and Graphs – Interceptor Well Field and Barrier Wall, TRX should recalculate the well efficiencies in the Revised GW Capture Evaluation based on NDEP's following comments:
   i. General comment, please note that NDEP used the following reference for the comments below: Roscoe Moss Company, 1990. Handbook of Ground Water Development. John Wiley & Sons, NY, pages 308 and 493.
   ii. General comment, the formula provided by TRX for well efficiency is incorrect. The correct formula is Aquifer Loss / Total Drawdown * 100%. Aquifer Loss at an extraction well is determined by first using linear regression on the groundwater elevation (GWE) at T = X. Using the regression line equation, a T = 0 GWE can be calculated for the extraction well. The difference between the observed T = 0 GWE and the calculated T=0 GWE is the Aquifer Loss.

iii. Pumping well I-K, NDEP has the following comments:
   1. NDEP noted that the GWE at T=0 data points are nearly equal to T=200 data points. This could possibly mean that insufficient time elapsed for complete water level recovery and/or that other factors have a greater influence on the data points.
   2. TRX should note that at a flow rate of 0.40 gpm in I-K and with the closest observation well was 66.2 ft; extraction at well I-K would likely have had little if any effect on the observation wells.

iv. Pumping well I-N, NDEP has the following comments:
   1. If a linear regression is run for the GWE data for each well versus distance from pumping well at T = 150 minutes the R^2 value (0.3222) indicates that GWE has low relationship to distance from extraction well (i.e. other factors are likely to have greater influence); as opposed TRX's statement that there is "insufficient data to estimate well efficiency." This is at least partially due to the relatively large distance from the extraction well to the observation wells and comparatively low flow rate.
   2. NDEP also noted that at T=0 GWE data points are nearly equal to T=150 data points at the observation wells. This could possibly mean that insufficient time elapsed for complete water level recovery and/or that other factors have a greater influence on the data points.

v. Pumping well I-T, based on the well efficiency formula presented above, the well efficiency calculated by TRX is incorrect.

dd. Pumping well I-R, while the NDEP concur that two data points are really not sufficient for analysis, the data suggest that the extraction well may quite inefficient based on the formula presented above.

9. Appendix E, NDEP has the following comments:
   a. General comment, TRX should provide only the records applicable to a DVSR in the database that is included with each DVSR. This practice would not only facilitate review of the DVSR but also provide a more cost-effective means of incorporating new data into the regional database maintained by NDEP.
   b. Section 2.0, TRX indicates that 10% of the data packages were subject to full validation. Based on Table 4, there were 140 unique SDGs and only samples from two SDGs (239631, and 230066) were bolded indicating full validation. This equals 29 samples out of 790. To clarify, a minimum of 10% of the samples should undergo full Level IV data validation. If this full data validation indicates anomalous quality assurance problems, the number of samples validated should be expanded. TRX should resubmit the DVSR after a minimum of 10% of the samples have completed full Level IV data validation.
   c. Section 3.1, paragraph 2, TRX should correct the text to reflect EPA Method is 218.6 (incorrectly typed as 281.6).

Tronox Response to October 6, 2008 NDEP Comments on
Groundwater Capture Evaluation (Appendix B of the Annual Remedial Performance Report, July 2007 – June 2008) dated August 25, 2008

NDEP Comment

8. Appendix B, NDEP has the following comments:
   a. General comment, all Annual Performance Report (July 2007 – June 2008) data and figures referenced in the Appendix B GW Capture Evaluation should be included in revised stand-alone submittal. (Any comments made on these figures in this letter should be addressed in the Revised GW Capture Evaluation.)
   b. Section 1.2, page 1-2, 3rd bullet, the NDEP does not support the use of well pairs; please provide 3-point gradient solutions.
   c. Section 2.0, general comment, TRX should provide a schedule **by October 13, 2008** for all additional work proposed in this section to address the identified data gaps.
   d. Section 2.1.1, page 2-2, 1st Data Gap, Results, NDEP has the following comments:
      i. TRX should additionally include potential leakage under the barrier wall to this data gap.
      ii. 1st paragraph, please clarify whether there a reference figure or analysis to demonstrate that the mound dissipated. If none is provided, then please provide a figure or analysis to demonstrate that the mound dissipated.
      iii. 2nd paragraph, please provide a map or data to support the conclusion that "the barrier wall has negligible leakage."
      iv. This section and all similar sections need to consider and discuss the density of the water relative to vertical gradients. This comment will not be repeated for the remaining sections.
      v. Section 2.1.1, page 2-3, 2nd Data Gap, Results, 3rd paragraph, please clarify whether groundwater density is a factor in regards to groundwater head in the calculations for vertical groundwater gradient. TRX should discuss this point and support discussion with data in the Revised GW Capture Evaluation. (Please note that this comment should be applied to other areas of this document as appropriate.)
   e. Section 2.1.1, page 2-4, 3rd Data Gap, 1st paragraph, TRX states that the "theoretical pumping rates for most of the wells were improved". Please discuss whether actual observed pumping rates improved in these wells.
   f. Section 2.1.1, page 2-4, 4th Data Gap, Results, NDEP has the following comments,
      i. 2nd paragraph, TRX stated that, "The results from well I-T provided adequate drawdown data in adjacent observation wells to estimate the pumping well efficiency, which was estimated to be about 84 percent." Based on the calculation provided in Attachment B, the pumping well efficiency is about 20 percent. Please review the data and calculations for resubmittal in the Revised GW Capture Evaluation.
      ii. 2nd paragraph, TRX states that, "The absence of drawdown beyond 20 to 25 feet is likely a function (of) well spacing…" Drawdown during an aquifer test is not a function of well spacing. Please remove the text in future submittals.
      iii. 3rd paragraph, NDEP does not concur that this data gap has been addressed based on the results presented in Attachment E to the GW Capture Evaluation. One of the four tests presented was successful and the one successful test was incorrectly analyzed. Please review the data and calculations for resubmittal in the Revised GW Capture Evaluation.
      iv. 3rd paragraph, TRX states "In the future, additional distance drawdown testing will be considered…" It is not clear what is precluding TRX from completing this work; please provide a schedule for implementation.
      v. 3rd paragraph, last sentence, TRX states that "Well efficiency data derived from the testing of well I-T will be used to contour pumping data from this well." TRX should note that the well efficiency for well I-T was calculated incorrectly. Please review the data and calculations for resubmittal in the Revised GW Capture Evaluation.
   g. Section 2.1.2, page 2-5, Capture Zone, TRX states, "…the barrier wall and Interceptor well field is stopping the downgradient flow of perchlorate above 35 mg/L on the east end and 120 mg/L on the west end." The data on Plate 4, Inset B do not support this conclusion for the west end. Please review the Plate and associated data to address this comment.

h. Section 2.1.2, page 2-5, Capture Zone, TRX states that "Considering this average concentration up gradient of the barrier wall…" As commented in previous document responses, NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
i. Section 2.1.2, page 2-5, flow budget, it is suggested that TRX install wells within the Muddy Creek formation to address potential underflow issues and to refine the flow budget.
j. Section 2.1.2, page 2-7, Downgradient Concentration Declines over Time, one of the reasons that NDEP requested wells at the east and west ends of the barrier wall was so that flow at both ends of the barrier could be calculated; and thus, calculations could be made on a mass basis. Furthermore, concentration versus time series graphs are requested to present and discuss concentration declines over time.
k. Section 2.1.2, page 2-7, Overlapping Cones of Depression, please provide a map at the scale of Plate 1 for groundwater elevation and contour.
l. Section 2.1.4, page 2-8, Data Gaps, TRX should be include an additional data gap that discusses the upper most water bearing zone (water table) flow around the eastern and western ends of the barrier wall using data from the new wells. If there is insufficient data for this, then TRX should propose additional wells for this purpose.
m. Section 2.2, page 2-8, last paragraph, 2nd bullet, TRX should note that McGinley recommended five new wells be installed. Please revise the text accordingly.
n. Section 2.2.1, page 2-9, 1st Data Gap, Results, TRX should discuss groundwater density as an influencing factor in regards to groundwater head. Please revise the text accordingly and support the discussion with data.
o. Section 2.2.1, page 2-10, 1st paragraph, the referenced Plate 2 (in the GW Capture Evaluation) shows the net drawdown. Please provide a groundwater elevation map at the same scale as the GW Capture Evaluation Plate 2.
p. Section 2.2.2, page 2-10, Capture Zone, NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
q. Section 2.2.2, page 2-10, Flow Budget, the analysis and discussion herein do not meet the EPA (2005) capture zone evaluation requirement. The EPA referenced document indicates that groundwater flow be calculated via Darcy's law and the results are compared to actual flow rate. Please revise the text and calculations accordingly.
r. Section 2.2.2, page 2-10, Overlapping Cones of Depression, TRX should note that there is very limited control for constructing the drawdown contours as drawn on Plate 2. Please discuss this in the Revised GW Capture Evaluation.
s. Section 2.2.2, page 2-11, Downgradient Concentration Declines over Time, both PC-98R and MW-K5 appear asymptotic (Figures 24 and 24A, Annual Remedial Performance Report). Please review and evaluate the long term trends and revise the text accordingly in the Revised GW Capture Evaluation.
t. Section 2.2.3, page 2-11, Data Gaps and Proposed Additional Evaluation, this section is incomplete. Please review the above-comments to assist in identifying additional data gaps. The text of the Revised GW Capture Evaluation should be revised accordingly.
u. Section 2.3, page 2-11, last paragraph, please note that NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
v. Section 2.3.1, page 2-12, Overlapping Cones of Depression, please provide a map at the scale of Plate 1 for groundwater elevation and contour.
w. Section 2.3.1, page 2-12, Downgradient Concentration Declines over Time, NDEP has the following comments:
    i. 1st sentence, please note that NDEP does not concur with this analysis based on concentration. Calculations must be made on a mass basis. Please revise the Revised GW Capture Evaluation accordingly.
    ii. 2nd sentence, TRX should note that this section references concentration declines over time; mass is related to concentration but also includes flow. Please revise the Revised GW Capture Evaluation as necessary to clarify the difference in these two concepts.
x. Section 3.0, page 3-1, please update this section based on the comments contained in this letter.

y. Figure 3, please discuss how the represented vertical gradients relate to density driven flow. This comment also applies to Figures 5 and 7.
z. Tables, NDEP has the following comments:
    i. Table 1, NDEP has the following comments:
        1. TRX should note that NDEP has recommended ASTM methods for all physical property analysis.
        2. In the following columns where two or more methods are listed, please clarify which method was used and whether the two methods are the same.
            a. Moisture Content – ASTM D2216 and API RP 40
            b. Effective permeability – ASTM D5084, API RP 40, and USEPA 9100 (Please note that TRX response (dated Nov. 28, 2007) to NDEP Comment #6 indicates that the ASTM method would be employed for the analysis.)
            c. Hydraulic conductivity ASTM D5084, API RP 40, and USEPA 9100
    ii. Table 3, TRX should provide the TDS concentrations for these wells and determine whether there are density effects that may influence the calculated vertical gradients. Please revise the Revised GW Capture Evaluation accordingly.
    iii. Table 4, the NDEP has the following comments:
        1. NDEP did not observe that mass flux calculations were completed in this table. Please include these calculations in the Revised GW Capture Evaluation.
        2. TRX should additionally include data east of I-Z.
aa. Attachment A, NDEP and TRX Correspondence, NDEP has the following comments:
    i. TRX should note that NDEP's Response (dated December 12, 2007) to TRX's *Response to Nevada Division of Environmental Protection (NDEP) Comments to the Revised Work Plan to Evaluate Effective Groundwater Capture* at Tronox LLC, Henderson, Nevada (dated November 28, 2007) was not included in this attachment. Please include this letter in the Revised GW Capture Evaluation.
    ii. TRX's November, 20, 2007 response-to-comments (RTC), RTC 8, TRX should note that NDEP has previously indicated that overlapping cones of depression need to include the text as indicated in the NDEP Comment #8. The difficulty with utilizing drawdown to indicate capture zone is that drawdown does not include the prevailing hydraulic gradient in its calculation. Drawdown and capture only coincide when the prevailing hydraulic gradient is zero. In the case of the Athens Road Well Field an argument could be made, if the gradient is sufficiently flat, that the paleochannel geometry, extraction well locations, and overlapping cones of depression combine to form one line of evidence.
bb. Attachment D, please provide the survey data for wells M-129 and M-130 in the Revised GW Capture Evaluation.
cc. Attachment E, Distance Drawdown Data and Graphs – Interceptor Well Field and Barrier Wall, TRX should recalculate the well efficiencies in the Revised GW Capture Evaluation based on NDEP's following comments:
    i. General comment, please note that NDEP used the following reference for the comments below: Roscoe Moss Company, 1990. Handbook of Ground Water Development. John Wiley & Sons, NY, pages 308 and 493.
    ii. General comment, the formula provided by TRX for well efficiency is incorrect. The correct formula is Aquifer Loss / Total Drawdown * 100%. Aquifer Loss at an extraction well is determined by first using linear regression on the groundwater elevation (GWE) at T = X. Using the regression line equation, a T = 0 GWE can be calculated for the extraction well. The difference between the observed T = 0 GWE and the calculated T=0 GWE is the Aquifer Loss.
    iii. Pumping well I-K, NDEP has the following comments:
        1. NDEP noted that the GWE at T=0 data points are nearly equal to T=200 data points. This could possibly mean that insufficient time elapsed for complete water level recovery and/or that other factors have a greater influence on the data points.
        2. TRX should note that at a flow rate of 0.40 gpm in I-K and with the closest observation well was 66.2 ft; extraction at well I-K would likely have had little if any effect on the observation wells.
    iv. Pumping well I-N, NDEP has the following comments:

1. If a linear regression is run for the GWE data for each well versus distance from pumping well at T = 150 minutes the R^2 value (0.3222) indicates that GWE has low relationship to distance from extraction well (i.e. other factors are likely to have greater influence); as opposed TRX's statement that there is "insufficient data to estimate well efficiency." This is at least partially due to the relatively large distance from the extraction well to the observation wells and comparatively low flow rate.
2. NDEP also noted that at T=0 GWE data points are nearly equal to T=150 data points at the observation wells. This could possibly mean that insufficient time elapsed for complete water level recovery and/or that other factors have a greater influence on the data points.

v. Pumping well I-T, based on the well efficiency formula presented above, the well efficiency calculated by TRX is incorrect.

dd. Pumping well I-R, while the NDEP concur that two data points are really not sufficient for analysis, the data suggest that the extraction well may quite inefficient based on the formula presented above.

Tronox Response

8.a. All data and figures referenced in the Revised GW Capture Evaluation will be included in the revised stand-alone document.

8.b. Three-point gradient solutions will be provided.

8.c. TRX submitted a schedule on October 14, 2008.

8.d.i Based on documented upward gradient on both ends of the barrier wall TRX believes that leakage beneath the wall is negligible.

8.d.ii. Data shows that the mound was dissipating until February 2008 when it began to build again as the result of the refurbishment of the recharge trenches. A figure will be provided.

8.d.iii. Hydrographs across the barrier wall show that the immediate upgradient water elevations are higher than the immediate downgradient water elevations. A figure will be provided.

8.d.iv. The density of water relative to vertical gradient measurements has been considered and found to have negligible effect. Data will be provided.

8.d.v. TRX will factor in groundwater density in the calculations for vertical groundwater gradient.

8.e TRX will list the observed change in pumping rates pre- and post-refurbishment.

8.f.i. The data will be reviewed.

8.f.ii The text will be removed.

8.f.iii. The data will be reviewed.

8.f.iv. No further drawdown tests will be performed because the groundwater mounding effect of the barrier wall and pumping effects in adjacent wells precludes obtaining useable data.

8.f.v. The data will be reviewed.

8.g. The average concentration moving around the west end of the barrier wall is 400 mg/L. The data will be reviewed.

8.h Calculations will be made on a mass basis.

8.i Based on documented upward gradient on both ends of the barrier wall TRX believes that leakage beneath the wall is negligible. TRX will install up to eight deep Muddy Creek formation wells in four locations on the plant site to delineate the contaminant plumes and determine vertical gradient.

8.j. Concentration versus time series graphs will be furnished.

8.k. A potentiometric surface map at the scale of 1" = 150' will be provided.

8.l. TRX will discuss flow around the ends of the barrier wall using data from the new wells.

8.m. The text will be revised accordingly.

8.n. TRX will discuss groundwater density as an influencing factor in regards to groundwater head.

8.o. A potentiometric surface map at the scale of 1" = 200' will be provided.

8.p. Calculations will be made on a mass basis.

8.q. The text and calculations will be revised accordingly.

8.r. TRX will discuss the contouring of the plate in the Revised GW Capture Evaluation.

8.s. TRX will review and evaluate the long term trends and revise the text accordingly in the Revised GW Capture Evaluation.

8.t. TRX will review and discuss whether other data gaps exist in the Athens Road area.

8.u. Calculations will be made on a mass basis.

8.v. A potentiometric surface map at the scale of 1" = 150' will be provided.
8.w.i. Calculations will be made on a mass basis.
8.w.ii TRX will revise the text.
8.x. TRX will update this section.
8.y. The relationship of vertical gradients and groundwater density will be discussed.
8.z.i.1 TRX notes that the NDEP recommends ASTM methods for all physical property analyses.
8.z.i.2.a. TRX will clarify the method used.
8.z.i.2.b. TRX will clarify the method used.
8.z.i.2.c. TRX will clarify the method used.
8.z.ii TRX will provide TDS analyses and discuss whether groundwater density affects vertical gradient.
8.z.iii.1. Mass flux calculations will be included.
8.z.iii.2. Data east of I-Z will be included.
8.aa.i. This letter was included in the original GW Capture Evaluation and will again be included in the Revised GW Capture Evaluation.
8.aa.ii TRX will include the requested language.
8.bb. TRX will provide the survey data for wells M-129 and 130 in the Revised GW Capture Evaluation.
8.cc.i TRX notes the NDEP reference.
8.cc.ii Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.
8.cc.iii.1 Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.
8.cc.iii.2 Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.
8.cc.iv.1 Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.
8.cc.iv.2 Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.
8.cc.v. Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.
8.dd. Boundary effects from the barrier wall and pumping effects from adjacent pumping recovery wells precluded collection of usable data. TRX will not include this discussion in the Revised GW Capture Evaluation.

Email from Susan Crowley to Shannon Harbour of NDEP
Dated October 14, 2008
cc – Keith Bailey, Mike Flack

Shannon,

In response to your letter dated October 6, 2008, the following request was made in the comments to the Tronox Annual Remedial Performance Report for Chromium and Perchlorate, Tronox LLC, Henderson, Nevada, July 2007 - 2008 (August 25, 2008):

- Appendix B – Groundwater (GW) Capture Evaluation, TRX should respond to the comments in Attachment A for this appendix in a separate RTC that should be included in a Revised GW Capture Evaluation submitted as a stand-alone document. Please advise the NDEP by October 13, 2008 regarding the schedule for this re-submittal.

and (in conjunction with the above request), the following was also requested:

- NDEP Comment - 8(c), Section 2.0, general comment, TRX should provide a schedule by October 13, 2008, for all additional work proposed in this section to address the identified data gaps.

In response to these requests (and for submittal of a revised Groundwater Capture Evaluation as a stand-alone document), Tronox will provide the revised document by **February 27, 2009**. To meet this date, the schedule for field program events (as proposed in Section 2.0 of the annual report) are summarized as follows:

- Regarding demonstration of barrier integrity (page 2-2, Data Gap No.1) - pumping of wells M-70, M-71, and M-72 was proposed. Tronox is currently working on a power source such that pumping could be performed in these wells. It is anticipated that the power source can be secured and pumping will begin by the end of December 2008.
- Regarding flow around the western end of the barrier (page 2-4, Data Gap No. 3) - This data gap will be addressed through the installation of two additional borings (M-147 and M-148). The borings will be installed in late November or early December 2008.
- Regarding overlapping cones of depression (page 2-4, Data Gap. No 4) - At the present time, Tronox does not intend to shutdown any of the interceptor well field to accommodate additional distance-drawdown testing. Tronox would like to discuss this matter further with NDEP.
- Regarding demonstration of inward flow (section 2.2.3, page 2-11), reconfiguration of the pumping wells, bringing well ART-6 back online was proposed. The engineering to accomplish this has begun and Tronox anticipates that the wells will be online in the later part of December or early January 2008. Significant additional work is required to bring this well back online given the breadth of development that has taken place in the past few years.

- Installation of three wells (PC-138, PC-139 and PC-140) near recovery wells PC-117, PC-118 and PC-133 in the area of the Seep to support the understanding of drawdown in these wells and the delineation of the capture zone. Tronox continues to work to secure an access agreement from BRC for the installation of these wells. The goal is to install these wells within the 4th quarter 2008, pending negotiation of access agreement language.

In consideration of additional wells as noted in NDEP Comment 8 (l), Section 2.1.2, page 2-5, flow budget, it is suggested that TRX install wells within the Muddy Creek formation to address potential underflow issues and to refine the flow budget. Tronox proposed additional nested "deep" wells in the response to the Vertical Delineation of Contaminant Plumes and Hydraulic Gradients (September 2008). Tronox believes that the installation of these wells should be done before consideration of additional wells in the area of the interceptor well field and barrier.

Please feel free to call or e-mail if you have any questions. Thanks.

TRONOX LLC
Susan Crowley
PO Box 55
Henderson, NV 89009
office 702.651.2234
cell 702.592.7727
efax 405.302.4607
email susan.crowley@tronox.com

FINAL

Meeting Minutes

Project: Tronox (TRX)
Location: Conference Call
Time and Date: 1:30 PM, Monday, October 20, 2008
In Attendance: NDEP – Brian Rakvica, Shannon Harbour
Hackenberry Assoc. – Paul Hackenberry (for NDEP)
Environmental Answers – Keith Bailey (for TRX)
ENSR –Mike Flack (for TRX)

CC: Jim Najima

1. The meeting was held to discuss TRX response-to-comments (RTC) e-mail dated October 14, 2008 in response to NDEP's October 6, 2008 Annual Remedial Performance Report response letter.
2. NDEP's October 6, 2008 letter requested TRX's response to specific comment by October 13, 2008. A complete annotated RTC letter will be included in the next Annual Remedial Performance Report.
3. Keith Bailey for TRX announced that Susan Crowley has been retired from TRX. Susan is expected to be contracted in a similar fashion as Keith for this project. To date, Susan has not been contracted and was therefore not on this call.
4. Keith will determine who the point of contact (POC) for TRX will be and notify NDEP. **ACTION ITEM.**
5. For this call, Keith and Mike Flack represented TRX.
6. TRX stated that TRX has a new AIG technical liaison, Julie Diebenow (pronounced as "D-ben-oh").
7. NDEP and TRX discussed the following comments from TRX's October 14, 2008 e-mail response.
   a. TRX RTC: "In response to these NDEP requests (and for submittal of a revised Groundwater Capture Evaluation as a stand-alone document), Tronox will provide the revised document by **February 27, 2009**."
      i. TRX should note that NDEP is approving the submittal date of February 27, 2009 with the understanding that no extensions will be granted.
      ii. TRX acknowledged NDEP's statement.
   b. TRX RTC: "Regarding demonstration of barrier integrity (page 2-2, Data Gap No.1) - pumping of wells M-70, M-71, and M-72 was proposed. Tronox is currently working on a power source such that pumping could be performed in these wells. It is anticipated that the power source can be secured and pumping will begin by the end of December 2008."
      i. NDEP requested clarification/explanation for the delay in obtaining electrical power. NDEP also noted that failure to obtain power will not be considered as justification for not addressing this data gap in the revised document. This work should be completed in time to include the data in the Revised Groundwater Capture Evaluation by the February 27, 2009 deadline.
      ii. TRX stated that the current electrical panel located at the groundwater treatment system does not have additional capacity for the operation of the pumps for M-70, M-71, and M-72. TRX is looking at options to supply

power to these pumps including solar panels since pumping rates are expected to be low.

c. TRX RTC: "Regarding flow around the western end of the barrier (page 2-4, Data Gap No. 3) - This data gap will be addressed through the installation of two additional borings (M-147 and M-148). The borings will be installed in late November or early December 2008."
   i. NDEP requested clarification/explanation for the delay in the advancement of these borings especially since the delay results in trying to schedule field work during holiday season. NDEP also noted that failure to schedule and complete this work will not be accepted as justification for not addressing this data gap in the revised document. This work should be completed in order to include the data in the Revised Groundwater Capture Evaluation by the February 27, 2009 deadline.
   ii. TRX stated that the schedule for advancement of these borings and the completion of the groundwater wells was being delayed to coordinate with the installation of the seep area wells. The seep wells are in turn being delayed by access agreement issues with BRC. TRX is in the process of reviewing and editing the latest version of the access agreement with BRC. TRX stated that BRC version of the access agreement had items concerning the development of the lower pond area including possible relocation of wells as needed for development.
d. TRX RTC: "Regarding overlapping cones of depression (page 2-4, Data Gap. No 4) - At the present time, Tronox does not intend to shutdown any of the interceptor well field to accommodate additional distance-drawdown testing. Tronox would like to discuss this matter further with NDEP."
   i. TRX stated that the investigation of overlap in the interceptor wells (south of the barrier is a somewhat lower priority than the other data gaps and the Phase B Source Area Investigation since the barrier wall serves to block downgradient flow.
   ii. NDEP stated that a detailed groundwater elevation map would be preferable to a drawdown investigation. NDEP mentioned that a program such as Surfer could be used to draw vectors for groundwater direction analysis.
   iii. TRX stated that the extraction wells are not operated in steady state but are intermittent and shut off when water levels drop. Any groundwater elevation map will only be a "snapshot in time". TRX will provide a draft map to the NDEP for comment prior to the inclusion in the final revised groundwater capture document.
e. TRX RTC: "Regarding demonstration of inward flow (section 2.2.3, page 2-11), reconfiguration of the pumping wells, bringing well ART-6 back online was proposed. The engineering to accomplish this has begun and Tronox anticipates that both ART-6 and ART-9 wells will be online in the later part of December or early January 2008. Significant additional work is required to bring this well back online given the breadth of development that has taken place in the past few years."
   i. NDEP requested clarification/explanation of this comment.

ii. TRX stated that ART-6 has been operated as a "buddy well" to ART-9. This means that only one well is operated as an extraction well at a time, using single power source and flow line back to Lift Station #3 TRX is investigating rewiring or re-designing the power system to the pumps. Additionally, TRX has been delayed by the need to raise the grade of the well completions due to COH construction.

iii. NDEP stated that failure to complete this work will not be accepted as justification for not addressing this data gap in the revised document. This work should be completed in order to include the data in the Revised Groundwater Capture Evaluation by February 27, 2008.

f. TRX RTC: "Installation of three wells (PC-138, PC-139 and PC-140) near recovery wells PC-117, PC-118 and PC-133 in the area of the Seep to support the understanding of drawdown in these wells and the delineation of the capture zone. Tronox continues to work to secure an access agreement from BRC for the installation of these wells. The goal is to install these wells within the 4th quarter 2008, pending negotiation of access agreement language."

i. NDEP responded that the installation of these three wells is acceptable.

ii. Scheduling delays due to access negotiations were discussed above.

g. TRX RTC: "In consideration of additional wells as noted in NDEP Comment 8 (l), Section 2.1.2, page 2-5, flow budget, it is suggested that TRX install wells within the Muddy Creek formation to address potential underflow issues and to refine the flow budget. Tronox proposed additional nested "deep" wells in the response to the Vertical Delineation of Contaminant Plumes and Hydraulic Gradients (September 2008). Tronox believes that the installation of these wells should be done before consideration of additional wells in the area of the interceptor well field and barrier."

i. NDEP stated that the well locations proposed in the Vertical Delineation document area are acceptable to advance and install prior to considering additional wells to address this data gap. NDEP also stated that this work should be completed in time to be included in the Revised Groundwater Capture Evaluation by February 27, 2008.

ii. NDEP stated that comments to the Vertical Delineation document should be issued by the end of the week.

iii. NDEP stated that there has been no resolution to the nomenclature issue.

iv. TRX stated concern with using existing nomenclature that may not be acceptable later.

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Kenny C. Guinn, Governor
Allen-Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

November 4, 2008

Mike Skromyda
Tronox LLC
PO Box 55
Henderson, NV 89009

Re: **Tronox LLC (TRX)**
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection (NDEP) Response to:
Response to NDEP Comments Vertical Delineation of Contaminant Plumes and Hydraulic Gradients
Dated September 2008 (received September 26, 2008)

Dear Mr. Skromyda,

The NDEP has received and reviewed TRX's report identified above and provides comments in Attachment A. No response is necessary, however, these comments should be considered in the development of future Deliverables. Please advise the NDEP as soon as possible regarding the schedule for the implementation of the proposed scope of work.

Please contact the undersigned with any questions at brakvica@ndep.nv.gov or (702) 486-2850 extension 247.

Sincerely,

Brian A. Rakvica, P.E.
Supervisor
Bureau of Corrective Actions
Special Projects Branch
NDEP-Las Vegas Office

BAR:sh:s

CC: Jim Najima, NDEP, BCA, Carson City
Shannon Harbour, NDEP, BCA, Las Vegas
Keith Bailey, Environmental Answers LLC, 3229 Persimmon Creek Drive, Edmond, OK 73013
Susan Crowley, Crowley Environmental LLC, 366 Esquina Dr, Henderson NV 89014
Sally Bilodeau, ENSR, 1220 Avenida Acaso, Camarillo, CA 93012-8727
Barry Conaty, Holland & Hart LLP, 975 F Street, N.W. Suite 900, Washington, D.C. 20004
Brenda Pohlmann, City of Henderson, PO Box 95050, Henderson, NV 89009
Mitch Kaplan, U.S. Environmental Protection Agency, Region 9, mail code: WST-5, 75 Hawthorne Street, San Francisco, CA 94105-3901
Ebrahim Juma, DAQEM, PO Box 551741, Las Vegas, NV, 89155-1741
Ranajit Sahu, BRC, 311 North Story Place, Alhambra, CA 91801
Rick Kellogg, BRC, 875 West Warm Springs, Henderson, NV 89011
Mark Paris, Landwell, 875 West Warm Springs, Henderson, NV 89011
Craig Wilkinson, TIMET, PO Box 2128, Henderson, Nevada, 89009-7003
Kirk Stowers, Broadbent & Associates, 8 West Pacific Avenue, Henderson, Nevada 89015
George Crouse, Syngenta Crop Protection, Inc., 410 Swing Road, Greensboro, NC 27409
Nick Pogoncheff, PES Environmental, 1682 Novato Blvd., Suite100, Novato, CA 94947
Lee Erickson, Stauffer Management Company, P.O. Box 18890, Golden, CO 80402
Michael Bellotti, Olin Corporation, 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312
Curt Richards, Olin Corporation, 3855 North Ocoee Street, Suite 200, Cleveland, TN 37312
Paul Sundberg, Montrose Chemical Corporation, 3846 Estate Drive, Stockton, California 95209
Joe Kelly, Montrose Chemical Corporation of CA, 600 Ericksen Avenue NE, Suite 380, Bainbridge Island, WA 98110
Paul Hackenberry, Hackenberry Associates, LLC, 550 W. Plumb Lane B425, Reno, NV 89509

Attachment A

1. General comment, groundwater density appears to be calculated by various methods by the various BMI Companies (BMI, Tronox, TIMET and the Pioneer-Olin-Stauffer-Syngenta-Montrose group). In performing these spot checks the NDEP used the online calculator found at http://www.csgnetwork.com/h2odenscalc.html. For example, TIMET used an online calculator found at http://www.earthwardconsulting.com/density. To facilitate comparability of results the NDEP recommends that all the BMI Companies standardize upon a single method, namely the method used at the online calculator found at http://www.earthwardconsulting.com/density. That website lists a reference for its implementation (in the spreadsheet linked at the bottom of the page) as *Handbook of Hydrology, 1993, David R. Maidment.*
2. General comment, there appears to be some disparity in groundwater temperature measurement that may or may not be related to sampling methodology by the BMI Companies. TRX did not present water temperatures and this issue needs clarification. Also, please clarify the sampling methods used.
3. Table 1, it is noted that the NDEP spot check for wells M-74, M-133, and M-132 for Spring 2008 provided comparable results.
4. Table 2, the NDEP has the following comments:
    a. The Spring 2008 data set was evaluated for all TR-Series wells; the data appear acceptable for the Standard Methods quality checks.
    b. Note regarding the Comments column; the NDEP does not approve the use of either anion or cation data from an earlier or later sample to compute the cation-anion balance.
5. Figure 1, NDEP notes that the spacing between wells TR-12 and H-58A is not appropriate for vertical gradient calculations. Based upon data reviewed in the region, it is expected that wells should generally be no further than 50' apart.
6. Plate 1, due to the large distances between the projected wells and the wells used to develop this cross-section, it is noted that the geologic interpretation is not likely to be meaningful. It is requested that the cross-section be redrawn once the new wells are installed.

References Cited

American Public Health Association, American Water Works Association, and Water Environment, 1995. Standard Methods for the Examination of Water and Wastewater, Section 1030 E for Correctness of Analyses. 19th Edition.

APPENDIX B

BOREHOLE LITHOLOGIC LOGS AND WELL COMPLETION DIAGRAMS

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: I-AB**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Dana R. Brown
Drilling Contractor: Boart Longyear	Date Started: 08/14/09 / Date Completed: 08/14/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 51.0 / Depth to Water (ft bgs): 29.0
Borehole Dia. (in): 10.0 / Completion: Monument	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1754.034
Blank Casing: SCH 80 PVC Casing Dia. (in): 6 From (ft bgs): 0 To: 25	Slotted Casing: Factory slotted SCH 80 PVC, 0.020" Slots Casing Dia. (in): 6 From (ft bgs): 25 To: 45	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 20 To: 51

Remarks: Boring advanced with 10.0" casing to 51.0'; Neat Cement from 0' to 16'; 3/8" Holeplug from 16' to 20'.

Depth (ft)	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)
1-10	SM	Qal	Silty Sand (SM): Pale yellowish brown 10 YR (6/2), very loose to loose, dry. 10% fine angular to sub-angular gravel to 3/8"+, 60% fine to medium sub-angular sand, 30% non-plastic fines. Probable fill material, many fractured angular gravel clasts.		81.7	0.4
					0.4	0.5
					2.3	0.3
9			Moist to damp @ 9.0'		56.7	0.7
10			Gravel lens 10.0' - 11.0', 10% angular to sub-angular gravel to 1/2".			
11	SM	Qal	Silty Sand (SM): Very pale orange 10 YR (8/2), very loose, damp to wet. 5% fine sub-angular gravel to 1/2"-, 60% fine to medium sub-angular sand, 35% non-plastic fines. Soils wetted from pond infiltration.		17.6	1.0
12-15	SM	Qal	Silty Sand (SM): Very pale orange 10 YR (8/2), very loose, dry. 60% fine sub-angular sand, 35% non-plastic fines. Unconsolidated, non-bedded fine sands, with very fine silt. Damp at upper contact, dry below 13.0'		24.4	0.8
16-19	MH	Qal	Elastic Silt (MH): Moderate yellowish brown 10 YR (5/4), very dense, wet. 5% fine sand, 95% moderate-plastic fines. No odor or staining. No resistance to sonic bit, driller lowered the casing through this unit. Poor recovery. 16.0' to 21.0' Driller-no resonance applied, too soft to drill. Unconsolidated sediments, 98%+non-plastic silt.		47.8	1.3
20					10.8	0.7
21-30	SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), loose to medium-dense, dry to damp. 5% fine sub-angular gravel to 3/4"-, 65% fine to medium sand, 30% non-plastic fines. No odor or staining.		9.3	0.4
					0.9	0.2
					1.8	0.3
					388	6.5
28			@ 28.0' Color change to pale yellowish brown 10 YR (6/2). Fining to 2% fine sub-angular gravel to 3/8"+, 60% sand, 38% fines.	▽	185	1.8
29						
30					26.9	1.4
31-34	ML	UMCf (MCf1)	Sandy Silt (ML): Dark yellowish brown 10 YR (6/6), medium stiff, wet. Trace sub-angular gravel to 3/8"+, 25% fine to medium sub-angular sand, 75% non-plastic fines. No odor or staining.		13.1	1.5
					71.5	1.5

Well Construction

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: I-AB**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Dana R. Brown
Drilling Contractor: Boart Longyear	Date Started: 08/14/09 / Date Completed: 08/14/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36		ML						
37		ML	UMCf (MCfl)	Silt with Sand (ML): Moderate yellowish brown 10 YR (5/4), stiff to medium-stiff, wet. Trace sub-angular coarse sand/fine gravel to 3/8", 15% fine sub-angular sand, 85% non-plastic fines. Trace caliche as nodules to 1/16". No odor or staining.		328	1.4	
38						346	2.4	
39								
40		ML	UMCf (MCfl)	Sandy Silt (ML): Dark yellowish brown 10 YR (6/6), medium stiff, wet. Trace sub-angular gravel to 3/8"+, 25% fine to medium sub-angular sand, 75% non-plastic fines. No odor or staining.		443	3.9	
41								
42						15.5	0.9	
43								
44		SW	UMCf (MCfl)	Well graded Sand with Gravel (SW): Dark yellowish brown 10 YR (6/6), loose, wet. 15% fine sub-angular gravel to 3/4"-, 80% fine to coarse sub-angular sand (5/35/60), 5% non-plastic fines. No odor or staining.		45.3	1.7	
45								
46		ML	UMCf (MCfl)	Sandy Silt (ML): Dark yellowish brown 10 YR (4/2), medium dense, wet. 5% fine sub-angular gravel to 3/8"+, 65% fine to medium sub-angular sand with up to 15% coarse sub-angular sand (15/40/45), 30% non-plastic fines. Up to 1% caliche as nodules and grain coatings. No odor or staining.		62.1	0.8	
47								
48								
49				No recovery 47.5' - 50.0'				
50								
51								
52				Total depth 51.0' @ 10:20, 8-14-09				
53								
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								
71								
72								
73								
74								

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-149**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 / Date Completed: 09/17/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 120.0 / Depth to Water (ft bgs): 47.0
Borehole Dia. (in): 6.0 / Completion: Flush Mount	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1796.823
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 100	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 100 To: 120	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 96 To: 120

Remarks: Boring advanced with 6.0" casing to 120.0'; Neat Cement from 0' to 92'; 3/8" Holeplug from 92' to 96'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1–19		SM	Qal	SAND (SM): Silty, gravelly. Lt brown (5YR 6/4), 60% very fine to very coarse, sub-rounded to sub-angular, sand; 20% silt and 20% volcanic gravel, sub-angular to angular, 1/2" - 1" diameter with minor 4" - 6" diameter. @ 8.5', 6" volcanic cobbles. Scattered thin layers of soft caliche.				
20–34		GM	Qal	GRAVEL (GM): Sandy, silty, moderate brown (5YR 4/4). 50% volcanic pea gravel to 1" diameter, sub-angular to angular with minor 2" - 3" cobbles; 20% silt and 30% medium to very coarse sub-rounded to sub-angular sand.				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-149**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 / Date Completed: 09/17/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36–42		GM	Qal	GRAVEL (GM): Sandy, silty, moderate brown (5YR 4/4). 50% volcanic pea gravel to 1" diameter, sub-angular to angular with minor 2" - 3" cobbles; 20% silt and 30% medium to very coarse sub-rounded to sub-angular sand. 38' - 42' common soft caliche.				
42–46		SW	Qal	Calichefied gravelly SAND (SW) zone: Discontinuous hard caliche layers. Very pale orange (10YR 8/2) and moderate brown (5YR 4/4).				
46–74		ML	UMCf (MCf1)	SILT (ML): sandy, light brown (5YR 6/4), 75% silt and 25% very fine-grained sub-angular sand.	▽			

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-149**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 — Date Completed: 09/17/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
76–79		ML	UMCf (MCf1)	SILT (ML): sandy, light brown (5YR 6/4), 75% silt and 25% very fine-grained sub-angular sand.				
79–99		ML	UMCf (MCf1)	SILT (ML), light brown (5YR 5/6).				
99–114		ML	UMCf (MCf1)	SILT and SANDY SILT (ML): Interbedded 0-20% very fine sub-angular sand. Light brown (10YR 7/4) to 114', then gray orange (10YR 7/4). 106' - 109' common caliche nodules to 1" in silt. 114' - 120' common caliche nodules.				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-149**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 / Date Completed: 09/17/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
116		ML	UMCf (MCf1)	SILT and SANDY SILT (ML): Interbedded 0-20% very fine sub-angular sand. Light brown (10YR 7/4) to 114', then gray orange (10YR 7/4).				
120				TD = 120.0' on 9-17-09				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-150**	
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish	
Drilling Contractor: Boart Longyear	Date Started: 09/17/09	Date Completed: 09/17/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 145.0	Depth to Water (ft bgs): 63.0
Borehole Dia. (in): 6.0	Completion: Monument	Surface Elevation (ft MSL):
		Top of Casing (ft MSL): 1759.107
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 125	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 125 To: 145	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 121 To: 145

Remarks: Boring advanced with 6.0" casing to 145.0'; Neat Cement from 0' to 117'; 3/8" Holeplug from 117' to 121'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1–18		SW-SM	Qal	SAND, gravelly, silty; Light brown (5YR 6/4), 60% fine to coarse with minor very coarse, sub-rounded to sub-angular, sand; 20% silt; 20% volcanic pea gravel to 3/4" with locally common cobbles to 4".				
18–24		SW	Qal	SAND, gravelly, pale yellowish brown (10YR 6/2). 70% fine to medium with common coarse to very coarse sub-rounded to sub-angular sand. 30% volcanic pea gravel (1/8" - 3/4") with minor 1" - 2", angular to sub-angular. Trace silt.				
24–28		SW	Qal	SAND (SW): silty, gravelly, light brown (5YR 5/6), 60% fine to medium with common coarse to very coarse sub-rounded to sub-angular sand. 10% volcanic pea gravel to 1/2". Wet @ 28'				
28–34		ML	UMCf (MCfl)	SILT (ML), and sandy silt interbedded, moderate yellowish orange (10YR 6/4). Predominately silt with minor thin layers of sandy silt with 10% - 20% very fine grained, sub-angular to sub-rounded sand. Minor scattered zones of semi-hard caliche nodules to 1-1/2".				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-150**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 — Date Completed: 09/17/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36–55		ML	UMCf (MCfl)	SILT (ML), and sandy silt interbedded, moderate yellowish orange (10YR 6/4). Predominately silt with minor thin layers of sandy silt with 10% - 20% very fine grained, sub-angular to sub-rounded sand. Minor scattered zones of semi-hard caliche nodules to 1-1/2".				
55–60		SW-SM	UMCf (MCfl)	SAND and silty sand, interbedded. Pale yellowish brown (10YR 6/2). Thin layers (2" - 3") of clean fine to medium with minor coarse grained sub-rounded to sub-angular, sand with thicker zones (6" - 8") with 50% silt as matrix.				
60–74		ML	UMCf (MCfl)	SILT (ML), sandy with minor SILT interbedded. Light brown (5YR 6/4), predominantly sandy silt with 10% - 20% very fine grained, sub-angular to sub-rounded sand. Scattered thin caliche zones of soft thin layers and hard nodules.	▽			

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-150**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 / Date Completed: 09/17/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
76–114		ML	UMCf (MCf1)	SILT (ML), sandy with minor SILT interbedded. Light brown (5YR 6/4), predominantly sandy silt with 10% - 20% very fine grained, sub-angular to sub-rounded sand. Scattered thin caliche zones of soft thin layers and hard nodules. 77' - 77.5' sandy pea gravel up to 3/8" diameter, 30% - 40% fine to coarse, sub-rounded to sub-angular volcanic granules. 80' - 95' common caliche nodules. 80' - 95' common caliche nodules. 108' - 110' common caliche nodules. 114' - 116' common caliche nodules.				

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-150**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/17/09 — Date Completed: 09/17/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
116–120		ML	UMCf (MCf1)	SILT (ML), sandy with minor SILT interbedded. Light brown (5YR 6/4), predominantly sandy silt with 10% - 20% very fine grained, sub-angular to sub-rounded sand. Scattered thin caliche zones of soft thin layers and hard nodules.				
120–133		CL	UMCf (MCf1)	Clay, with minor amounts of silt. White (N9) to 124' then mottled white (N9) and yellow gray (5Y 8/1). Abundant soft caliche to 124', then minor scattered soft caliche to 133'.				
133–143		ML	UMCf (MCf1)	SILT (ML), sandy, greyish orange (10YR 7/4). 10% - 15% very fine grained, sub-angular to sub-rounded sand in silt matrix. Scattered soft caliche layers and semi-hard nodules to 1".				
143–145		ML	UMCf (MCf1)	SILT (ML), moderate greyish orange (10YR 6/4) with 0% - 10% very fine grained sand in matrix.				
145–154				TD = 145' on 9-17-09				

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-151**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/24/09 / Date Completed: 09/24/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 145.0 / Depth to Water (ft bgs): 26.0
Borehole Dia. (in): 6.0 / Completion: Monument	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1730.953
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 125	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 125 To: 145	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 121 To: 145

Remarks: Boring advanced with 6.0" casing to 145.0'; Neat Cement from 0' to 117'; 3/8" Holeplug from 117' to 121'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1–19		SW	Qal	SAND, gravelly, silty; Light brown (5YR 6/4), 60% fine to very coarse, sub-angular to sub-rounded, sand; 20% silt; 20% volcanic gravel to 1/2", angular to sub-angular with minor cobbles to 6".				
19–25		SP-SW	Qal	SAND, clean, light brown (5YR 6/4). 70% fine to medium with minor coarse grained sub-rounded to sub-angular sand. 22' - 22.5' layer of gravel to 6".				
25–27		GP	Qal	Gravel, sandy, light brown (5YR 6/4), 40% fine to very coarse, sub-angular sand. 60% volcanic granules 1/8" - 1/2". Wet @ 26'	▽			
27–30		SP	Qal	SAND, poorly graded, greyish orange (10YR 7/4), very fine to fine grained sand. Hard caliche nodules @ 28' - 28.5'				
30–34		GP	Qal	GRAVEL, sandy, moderate yellowish brown (10YR 5/2). 60% granules, volcanic, sub-angular 1/8" - 1/4" and 40% medium to very coarse sub-angular to sub-rounded sand.				
34		ML	UMCf (MCfl)					

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-151**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/24/09 / Date Completed: 09/24/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36–50		ML	UMCf (MCfl)	SILT, sandy, greyish orange (10YR 7/4). 34' - 39'; 40% very fine grained sand. 39' - 50'; 10% - 15% very fine grained sand and 5% clay. 40' - 50'; 5% floating very coarse grained sand. @ 41'; 6" bed of 40% coarse to very coarse, sub-rounded to sub-angular sand.				
50–56		SM	UMCf (MCfl)	SAND, silty; light brown (5YR 5/4), 55% very fine grained sand and 45% silt.				
56–74		ML	UMCf (MCfl)	SILT, sandy, light brown (5YR 6/4). 56' - 65'; 10% very fine grained sand. 65' - 67'; 40% very fine grained sand. 67' - 77'; 10% very fine grained sand.				

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-151**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/24/09 — Date Completed: 09/24/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
76		ML	UMCf (MCf1)	SILT, sandy, light brown (5YR 6/4). 56' - 65'; 10% very fine grained sand.				
77				SILT, light brown (5YR 6/4) to 85' then pale orangish gray (10YR 7/2) to 90'.				
85		ML	UMCf (MCf1)	85' - 90'; moderately soft caliche throughout.				
90				90' - 94'; Silt with 5% - 10% clay.				
94		ML	UMCf (MCf1)	SILT, sandy, light brown (5YR 6/4) with 10% - 20% very fine grained sand.				
112		ML	UMCf (MCf1)	SILT, light brown (5YR 6/4).				
114								

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-151**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/24/09 / Date Completed: 09/24/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
116–121		ML	UMCf (MCfl)	SILT, light brown (5YR 6/4).				
122–127		ML	UMCf (MCfl)	SILT, sandy, grayish orange (10YR 7/4) with 30% very fine grained sand.				
127–137		ML	UMCf (MCfl)	SILT, grayish orange to 132.5', then changes to light greenish gray (5GY 8/1). 132.5' - 137'; 10% clay.				
137–145		Cl	UMCf (MCfl)	CLAY, sandy, silty, light greenish gray (5GY 8/1), mottled with moderate yellow (5Y 6/2). Locally up to 15% very fine grained sand and 15% silt.				
145				TD = 145' on 9-24-09				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-152**	
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish	
Drilling Contractor: Boart Longyear	Date Started: 09/23/09	Date Completed: 09/23/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 145.0	Depth to Water (ft bgs): 25.0
Borehole Dia. (in): 6.0	Completion: Monument	Surface Elevation (ft MSL):
		Top of Casing (ft MSL): 1698.501
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 125	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 125 To: 145	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 121 To: 145

Remarks: Boring advanced with 6.0" casing to 145.0'; Neat Cement from 0' to 117'; 3/8" Holeplug from 117' to 121'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1-4		GP	Qal	GRAVEL, sandy, light brown (5YR 5/4), 55% pea size granules (1/8" - 1/2"), volcanic, sub-angular, some caliche rinds; 40% very fine to very coarse, sub-angular to angular sand; 5% silt.				
4-21		SW	Qal	SAND, gravelly, silty, light brown (5YR 5/4), 60% fine to very coarse, sub-angular to sub-rounded, sand; 25% pea gravel 1/8" to 3/4" with minor clasts to 2"; 15% silt in matrix. Common soft calice as stringers and rinds on gravel clasts. 19.5' - 20', hard caliche.				
21-30		ML	UMCf (MCfl)	SILT, light brown (5YR 5/4), non-calcareous to 28', then common thin calcareous (caliche) stringers to 30'. Trace very fine to fine grained sand, 5% - 10% clay in matrix. Wet @ 25' 28' - 30', calcareous.	▽			
30-34		ML	UMCf (MCfl)	SILT, sandy and SAND, silty-interbedded (silt to sand ratio approx. 70:30), light brown (5YR 5/4). SAND: very fine to fine grained, angular to sub-angular in silt; 30% - 40% silt in sand.				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-152**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/23/09 / Date Completed: 09/23/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
36–38		ML	UMCf (MCf1)	SILT, sandy and SAND, silty-interbedded (silt to sand ratio approx. 70:30), light brown (5YR 5/4). SAND: very fine to fine grained, angular to sub-angular in silt; 30% - 40% silt in sand.				
38–42		SM	UMCf (MCf1)	SAND, silty, light brown (5YR 5/4), very fine grained with 30% - 40% silt.				
42–52		ML	UMCf (MCf1)	SILT, light brown (5YR 5/4) with 10% clay and 10% very fine grained sand.				
52–55		ML	UMCf (MCf1)	SILT, sandy, light brown (5YR 5/4), 20% - 30% very fine sand.				
55–64		SM	UMCf (MCf1)	SAND, silty; light brown (5YR 5/4) and pale orange (10YR 7/2) where calcareous very fine grained, angular to sub-angular with 30% - 40% silt and 5% clay.				
64–74		ML	UMCf (MCf1)	SILT, sandy, light brown (5YR 5/4), 20% - 25% very fine grained sand, 5% - 10% clay. Slightly calcareous, soft stringers.				

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-152**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/23/09 / Date Completed: 09/23/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
76–79		ML	UMCf (MCf1)	SILT, sandy, light brown (5YR 5/4), 20% - 25% very fine grained sand, 5% - 10% clay. Slightly calcareous, soft stringers.				
80–86		SM	UMCf (MCf1)	SAND, silty, with minor pea gravel, moderate brown (5YR 5/4), fine to medium grained, sub-angular to sub-rounded with 20% floating coarse to very coarse sand and granules to 3/8". 30% silt.				
87–91		ML	UMCf (MCf1)	SILT, sandy, moderate brown (5YR 5/4) to 90' then greyish orange (10YR 7/4) where calcareous (commonly 1/2" nodules and soft stringers).				
92–114		Cl	UMCf (MCf1)	CLAY, silty, yellowish gray (5Y 8/1) then greenish gray (5GY 8/1) to 117'. 20% - 30% silt in matriz. Common soft caliche nodules and stringers (locally mottled with pale greyish orange (10Y 8/4).				

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-152**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/23/09 / Date Completed: 09/23/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
116		Cl	UMCf (MCf1)					
117		SM	UMCf (MCf1)	SAND, silty, moderate yellowish gray (5Y 6/2), very fine grained, 30% -40% silt in matrix.				
122		ML	UMCf (MCf1)	SILT, dark grayish orange (10YR 6/4).				
135		CL	UMCf (MCf1)	CLAY, silty, very pale orange (10YR 8/2), 20% - 30% silt in matrix, with minor scattered 1/8" caliche nodules.				
143		ML	UMCf (MCf1)	Silt, clayey, light brown (5YR 5/4).				
145				TD = 145' on 9-24-09				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-153**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/25/09 / Date Completed: 09/30/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 170.0 / Depth to Water (ft bgs):
Borehole Dia. (in): 6.0 / Completion: Flush Mount	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1796.822
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 150	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 150 To: 170	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 146 To: 170

Remarks: Boring located 15' east of M-149; Neat Cement from 0' to 142'; 3/8" Holeplug from 142' to 146'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
98				M-153 is located 15' east of M-149. See lithology log for M-149 for lithology from 0' to 120'.				
99				SILT and sandy SILT - interbedded (silt to sand ratio 70:30), grayish orange (10YR 7/4) from 114'.				
100								
101								
102								
103								
104								
105								
106								
107								
108								
109								
110								
111								
112								
113								
114								
115		ML	UMCf (MCf1)					
116								
117								
118								
119								
120								
121								
122								
123								
124								
125								
126								
127				127' - 136', minor soft caliche nodules to 1/2".				
128				128' - 130', 20% - 25% very fine grained sand in matrix.				
129								
130								
131								

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-153**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/25/09 — Date Completed: 09/30/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
133				SILT and sandy SILT - interbedded (silt to sand ratio 70:30), grayish orange (10YR 7/4) from 114'.				
134				134' - 136', 20% very fine grained sand in matrix.				
135								
136								
137								
138				138' - 140', minor caliche nodules.				
139								
140								
141								
142								
143								
144								
145								
146								
147								
148				Common caliche nodules to 1" and stringers.				
149								
150								
151		ML	UMCf (MCfl)	151' - 151.5', common caliche nodules.				
152				150' - 154', 20% - 25% very fine grained sand in matrix.				
153								
154								
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166				166' - 170', 20% - 25% very fine grained sand in matrix.				
167				167.5' - 168', comon caliche nodules.				
168								
169								
170								
171				TD = 170' on 9-30-09				

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-154**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/30/09 / Date Completed: 10/01/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 195.0 / Depth to Water (ft bgs):
Borehole Dia. (in): 6.0 / Completion: Monument	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1758.893
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 175	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 175 To: 195	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 171 To: 195

Remarks: Boring located 15' west of M-150; Neat Cement from 0' to 167'; 3/8" Holeplug from 167' to 171'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
132–142		ML	UMCf (MCf1)	M-154 is located 15' west of M-150. See lithology log of M-150 for lithologic description from 0' to 145'. (133' - 143' continued from M-150) SILT, sandy.				
143–164		ML	UMCf (MCf1)	SILT, medium greyish orange (10YR 6/4) with 0% - 10% very fine grained sand locally. 153' - 153.5', moderate caliche nodules and stringers. 156' - 156.5', moderate caliche nodules to 1". 159.5' - 160', moderate caliche nodules to 1/2".				
165		ML	UMCf (MCf1)	Moderate caliche nodules.				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-154**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 09/30/09 — Date Completed: 10/01/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
167–183		ML	UMCf (MCf1)	SILT, sandy, medium greyish orange (10YR 6/4) with 20% - 30% disseminated very fine grained sand in matrix. Locally calichified. 166' - 168', with 10% very coarse grained sand and 1/8" granules floating in matrix. Moderate caliche nodules. 179' - 179.5', moderate caliche nodules. 182' - 182.5', moderate caliche nodules.				
184–195		SM	UMCf (MCc2)	SAND, silty, moderate greyish orange (10YR 6/4), 60% very fine grained sand with 40% silt in matrix. Locally calcareous. Hard caliche nodules 184' - 184.5'. Second coarse-grained facies (MCc2) 190' - 195', moderate caliche nodules and stringers.				
195				TD = 195' on 10-1-09				

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-155**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 10/03/09 / Date Completed: 10/04/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 220.0 / Depth to Water (ft bgs):
Borehole Dia. (in): 6.0 / Completion: Monument	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1730.960
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 200	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 200 To: 220	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 195 To: 220

Remarks: Well M-151 is located 20' west of M-155; Neat Cement from 0' to 190'; 3/8" Holeplug from 190' to 195'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
144				M-151 is located 20' west of M-155. See lithology log of M-151 for lithologic description from 0' to 145'.				
145		CL	UMCf (MCf1)	CLAY, silty, moderate yellow grey (5YR 5/4) from 145' to 147'. 20% very fine grained sand and 10% silt.				
147				Interbedded SILT and Sandy SILT 147' - 199'				
148								
149								
150				147' - 152' Sandy SILT, light brown (5YR 5/4) with 10% very fine grained sand, 5% clay.				
151								
152								
153								
154								
155				152' - 179' SILT, moderate grayish orange (10YR 6/4) with 20% very fine grained sand.				
156								
157								
158				@ 158' 1' Sandy SILT with 20% fine grained sand.				
159								
160								
161								
162		ML	UMCf (MCf1)					
163				@ 163' moderate caliche as nodules. 3' of Sandy SILT with 20%				
164								
165								
166								
167								
168								
169								
170								
171								
172								
173								
174								
175								
176								
177								

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-155**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 10/03/09 / Date Completed: 10/04/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
179–199		ML	UMCf (MCf1)	Interbedded SILT and Sandy SILT 147' - 199' 179' - 184' Sandy SILT, moderate grayish orange (10YR 6/4). 20% - 30% very fine grained sand and 5% clay. 184' - 193' Moderate grayish orange (10YR 6/4). @ 193', 1' of Silty SAND, moderate grayish orange (10YR 6/4), 60% very fine to fine grained sand, 35% silt, 5% clay. 195' - 199' Pale orange (10YR 8/4)				
199–217		SM	UMCf (MCc2)	SAND (SM): Silty, brown (5YR 5/4), 60% very fine grained sand with 35% silt and 5% clay. Second coarse-grained facies (MCc2). 211' - 212', 60% very fine to fine sand, 20% medium to coarse sand, 35% silt, 5% clay				
217		ML	UMCf (MCf1)					

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-155**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 10/03/09 / Date Completed: 10/04/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
219		ML	UMCf (MCf1)	SILT (ML): sandy, brown (5YR 5/4), 20% very fine sand, 5%- 10% medium to coarse sand, 5% clay. @ 217' 6" lens of nodular caliche				
220								
221								
222								
223								
224								
225								
226								
227								
228								
229								
230								
231								
232								
233								
234								
235								
236								
237								
238								
239								
240								
241								
242								
243								
244								
245								
246								
247								
248								
249								
250								
251								
252								
253								
254								
255								
256								
257								

northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-156**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 10/02/09 / Date Completed: 10/02/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 195.0 / Depth to Water (ft bgs):
Borehole Dia. (in): 6.0 / Completion: Monument	Surface Elevation (ft MSL): / Top of Casing (ft MSL): 1698.380
Blank Casing: SCH 40 PVC Casing Dia. (in): 2 From (ft bgs): 0 To: 175	Slotted Casing: Factory slotted SCH 40 PVC, 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 175 To: 195	Filter Pack Type: Silica Sand Size: #10-20 Interval (ft bgs) From: 171 To: 195

Remarks: Boring located 10' west of M-152; Neat Cement from 0' to 167'; 3/8" Holeplug from 167' to 171'.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
134–143		CL	UMCf (MCfl)	M-156 is located 10' west of M-152. See lithologic log of M-152 for lithologic description from 0' to 145'. (Continued from M-152) CLAY, silty.				
143–147		ML	UMCf (MCfl)	SILT, clayey, light brown (5YR 5/4), 20% clay in matrix.				
147–155		ML	UMCf (MCfl)	SILT, sandy,moderate grayish orange (10YR 6/4) with 10% - 20% very fine grained sand in matrix. Trace to 5% clay. 151' - 152', common soft caliche. 154' - 155', with 10% - 15% floating medium to coarse, sub-rounded to sub-angular sand grains in matrix.				
155–165		ML	UMCf (MCfl)	SILT, moderate greyish orange (10YR 6/4); trace to 5% clay.				
165–167		SM	UMCf (MCfl)	SAND, silty; moderate greyish orange (10YR 6/4), 60% very fine grained sand with 40% silt.				

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-156**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Ed Krish
Drilling Contractor: Boart Longyear	Date Started: 10/02/09 / Date Completed: 10/02/09

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
169		SM	UMCf (MCf1)	SAND, silty; moderate greyish orange (10YR 6/4), 60% very fine grained sand with 40% silt.				
170								
171				SILT, very pale orange (10YR 8/2) to 171' then moderate greyish orange (10YR 6/4), with trace to 10% very fine grained sand in matrix locally and 0% - 5% clay.				
172								
173								
174								
175								
176								
177								
178		ML	UMCf (MCf1)					
179								
180								
181								
182								
183				182.5' - 183.5', common soft caliche with 10% - 20% very fine grained sand.				
184								
185								
186				SILT and sandy SILT (interbedded), moderate greyish orange (10YR 6/4). @ 186', 6" layer of silty sand, 60% very fine to fine grained with common sub-rounded medium to coarse grains.				
187								
188								
189								
190		ML	UMCf (MCf1)					
191								
192				192' - 193', silty sand with 60% very fine to fine grained and moderate medium to very coarse grained, sub-rounded sand.				
193								
194								
195				TD = 195' on 10-2-09				
196								
197								
198								
199								
200								
201								
202								
203								
204								
205								
206								
207								

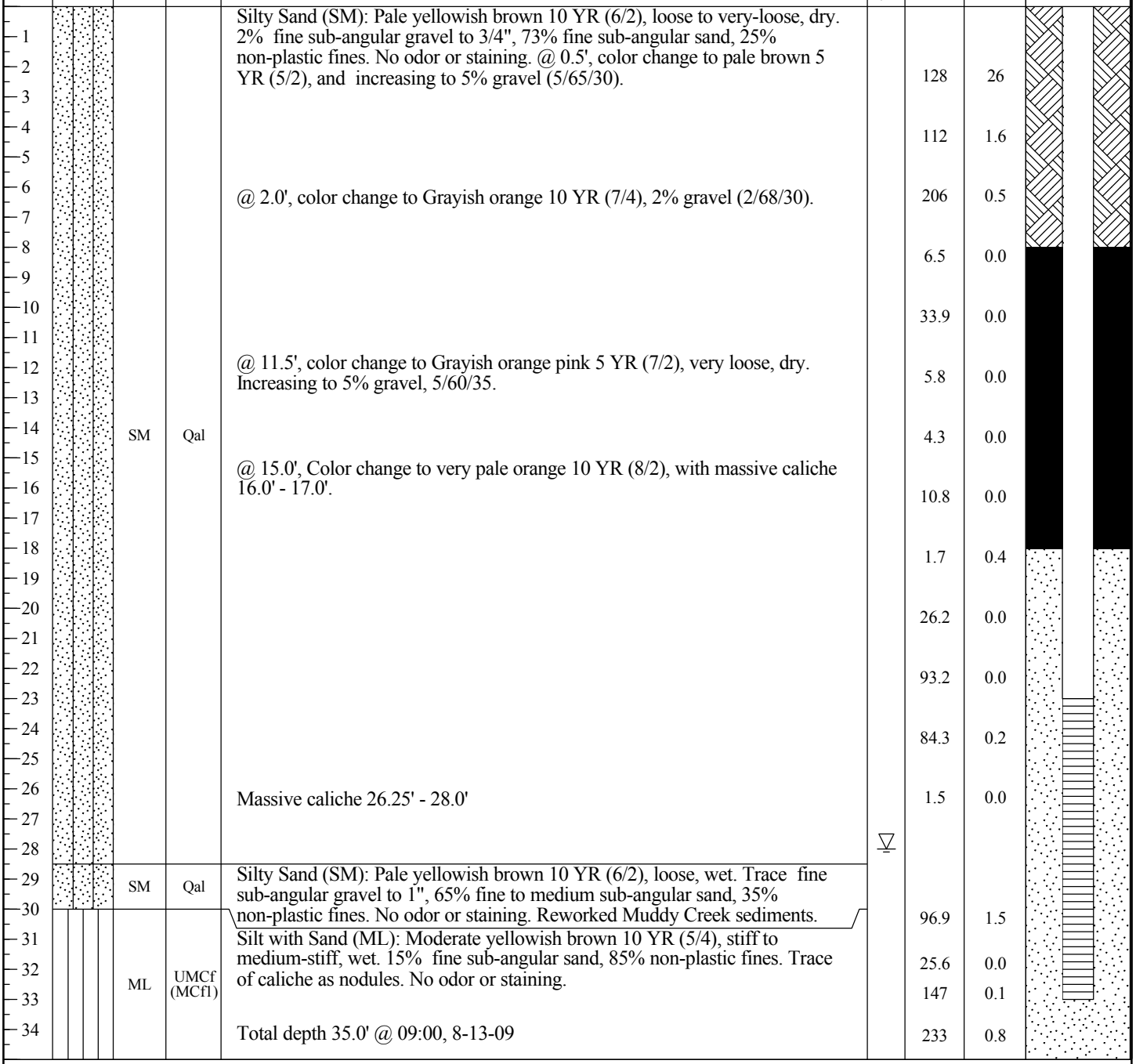
northgate environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-157**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Dana R. Brown
Drilling Contractor: Boart Longyear	Date Started: 08/13/09 / Date Completed: 08/13/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 35.0 / Depth to Water (ft bgs): 28.0
Borehole Dia. (in): 6.0 / Completion:	Surface Elevation (ft MSL): / Top of Casing (ft MSL):
Blank Casing: SCH 40 Casing Dia. (in): 2 From (ft bgs): 0 To: 23	Slotted Casing: Factory slotted SCH 40 , 0.020" Slots Casing Dia. (in): 2 From (ft bgs): 23 To: 33	Filter Pack Type: Size: Interval (ft bgs) From: 18 To: 35

Remarks: Boring advanced with 6.0" casing to 35.0'. Temporary well constructed for water sample collection. Abandoned with neat cement grout.; from 0' to 8'; from 8' to 18'.

Depth (ft)	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)
1–2	SM	Qal	Silty Sand (SM): Pale yellowish brown 10 YR (6/2), loose to very-loose, dry. 2% fine sub-angular gravel to 3/4", 73% fine sub-angular sand, 25% non-plastic fines. No odor or staining. @ 0.5', color change to pale brown 5 YR (5/2), and increasing to 5% gravel (5/65/30).		128	26
3–4					112	1.6
5–6			@ 2.0', color change to Grayish orange 10 YR (7/4), 2% gravel (2/68/30).		206	0.5
7–8					6.5	0.0
9–10					33.9	0.0
11–12			@ 11.5', color change to Grayish orange pink 5 YR (7/2), very loose, dry. Increasing to 5% gravel, 5/60/35.		5.8	0.0
13–14					4.3	0.0
15–16			@ 15.0', Color change to very pale orange 10 YR (8/2), with massive caliche 16.0' - 17.0'.		10.8	0.0
17–18					1.7	0.4
19–20					26.2	0.0
21–22					93.2	0.0
23–24					84.3	0.2
25–26			Massive caliche 26.25' - 28.0'		1.5	0.0
27–28				▽		
29–30	SM	Qal	Silty Sand (SM): Pale yellowish brown 10 YR (6/2), loose, wet. Trace fine sub-angular gravel to 1", 65% fine to medium sub-angular sand, 35% non-plastic fines. No odor or staining. Reworked Muddy Creek sediments.		96.9	1.5
31–32	ML	UMCf (MCf1)	Silt with Sand (ML): Moderate yellowish brown 10 YR (5/4), stiff to medium-stiff, wet. 15% fine sub-angular sand, 85% non-plastic fines. Trace of caliche as nodules. No odor or staining.		25.6	0.0
33					147	0.1
34			Total depth 35.0' @ 09:00, 8-13-09		233	0.8



TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

northgate
environmental management, inc.
1100 Quail Street, Suite 102
Newport Beach, CA 92660
Telephone: 949.260.9293
Fax: 949.260.9299

Well Log

Project Number: 2027.02	**Boring No.: M-158**
Project Name: Vertical Delineation / Cature Zone Eval.	Logged by: Dana R. Brown
Drilling Contractor: Boart Longyear	Date Started: 08/13/09 / Date Completed: 08/13/09
Drilling Method: Rotary Sonic	Total Depth (ft bgs): 34.0 / Depth to Water (ft bgs):
Borehole Dia. (in): 6.0 / Completion:	Surface Elevation (ft MSL): / Top of Casing (ft MSL):
Blank Casing: SCH Casing Dia. (in): From (ft bgs): To:	Slotted Casing: SCH , " Slots Casing Dia. (in): From (ft bgs): To:	Filter Pack Type: Size: Interval (ft bgs) From: To:

Remarks: Boring advanced with 6.0" casing to 34.0'; from ' to '; from ' to '.

Depth (ft)	Graphic Log	USCS Code	Formation Name	Material Description	Water Level	10.6 ev PID (ppm)	11.7 ev PID (ppm)	Well Construction
1–12		SM	Qal	Silty Sand (SM): Pale yellowish brown 10 YR (6/2), loose to very-loose, dry. 5% fine sub-angular gravel to 1"-, 70% fine to medium sub-angular sand, 25% non-plastic fines. No odor or staining. 6.0' - 8.0', gravel lens, up to 10% fine sub-angular gravel to 2".		2101 397 89.4	0.7 3.7 3.5	
13–17		SM	Qal	Silty Sand (SM): Very pale orange 10 YR (8/2), very-loose to loose, dry. 2% fine sub-angular gravel to 3/4", 60% fine to medium sub-angular sand, 38% non-plastic fines. No odor or staining. Caliche lens @ 16.0' - 17.0'.		231	3.0	
18–20		SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense to loose, damp to dry. 5% fine sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non-plastic fines. No odor or staining.		146	3.1	
21–28		SM		Silty Sand (SM): Dark yellowish orange 10 YR (6/6), loose, dry. 70% fine sub-angular sand, 30% non to moderate-plastic fines. No odor or staining. Caliche lens @ 21.0' - 22.0'. Caliche lens @ 25.8' - 29.0'.		218 155	3.1 2.5	
29–30		SM	Qal	Silty Sand (SM): Dark yellowish orange 10 YR (6/6), medium dense to loose, damp to dry. 5% fine sub-angular gravel to 1"-, 65% fine to medium sub-angular sand, 30% non-plastic fines. No odor or staining. Reworked Muddy Creek sediments.		152	4.5	
31–33		ML	UMCf (MCfl)	Sandy Silt (ML): Pale brown 5 YR (5/2), medium-stiff, damp to moist. Trace to 2% locally fine sub-rounded gravel to 1/2"-, 35% fine sub-angular sand, 65% non to moderate-plastic fines. No odor or staining.		10.4	2.0	
34				Total depth 34.0' @ 11:25, 8-13-09		157	2.2	

TRONOX PERCHLORATE LOG 2027.02.GPJ 12/21/09

APPENDIX C

WELL DEVELOPMENT RECORDS

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☒ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: I-AB	Sand Pack Interval:	Gal. To be Purged:
Date: 10-9-09	Screened Interval:	Development Methods:
Time Start: 3:01 End: 4:32	Measured Depth (pre-development): 52.33	
Recorded By: EK	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): (post): 32.35	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter:	One Well Volume (gal.):	Turbidity Meter:
Well Diameter: 6"	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		EC	PH	Temp.	DO	ORP	Turbidity	PID	
3:01		4.565	7.29	26.49	2.63	155.5	193		
3:20		4.473	7.07	25.84	3.62	161.6	68.7		
4:00		4.418	7.08	25.78	3.66	163.4	134		
4:32	144	4.414	7.16	25.84	2.89	165.0	82.6		

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☒ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: M-149	Sand Pack Interval:	Gal. To be Purged: 25
Date: 10-16-09	Screened Interval:	Development Methods:
Time Start: End:	Measured Depth (pre-development): 120.0'	
Recorded By: EK	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): (post):	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter:	One Well Volume (gal.):	Turbidity Meter:
Well Diameter: 2"	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		~~EC~~ Temp	PH	~~Temp.~~ EC	DO	ORP	Turbidity	PID	
	0	25.99	7.38	3.777	1.61	160.6	OVRG		
		27.89	7.67	1.945	4.69	158.6	OVRG		
		26.94	7.90	1.350	3.51	157.1	439		
		26.03	7.54	3.258	4.89	157.3	342		
	25	26.55	7.78	2.081	4.57	156.4	324		

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☐ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: M150	Sand Pack Interval:	Gal. To be Purged:
Date: 10/14/09 - 10/15/09	Screened Interval:	Development Methods:
Time Start: 410 End:	Measured Depth (pre-development): 148.6	
Recorded By:	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): 24.5 (post):	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter:	One Well Volume (gal.):	Turbidity Meter:
Well Diameter: 24	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		EC	PH	Temp.	DO	ORP	Turbidity	PID	
410	0								
415	7.5	1.541	7.94	26.94	.230	175.1	error		rain dry
435	22	1.492	7.91	26.89	1.210	180.4	error		
455	37	1.488	7.92	26.87	1.281	181.0	error		
530	42	1.472	7.89	26.51	1.277	181.4	error		
730	52	1.495	7.85	24.88	.815	177.2	12.5		
745	57	1.488	7.86	25.04	1.211	180.2	200		

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☒ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: MW52	Sand Pack Interval:	Gal. To be Purged:
Date: 10/15/09	Screened Interval:	Development Methods:
Time Start: End:	Measured Depth (pre-development): 132.0	
Recorded By: EK	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): 26.5 (post):	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter:	One Well Volume (gal.):	Turbidity Meter:
Well Diameter: 2 4	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		EC	PH	Temp.	DO	ORP	Turbidity	PID	
340	0								
345	7.5	3.270	7.76	26.33	1.48	181.7	error		
350	67.5	1.744	7.73	26.83	2.00	178.5	24.3		
430	127.5	1.491	7.84	26.57	3.31	177.0	460		
510	157.5	1.290	7.86	26.59	2.99	178.9	46.5		
530	187.5	1.312	7.86	26.55	2.91	179.1	9.80		

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☒ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: M-153	Sand Pack Interval:	Gal. To be Purged: 25
Date: 10-12-09	Screened Interval:	Development Methods:
Time Start: End:	Measured Depth (pre-development):	
Recorded By: EK	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): (post):	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter:	One Well Volume (gal.):	Turbidity Meter:
Well Diameter: 2"	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		EC	PH	Temp.	DO	ORP	Turbidity	PID	
10:40	0	1.075	7.39	25.5	2.17	155.1	OVRG		
11:06		0.872	8.04	25.84	5.33	157.4	495		
11:49		0.846	7.84	25.94	4.61	158.6	177		
12:12	25	0.834	7.87	26.41	4.87	158.6	error		

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☒ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: MW54	Sand Pack Interval:	Gal. To be Purged:
Date: 10/14/09	Screened Interval:	Development Methods:
Time Start: 1255 End:	Measured Depth (pre-development): 195.3	
Recorded By: EK	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): 18.0 (post):	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter:	One Well Volume (gal.):	Turbidity Meter:
Well Diameter: 2"	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		EC	PH	Temp.	DO	ORP	Turbidity	PID	
1255	0			~~26.45~~					
100	7.5	.885	7.99	26.45	1.22	182.3	error		ran dry
120	28.60	1.204	7.95	26.71	3.22	187.3	error		
135	33	.829	8.08	27.63	2.92	178.0	error		
205	43	.846	8.00	27.92	2.84	176.7	error		
220	48	.846	7.98	27.98	3.01	178.4	error		

northgate
environmental management, inc.

WELL DEVELOPMENT LOG

All measurements taken from: ☒ Top of Casing ☐ Protective Casing ☐ Ground Level		Sample ID:
Well ID: M156	Sand Pack Interval:	Gal. To be Purged:
Date: 10/15/09	Screened Interval:	Development Methods:
Time Start: End:	Measured Depth (pre-development): 198	
Recorded By:	Measured Depth (post-development):	Purging Equipment:
Project ID:	Static Water Level (pre): 22.0 (post):	Water Level Equipment:
Job Number:	Standing Water Column (ft.):	PH/EC Meter:
Borehole Diameter: 2"	One Well Volume (gal.):	Turbidity Meter:
Well Diameter:	One Annulus Vol. (gal.):	Other:

Time	Amount Purged (gal)	Field Parameters Measured							Comments
		EC	PH	Temp.	DO	ORP	Turbidity	PID	
905	0								
910	7.5	2.529	8.28	25.44	1.20	195.7	error		ran dry
1030	17	2.247	8.05	26.94	1.94	135.1	367		
1100	22	1.930	8.05	27.44	3.40	163.4	error		
1130	27	1.762	8.00	27.68	3.64	170.3	error		
1200	32	1.630	8.19	27.53	3.59	178.1	~~error~~ 393		

APPENDIX D

SURVEY DATA

TRONOX

Survey Data - New Vertical Delineation and Interceptor Wells and Soil Borings

Well No.	Latitude (WGS 84)	Longitude (WGS 84)	Northing (SPC)	Easting (SPC)	Well Elevation	GROUND ELEVATION	Reference	Discription
I-AB	36°02'54.6648"N	115°00'16.7646"W	26719790.51	827224.98	1753.89	1750.57	Top of Casing	Recovery Well
M-149	36°02'39.717"N	115°00'02.8908"W	26718285.78	828373.149	1796.81	NA	Top of Casing	Vertical Delineation Well
M-150	36°02'52.4328"N	115°00'06.6204"W	26719569.83	828059.148	1758.86	NA	Top of Casing	Vertical Delineation Well
M-151	36°03'04.8888"N	115°00'11.595"W	26720826.75	827643.033	1730.64	NA	Top of Casing	Vertical Delineation Well
M-152	36°03'23.3598"N	115°00'19.6158"W	26722690.63	826973.486	1698.50	NA	Top of Casing	Vertical Delineation Well
M-153	36°02'39.735"N	115°00'02.739"W	26718287.91	828385.605	1796.69	NA	Top of Casing	Vertical Delineation Well
M-154	36°02'52.4214"N	115°00'06.7608"W	26719568.61	828047.739	1758.78	NA	Top of Casing	Vertical Delineation Well
M-155	36°03'04.896"N	115°00'11.682"W	26720827.4	827636.1	1730.69	NA	Top of Casing	Vertical Delineation Well
M-156	36°03'23.3634"N	115°00'19.728"W	26722690.74	826964.224	1698.38	NA	Top of Casing	Vertical Delineation Well
M-157	36°02'54.3984"N	115°00'18.039"W	26719762.92	827120.264	NA	NA	Ground Surface	Soil Boring
M-158	36°02'54.4446"N	115°00'17.8272"W	26719767.62	827137.777	NA	NA	Ground Surface	Soil Boring

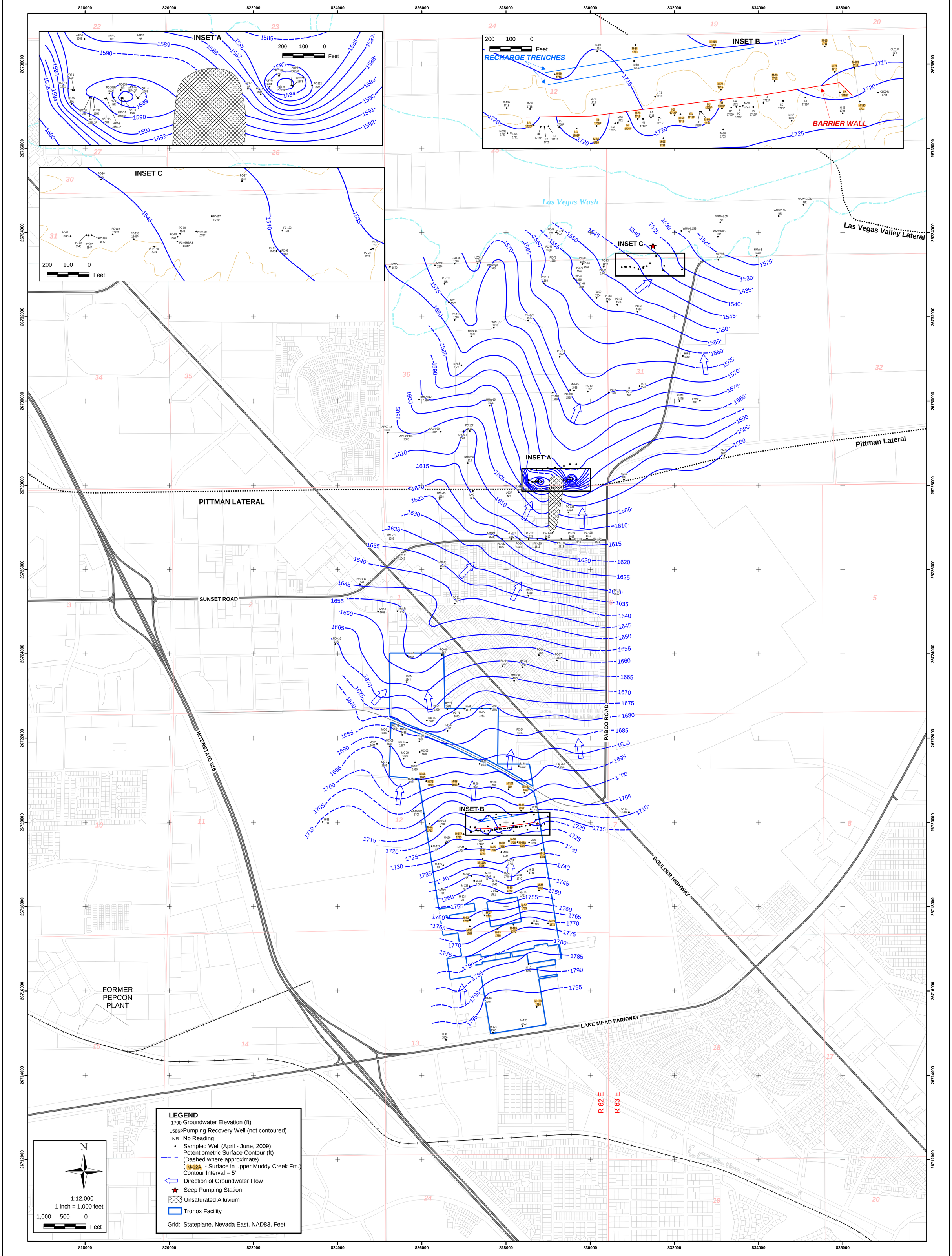
Note: All coordinates shown are based upon the Nevada State Plane Projection (SPC), East Zone 2701 as derived from NGS point W51, (also Clark County Vertical Control point W 51 1934) from survey dated June 2, 2008.

All elevations were established by GPS-RTK methods and are in direct relationship to previous work on Tronox Plant site using the reference Clark County bench mark, below. Well elevations shown are on the top of well casing.

APPENDIX E

SELECTED PLATES AND DATA FROM THE 2009
ANNUAL REMEDIAL PERFORMANCE REPORT
FOR CHROMIUM AND PERCHLORATE

\\Ng-oak1\NG-GIS\Projects\2027_Tronox\NGEM\Groundwater_Reports\2009_annual_report\plate-02_potentiometric-2009-PHB_R01.mxd Last updated 8/13/2009 2:07:39 PM



LEGEND

- 1790 Groundwater Elevation (ft)
- 1586P Pumping Recovery Well (not contoured)
- NR No Reading
- • Sampled Well (April - June, 2009)
- Potentiometric Surface Contour (ft) (Dashed where approximate) (M-12A - Surface in upper Muddy Creek Fm.) Contour Interval = 5'
- Direction of Groundwater Flow
- Seep Pumping Station
- Unsaturated Alluvium
- Tronox Facility

Grid: Stateplane, Nevada East, NAD83, Feet

N

1:12,000
1 inch = 1,000 feet
1,000 500 0 Feet

PLATE NUMBER: 2
SHEET NUMBER: 1

POTENTIOMETRIC SURFACE MAP
SHALLOW WATER BEARING ZONE
SECOND QUARTER 2009

Annual Performance Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
1:12,000	8/12/2009	2027

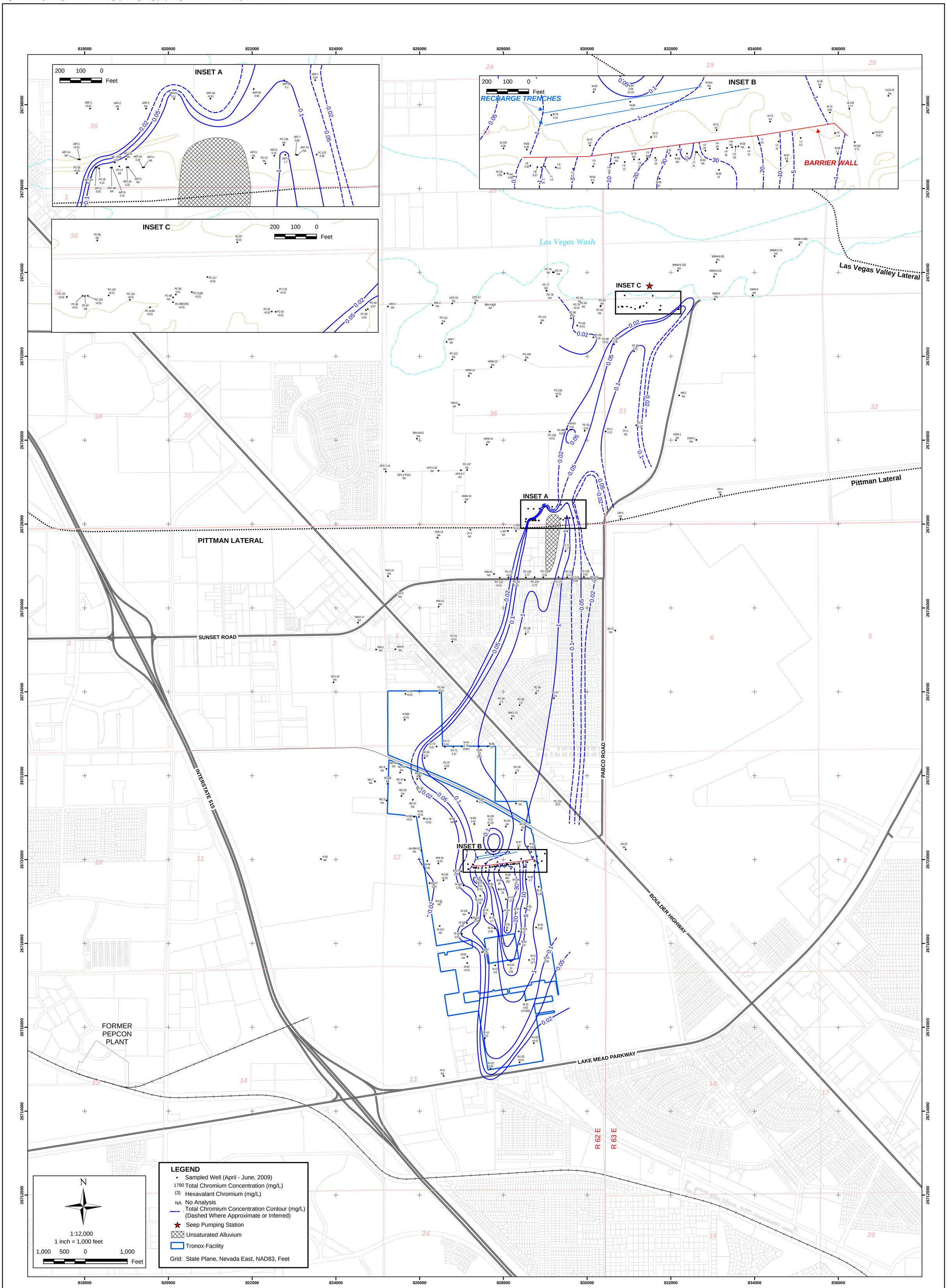
DESIGNED BY:	REVISIONS			
E. Krish	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
NGEM				
CHECKED BY:				
NGEM				
APPROVED BY:				
NGEM				

northgate environmental management, inc.

TRONOX

http://www.ngem.com

\\Ng-oak1\NG-GIS\Projects\2027_Tronox\NGEM\Groundwater_Reports\2009_annual_report\plate-06_Total-Chromium-2009.mxd Last updated 8/11/2009 10:54:27 PM



SHEET NUMBER: 1	PLATE NUMBER: 6	

GROUNDWATER TOTAL CHROMIUM MAP
SHALLOW WATER-BEARING ZONE
SECOND QUARTER 2009

Annual Performance Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
1:12,000	8/12/2009	2027

DESIGNED BY:	REVISIONS			
E. Krish	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
NGEM				
CHECKED BY:				
NGEM				
APPROVED BY:				
NGEM				

northgate environmental management, inc.

TRONOX

http://www.ngem.com

\\Ng-oak1\NG-GIS\Projects\2027_Tronox\NGEM\Groundwater_Reports\2009_annual_report\plate-07_Perchlorate-2009.mxd Last updated 8/11/2009 3:33:34 PM

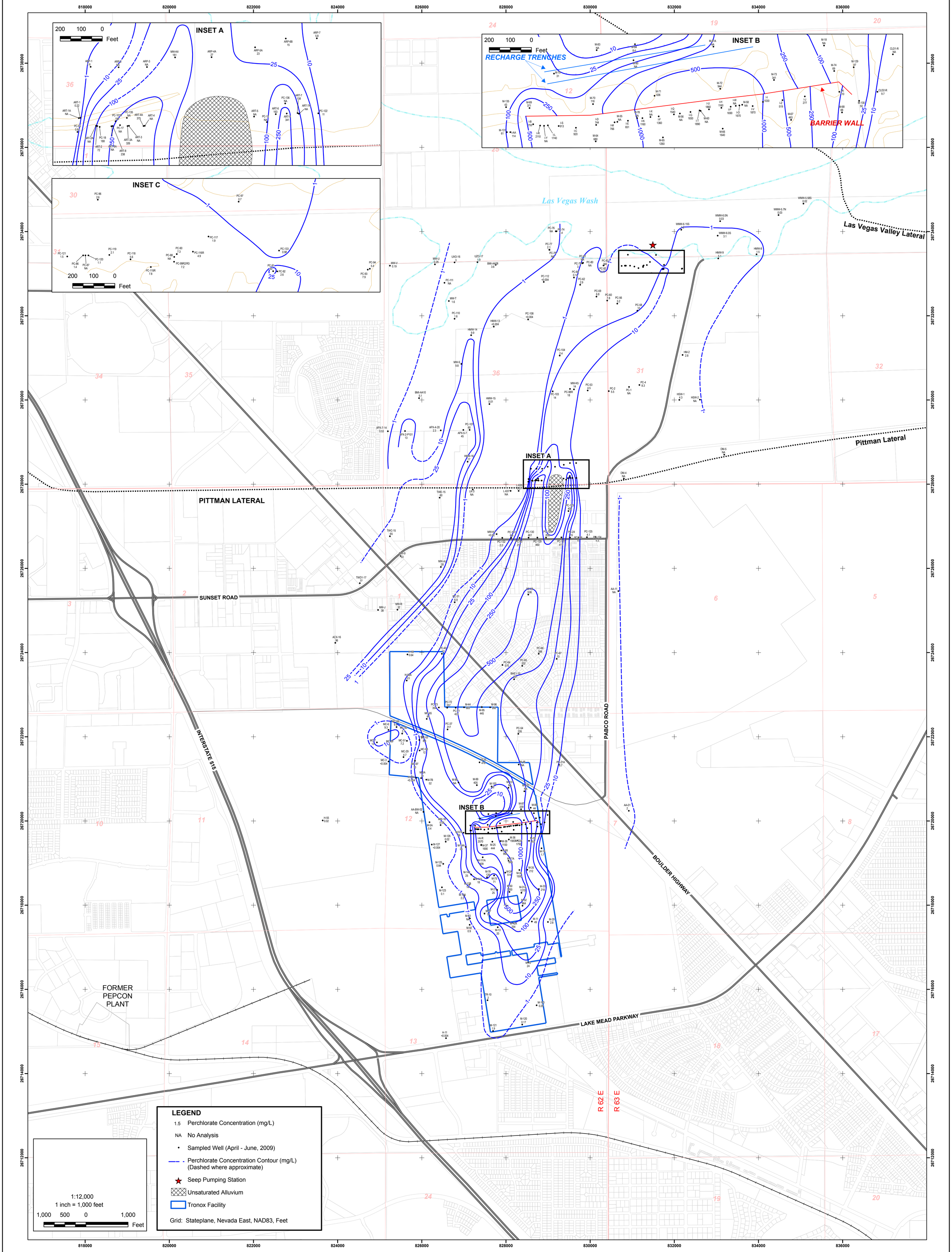


PLATE NUMBER: 7

SHEET NUMBER: 1

GROUNDWATER PERCHLORATE MAP
SHALLOW WATER-BEARING ZONE
SECOND QUARTER 2009

Annual Performance Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
1:12,000	8/12/2009	2027

DESIGNED BY:	REVISIONS			
E. Krish	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
NGEM				
CHECKED BY:				
NGEM				
APPROVED BY:				
NGEM				

northgate environmental management, inc.

TRONOX

http://www.ngem.com

\\Ng-oak1\NG-GIS\Projects\2027_Tronox\NGEM\Groundwater_Reports\2009_annual_report\plate-08_TDS-2009.mxd Last updated 8/6/2009 7:50:20 PM

INSET A

INSET B

INSET C

RECHARGE TRENCHES

BARRIER WALL

Las Vegas Wash

Las Vegas Valley Lateral

Pittman Lateral

PITTMAN LATERAL

SUNSET ROAD

INTERSTATE 515

BOULDER HIGHWAY

PABCO ROAD

LAKE MEAD PARKWAY

FORMER PEPCON PLANT

R 62 E

R 63 E

LEGEND

1.5 Total Dissolved Solids (TDS) Concentration (mg/L)

NA No Analysis

• Sampled Well (April - June, 2009)

TDS Concentration Contour (mg/L) (Dashed where approximate)

Seep Pumping Station

Unsaturated Alluvium

Tronox Facility

Grid: Stateplane, Nevada East, NAD83, Feet

N

1:12,000

1 inch = 1,000 feet

1,000 500 0 1,000 Feet

SHEET NUMBER: 1

PLATE NUMBER: 8

GROUNDWATER TOTAL DISSOLVED SOLIDS MAP
SHALLOW WATER-BEARING ZONE
SECOND QUARTER 2009

Annual Performance Report
Tronox Facility
Henderson, Nevada

SCALE:	DATE:	PROJECT NUMBER:
1:12,000	8/12/2009	2027

DESIGNED BY:	REVISIONS			
E. Krish	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
NGEM				
CHECKED BY:				
NGEM				
APPROVED BY:				
NGEM				

northgate environmental management, inc.

TRONOX

http://www.ngem.com

Table A-1

Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009

Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
AA-01	5/28/09	1709.42				1.95	3600
AA-11	5/28/09	1629.50		NA		NA	NA
ARP-1	4/17/08	1589.00				1.69	6380
ARP-1	5/14/08	1589.00		<0.01		1.52	6400
ARP-1	6/17/08	1588.98				2.28	7080
ARP-1	7/15/08	1589.20				2.22	6130
ARP-1	8/11/08	1589.39		NA		2.34	6800
ARP-1	9/9/08	1589.38				2.41	7200
ARP-1	10/14/08	1589.32				2.74	6300
ARP-1	11/11/08	1589.47		<0.01		2.87	6270
ARP-1	12/9/08	1589.71				2.97	6260
ARP-1	1/15/09	1589.52				2.43	6020
ARP-1	2/11/09	1589.65		<0.01		1.60	6270
ARP-1	3/11/09	1589.64				1.38	6530
ARP-1	4/14/09	1589.50				1.23	6510
ARP-1	5/13/09	1589.33		<0.01		1.55	6560
ARP-1	6/10/09	1589.26		<0.01		2.12	5840
ARP-2	4/17/08	1588.60				0.25	7000
ARP-2	5/14/08	1588.59		0.047		0.40	6500
ARP-2	6/17/08	buried					
ARP-2	7/15/08	buried					
ARP-2	8/11/08	buried					
ARP-2	9/9/08	buried					
ARP-2	10/14/08	buried					
ARP-2	11/11/08	buried					
ARP-2	12/9/08	buried					
ARP-2	1/15/09	buried					
ARP-2	2/11/09	buried					
ARP-2	3/11/09	buried					
ARP-2	4/14/09	buried					
ARP-2	5/12/09	buried					
ARP-2	6/10/09	buried					
ARP-3	4/17/08	1587.59				10	8450
ARP-3	5/14/08	buried					
ARP-3	6/17/08	buried					
ARP-3	7/15/08	buried					
ARP-3	8/11/08	buried					
ARP-3	9/9/08	buried					
ARP-3	10/14/08	buried					
ARP-3	11/11/08	buried					
ARP-3	12/9/08	buried					
ARP-3	1/15/09	buried					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
ARP-3	2/11/09	buried					
ARP-3	3/11/09	buried					
ARP-3	4/14/09	buried					
ARP-3	5/12/09	buried					
ARP-4A	4/17/08	1586.16				38.0	4960
ARP-4A	5/14/08	1586.17		<0.01		30.8	4480
ARP-4A	6/17/08	1586.24				30.0	3510
ARP-4A	7/15/08	1586.41				33.9	6400
ARP-4A	8/11/08	1586.73		NA		30.2	4610
ARP-4A	9/9/08	1586.67				31.2	4700
ARP-4A	10/15/08	1586.66				34.0	4620
ARP-4A	11/12/08	1586.71		<0.01		30.4	4440
ARP-4A	12/11/08	1587.06				28.0	4460
ARP-4A	1/15/09	1586.88				29.5	4430
ARP-4A	2/11/09	1586.83		<0.01		28.4	4630
ARP-4A	3/11/09	1586.76				28.0	4470
ARP-4A	4/14/09	1586.58				26.5	4492
ARP-4A	5/12/09	1586.51		<0.01		27.4	4640
ARP-4A	6/10/09	1586.43				25.5	4570
ARP-5A	4/17/08	1583.46				31.7	6980
ARP-5A	5/14/08	1583.41		0.04		20.5	4590
ARP-5A	6/17/08	1583.37				24.6	6410
ARP-5A	7/15/08	1583.52				26.5	8040
ARP-5A	8/11/08	1583.91		NA		26.2	5910
ARP-5A	9/9/08	1583.79				24.8	6600
ARP-5A	10/15/08	1583.75				24.7	6200
ARP-5A	11/12/08	1584.12		0.07		24.8	6110
ARP-5A	12/11/08	1584.51				24.0	6490
ARP-5A	1/15/09	1584.23				24.0	6180
ARP-5A	2/11/09	1583.95		0.06		24.0	5850
ARP-5A	3/11/09	1583.68				24.1	5950
ARP-5A	4/14/09	1583.46				21.8	6196
ARP-5A	5/12/09	1583.43		0.06		22.5	6290
ARP-5A	6/10/09	1583.46				21.0	6270
ARP-6B	4/17/08	1583.42				17.2	9750
ARP-6B	5/14/08	1583.33		0.11		15.0	9000
ARP-6B	6/17/08	1583.33				14.8	10200
ARP-6B	7/15/08	1583.60				16.9	9350
ARP-6B	8/11/08	1583.42		NA		15.6	10400
ARP-6B	9/9/08	1583.71				16.7	10000
ARP-6B	10/15/08	1583.77				9.06	9260
ARP-6B	11/12/08	1584.25		0.13		18.0	10200

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
ARP-6B	12/11/08	1584.53				19.4	9740
ARP-6B	1/15/09	1584.20				19.4	10200
ARP-6B	2/11/09	1583.95		0.12		18.6	8820
ARP-6B	3/11/09	1583.67				17.0	9380
ARP-6B	4/14/09	1583.47				14.6	9040
ARP-6B	5/12/09	1583.40		0.10		15.3	8480
ARP-6B	6/10/09	1583.45				15.5	7700
ARP-7	4/24/08	1583.61				4.78	6210
ARP-7	5/14/08	1583.58		0.03		5.02	6710
ARP-7	6/17/08	buried					
ARP-7	7/15/08	buried					
ARP-7	8/11/08	buried					
ARP-7	9/9/08	buried					
ARP-7	10/15/08	buried					
ARP-7	11/12/08	buried					
ARP-7	12/11/08	1584.66				5.41	6620
ARP-7	1/15/09	1584.33				5.98	6460
ARP-7	2/11/09	buried					
ARP-7	3/11/09	buried					
ARP-7	4/14/09	NR					
ARP-7	5/12/09	1582.41		0.04		5.83	7050
ARP-7	6/10/09	1583.13				5.65	7440
ART-1	4/7/08	1590.23				0.06	8050
ART-1	5/12/08	1590.25		0.03		0.18	6800
ART-1	6/9/08	1590.26				0.19	7050
ART-1	7/15/08	1590.38				0.10	6850
ART-1	8/11/08	1585.80		<0.01		0.13	7400
ART-1	9/15/08	1590.29				0.13	8300
ART-1	10/16/08	1590.26				0.13	7500
ART-1	11/11/08	1590.66		<0.01		0.16	7100
ART-1	12/10/08	1590.85				0.15	7780
ART-1	1/14/09	1590.78				0.15	8220
ART-1	2/12/09	1591.03		0.12		0.20	6580
ART-1	3/10/09	1590.92				0.48	7660
ART-1	4/6/09	1590.85				0.28	7960
ART-1	5/11/09	1590.54		<0.01		0.22	10300
ART-1	6/8/09	1590.55				0.21	7150
ART-2	4/7/08	1588.88				70.5	9950
ART-2	5/12/08	1588.84		0.02		68.3	9000
ART-2	6/9/08	1588.80				63.9	9200
ART-2	7/15/08	1589.01				79.5	8100
ART-2	8/11/08	1589.19		0.02		63.4	9600

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
ART-2	9/15/08	1588.09				59.0	12100
ART-2	10/16/08	1589.07				61.8	9680
ART-2	11/11/08	1589.21		0.02		60.2	8000
ART-2	12/10/08	1589.48				54.0	9760
ART-2	1/14/09	1589.39				60.3	12000
ART-2	2/12/09	1589.61		0.03		69.3	9860
ART-2	3/10/09	1589.69				136	9880
ART-2	4/6/09	1589.52				77.5	9900
ART-2	5/11/09	1589.26		0.03		71.6	12100
ART-2	6/8/09	1589.19				64.6	9150
ART-3	4/7/08	1586.67				328	9100
ART-3	5/12/08	1586.75		0.26		297	8350
ART-3	6/9/08	1586.65				306	8750
ART-3	7/15/08	1586.67				322	6950
ART-3	8/11/08	1587.01		0.26		312	9050
ART-3	9/15/08	1586.56				280	10800
ART-3	10/16/08	1586.74				295	8500
ART-3	11/11/08	1586.98		0.28		287	7700
ART-3	12/10/08	1587.22				288	8780
ART-3	1/14/09	1587.06				292	11200
ART-3	2/12/09	1587.41		0.29		309	12100
ART-3	3/10/09	1587.97				337	8680
ART-3	4/6/09	1587.62				327	8880
ART-3	5/11/09	1587.39		0.31		326	10400
ART-3	6/8/09	1587.26				292	8600
ART-4	4/7/08	1577.78				329	6330
ART-4	5/12/08	1577.44		0.25		299	6550
ART-4	6/9/08	1588.22				311	6560
ART-4	7/15/08	1588.35				325	5850
ART-4	8/11/08	1588.47		0.25		336	6410
ART-4	9/15/08	1588.50				300	5880
ART-4	10/16/08	1588.35				301	6920
ART-4	11/11/08	1588.54		0.29		306	600
ART-4	12/10/08	1588.87				318	6650
ART-4	1/14/09	1588.82				324	7380
ART-4	2/12/09	1589.05		0.35		348	7360
ART-4	3/10/09	1589.00				367	6870
ART-4	4/6/09	1588.92				362	7040
ART-4	5/11/09	1588.67		0.36		375	6390
ART-4	6/8/09	1588.61				343	7270
ART-6	4/7/08	1584.84				288	7920
ART-6	5/12/08	NR		NA		NA	NA

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
ART-6	6/2/08	1584.99					
ART-6	6/9/08	NR				340	8700
ART-6	6/23/08	1584.84					
ART-6	7/15/08	1582.42				331	7200
ART-6	8/15/08	1584.95		0.22		78.7	9550
ART-6	9/15/08	1584.43				75.0	8500
ART-6	10/16/08	1583.98				321	8000
ART-6	11/11/08	1585.34		1.60		308	7550
ART-6	12/10/08	1585.82				202	7840
ART-6	1/14/09	NR					
ART-6	2/12/09	1585.73		1.70		355	9990
ART-6	3/10/09	NR					
ART-6	4/6/09	NR					
ART-6	5/11/09	1583.83		0.78		163	7750
ART-6	6/8/09	1583.59		NA		84.0	7650
ART-7	4/7/08	1582.45				123	10800
ART-7	5/12/08	1582.16		0.64		125	9850
ART-7	6/9/08	1582.26				131	10500
ART-7	7/15/08	1582.39				136	9950
ART-7	8/11/08	1582.46		0.65		136	10800
ART-7	9/15/08	1582.10				127	8650
ART-7	10/16/08	1582.60				139	10400
ART-7	11/11/08	1582.72		0.69		137	8900
ART-7	12/10/08	1583.55				140	10100
ART-7	1/14/09	1583.32				140	12800
ART-7	2/12/09	1583.21		0.73		142	9660
ART-7	3/10/09	1584.16				134	9820
ART-7	4/6/09	1582.58				131	10020
ART-7	5/11/09	1582.56		0.66		138	11800
ART-7	6/8/09	1579.45				138	9950
ART-8	4/7/08	1584.50				223	9750
ART-8	5/12/08	1584.37		0.16		221	9600
ART-8	6/9/08	1583.70				222	10000
ART-8	7/15/08	1583.76				232	8850
ART-8	8/11/08	1586.13		0.15		234	9750
ART-8	9/15/08	1584.80				222	12100
ART-8	10/16/08	1585.20				205	9760
ART-8	11/11/08	1583.58		0.16		217	8600
ART-8	12/10/08	1583.90				227	9920
ART-8	1/14/09	1585.43				216	12700
ART-8	2/12/09	1589.77		0.18		249	10100
ART-8	3/10/09	1585.97				270	10000

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
ART-8	4/6/09	1586.24				253	9800
ART-8	5/11/09	1585.14		0.16		238	10500
ART-8	6/8/09	1585.03				216	10000
ART-9	4/7/08	1575.93				313	8020
ART-9	5/12/08	1577.18		1.40		316	7730
ART-9	6/9/08	1574.94				333	8600
ART-9	7/15/08	1576.20				348	6750
ART-9	8/11/08	1578.28		1.40		315	7650
ART-9	9/15/08	1575.88				311	8600
ART-9	10/16/08	1577.46				316	8090
ART-9	11/11/08	1580.61		1.50		314	7490
ART-9	12/10/08	1582.68				327	7960
ART-9	1/14/09	NR				336	7530
ART-9	2/12/09	1581.85		1.70		343	8990
ART-9	3/10/09	NR				346	7270
ART-9	4/6/09	1574.66				340	8120
ART-9	5/11/09	1573.71		1.70		341	7960
ART-9	6/8/09	1580.46				346	8780
CLD1-R	5/9/08	1715.14		0.49		7.71	5020
CLD1-R	5/20/09	DRY					
CLD2-R	5/9/08	1718.94		0.92		6.56	4620
CLD2-R	1/6/09	1718.32					
CLD2-R	5/20/09	1723.53		0.42		9.66	6010
DM-4	5/8/08	DRY					
DM-4	5/12/09	DRY					
DM-5	5/8/08	DRY					
DM-5	5/12/09	1602.18					
H-11	5/9/08	1796.69				<0.004	820
H-11	6/4/09	1800.00				<0.004	634
H-28A	5/6/08	1692.18		<0.01		11.2	8100
H-28A	6/4/09	1693.20		<0.01		<0.4	9050
H-48	5/10/08	1660.73				0.23	20300
H-48	5/14/09	1655.44		<0.01		0.64	22900
H-55	5/10/08	1705.43				<0.004	3700
H-55	5/19/09	1710.99				0.02	3370
H-58A	5/14/09	1663.99		<0.01		3.50	11800
HM-2	5/8/08	1579.27				1.92	4220
HM-2	5/8/09	1562.20				2.75	4240
HM-2	5/26/09	1568.00				2.52	4240
HMW-13	5/8/08	1579.17				<0.004	1890
HMW-13	5/11/09	1575.91				<0.004	2460
HMW-14	5/8/08	1580.88				0.02	1900

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
HMW-14	5/8/09	1578.62				9.89	6700
HMW-15	5/8/08	1600.90				<0.004	3390
HMW-15	5/11/09	1601.10				0.01	3450
HMW-16	5/8/08	1611.71				19.7	5780
HMW-16	5/12/09	1611.93				17.4	5990
HMW-9	5/7/08	1531.42				1.37	3730
HMW-9	5/7/09	1526.83				5.06	5250
HSW-1	5/8/08	1587.83				0.02	3430
HSW-1	5/8/09	1577.90				4.33	5170
I-AA	5/6/08	1721.32		0.08		120	3280
I-AA	8/5/08	1721.44		0.07		129	3340
I-AA	11/5/08	1721.75		0.07		120	3460
I-AA	2/3/09	1721.48		0.08		115	3560
I-AA	5/5/09	1720.99		0.08		114	3490
I-A-R	4/18/08	1716.97					
I-A-R	5/6/08	1715.52		1.10		3000	6110
I-A-R	6/20/08	1715.81					
I-A-R	7/22/08	1715.61					
I-A-R	8/5/08	1714.91		1.20		3070	7400
I-A-R	9/11/08	1715.24					
I-A-R	10/16/08	1715.91					
I-A-R	11/3/08	1715.63		0.95		2960	6160
I-A-R	12/8/08	1715.03					
I-A-R	1/16/09	1715.29					
I-A-R	2/3/09	1715.88					
I-A-R	3/12/09	1715.99		1.10		3090	7360
I-A-R	4/17/09	1715.48					
I-A-R	5/5/09	1716.20		0.76		2570	6170
I-A-R	6/9/09	1715.26					
I-B	4/18/08	1709.81					
I-B	5/6/08	1709.79		0.35		825	4610
I-B	6/20/08	1709.78					
I-B	7/22/08	1709.77					
I-B	8/5/08	1709.03		0.32		766	4490
I-B	9/11/08	1709.69					
I-B	10/16/08	1709.78					
I-B	11/3/08	1710.91		0.30		928	4860
I-B	12/8/08	1712.73					
I-B	1/16/09	1710.29					
I-B	2/3/09	1710.29		0.28		1480	5000
I-B	3/12/09	1709.88					
I-B	4/17/09	1709.97					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
I-B	5/5/09	1712.44		0.30		755	4680
I-B	6/9/09	1709.99					
I-C	4/18/08	1708.19					
I-C	5/6/08	1708.72		5.20		890	6670
I-C	6/20/08	1709.13					
I-C	7/22/08	1708.19					
I-C	8/5/08	1712.18		5.40		960	6350
I-C	9/11/08	1709.32					
I-C	10/16/08	1710.32					
I-C	11/3/08	1709.16		4.80		891	7570
I-C	12/8/08	1708.14					
I-C	1/16/09	1708.13					
I-C	2/3/09	1724.28		4.60		886	6960
I-C	3/12/09	1709.73					
I-C	4/17/09	1708.23					
I-C	5/5/09	1708.21		4.60		920	7170
I-C	6/9/09	1709.16					
I-D	4/18/08	1710.55					
I-D	5/6/08	1710.49		9.80		779	9550
I-D	6/20/08	1721.21					
I-D	7/22/08	1721.16					
I-D	8/5/08	1706.22		9.50		826	7800
I-D	9/11/08	1720.69					
I-D	10/16/08	1721.27					
I-D	11/3/08	1706.09		9.20		745	9040
I-D	12/8/08	1705.94					
I-D	1/16/09	1719.36					
I-D	2/3/09	1706.57		10.0		705	7340
I-D	3/12/09	1705.93					
I-D	4/17/09	1706.09					
I-D	5/5/09	1706.35		9.00		744	9360
I-D	6/9/09	1705.98					
I-E	4/18/08	1720.21					
I-E	5/6/08	1707.96		13.0		782	9550
I-E	6/20/08	1707.91					
I-E	7/22/08	1707.95					
I-E	8/5/08	1707.38		13.0		752	9050
I-E	9/11/08	1707.37					
I-E	10/16/08	1707.82					
I-E	11/3/08	1707.89		12.0		684	9920
I-E	12/8/08	1707.81					
I-E	1/16/09	1707.82					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
I-E	2/3/09	1707.87		12.0		646	9080
I-E	3/12/09	1707.86					
I-E	4/17/09	1707.93					
I-E	5/5/09	1707.98		12.0		651	9600
I-E	6/9/09	1707.90					
I-F	4/18/08	1709.49					
I-F	5/6/08	1711.22		23.0		1440	13700
I-F	6/20/08	1720.70					
I-F	7/22/08	1712.57					
I-F	8/5/08	1711.68		24.0		1520	14400
I-F	9/11/08	1717.94					
I-F	10/16/08	1716.31					
I-F	11/3/08	1715.68		23.0		1470	13900
I-F	12/8/08	1716.46					
I-F	1/16/09	1711.97					
I-F	2/3/09	1715.54		23.0		1310	12300
I-F	3/12/09	1709.58					
I-F	4/17/09	1712.97					
I-F	5/5/09	1710.78		22.0		1360	10200
I-F	6/9/09	1712.76					
I-G	4/18/08	1720.93					
I-G	5/6/08	1721.21					
I-G	6/20/08	1721.48					
I-G	7/22/08	1710.88					
I-G	8/5/08	1720.05		27		2210	19900
I-G	9/11/08	1721.39					
I-G	10/16/08	1720.09					
I-G	11/3/08	1711.17		28		1960	18500
I-G	12/8/08	1711.24					
I-G	1/16/09	1712.86					
I-G	2/3/09	1710.57		27		1960	13900
I-G	3/12/09	1716.06					
I-G	4/17/09	1716.05					
I-G	5/5/09	1710.89		27		1830	12900
I-G	6/9/09	1714.81					
I-H	4/18/08	1709.11					
I-H	5/6/08	1708.49		33.0		1640	17200
I-H	6/20/08	1709.09					
I-H	7/22/08	1709.07					
I-H	8/5/08	1709.16		32.0		1740	18500
I-H	9/11/08	1709.21					
I-H	10/16/08	1709.09					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
I-H	11/3/08	1709.26		30.0		1660	16000
I-H	12/8/08	1708.45					
I-H	1/16/09	1709.11					
I-H	2/3/09	1708.85		32.0		1690	14800
I-H	3/12/09	1709.14					
I-H	4/17/09	1709.05					
I-H	5/5/09	1709.09		29.0		1160	13000
I-H	6/9/09	1709.11					
I-I	4/18/08	1720.36					
I-I	5/6/08	1720.37		22.0		949	12100
I-I	6/20/08	1720.33					
I-I	7/22/08	1720.41					
I-I	8/5/08	1720.43		22.0		1110	12100
I-I	9/11/08	1720.42					
I-I	10/16/08	1720.40					
I-I	11/3/08	1720.75		23.0		1070	13100
I-I	12/12/08	1720.82					
I-I	1/16/09	1720.83					
I-I	2/3/09	1720.75		22.0		1080	12500
I-I	3/12/09	1720.86					
I-I	4/17/09	1720.86					
I-I	5/6/09	1721.39		20.0		1030	11400
I-I	6/9/09	1721.07					
I-J	4/18/08	1708.12					
I-J	5/6/08	1708.12		3.00		217	6400
I-J	6/20/08	1708.01					
I-J	7/22/08	1719.43					
I-J	8/5/08	1717.02		3.00		257	6630
I-J	9/11/08	1707.64					
I-J	10/16/08	1711.02					
I-J	11/3/08	1717.92		3.30		257	6540
I-J	12/12/08	1715.23					
I-J	1/16/09	1719.13					
I-J	2/3/09	1717.39		3.30		243	6350
I-J	3/12/09	1708.31					
I-J	4/17/09	1718.11					
I-J	5/6/09	1719.18		3.20		277	6570
I-J	6/9/09	1713.59					
I-K	4/18/08	1718.72					
I-K	5/6/08	1716.08		1.20		82	5810
I-K	6/20/08	1716.67					
I-K	7/22/08	1717.87					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
I-K	8/5/08	1715.34		1.20		94	5900
I-K	9/11/08	1715.37					
I-K	10/16/08	1715.45					
I-K	11/3/08	1714.06		1.40		94	5950
I-K	12/12/08	1717.51					
I-K	1/16/09	1718.47					
I-K	2/3/09	1717.27		1.30		97	4990
I-K	3/12/09	1714.10					
I-K	4/17/09	1714.98					
I-K	5/6/09	1717.77		1.40		110	5960
I-K	6/9/09	1717.72					
I-L	4/18/08	1716.37					
I-L	5/6/08	1716.55		1.30		1260	5520
I-L	6/20/08	1716.51					
I-L	7/22/08	1711.72					
I-L	8/5/08	1711.38		1.40		1560	5380
I-L	9/11/08	1716.56					
I-L	10/16/08	1714.37					
I-L	11/3/08	1713.88		0.91		1940	6980
I-L	12/8/08	1714.49					
I-L	1/16/09	1718.03					
I-L	2/3/09	1716.67		0.98		1760	7220
I-L	3/12/09	1711.84					
I-L	4/17/09	1713.88					
I-L	5/5/09	1711.49		1.00		1740	6370
I-L	6/9/09	1712.61					
I-M	4/18/08	1712.08					
I-M	5/6/08	1711.84		12.0		834	9100
I-M	6/20/08	1712.18					
I-M	7/22/08	1712.28					
I-M	8/5/08	1711.79		11.0		795	7900
I-M	9/11/08	1711.84					
I-M	10/16/08	1711.83					
I-M	11/3/08	1711.66		11.0		750	9420
I-M	12/8/08	1711.77					
I-M	1/16/09	1712.21					
I-M	2/3/09	1711.22		11.0		752	9020
I-M	3/12/09	1711.23					
I-M	4/17/09	1711.61					
I-M	5/5/09	1712.12		10.0		766	7900
I-M	6/9/09	1711.41					
I-N	4/18/08	1714.41					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
I-N	5/6/08	1713.78		15.0		1100	11800
I-N	6/20/08	1718.38					
I-N	7/22/08	1716.64					
I-N	8/5/08	1712.12		13.0		1150	7950
I-N	9/11/08	1718.42					
I-N	10/16/08	1717.66					
I-N	11/3/08	1717.58		13.0		987	11000
I-N	12/8/08	1716.91					
I-N	1/16/09	1716.74					
I-N	2/3/09	1716.67		14.0		1100	9800
I-N	3/12/09	1711.09					
I-N	4/17/09	1715.96					
I-N	5/5/09	1711.75		13.0		1160	11600
I-N	6/9/09	1715.04					
I-O	4/18/08	1714.89					
I-O	5/6/08	1717.06		32.0		1720	16600
I-O	6/20/08	1714.61					
I-O	7/22/08	1714.53					
I-O	8/5/08	1717.08		33.0		1800	16100
I-O	9/11/08	1714.09					
I-O	10/16/08	1714.66					
I-O	11/3/08	1715.08		30.0		1520	15600
I-O	12/8/08	1715.85					
I-O	1/16/09	1716.58					
I-O	2/3/09	1717.66		31.0		1770	14000
I-O	3/12/09	1716.73					
I-O	4/17/09	1714.67					
I-O	5/5/09	1715.12		29.0		1670	16900
I-O	6/9/09	1719.56					
I-P	4/18/08	1709.34					
I-P	5/6/08	1708.08		31.0		1810	15600
I-P	6/20/08	1709.33					
I-P	7/22/08	1708.91					
I-P	8/5/08	1708.79		31.0		1770	12400
I-P	9/11/08	1709.12					
I-P	10/16/08	1708.91					
I-P	11/3/08	1710.08		29.0		1550	14000
I-P	12/8/08	1709.14					
I-P	1/16/09	1709.24					
I-P	2/3/09	1711.23		30.0		1660	14300
I-P	3/12/09	1709.84					
I-P	4/17/09	1709.97					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
I-P	5/5/09	1709.42		29.0		1690	18400
I-P	6/9/09	1712.44					
I-Q	4/18/08	1712.68					
I-Q	5/6/08	1720.29		17.0		1000	11600
I-Q	6/20/08	1712.49					
I-Q	7/22/08	1712.76					
I-Q	8/5/08	1712.24		30.0		1640	18600
I-Q	9/11/08	1712.32					
I-Q	10/16/08	1712.41					
I-Q	11/3/08	1720.69		14.0		994	11000
I-Q	12/8/08	1714.72					
I-Q	1/16/09	1712.77					
I-Q	2/3/09	1713.08		31.0		1630	17100
I-Q	3/12/09	1713.64					
I-Q	4/17/09	1713.61					
I-Q	5/5/09	1713.59		31.0		1540	14800
I-Q	6/9/09	1712.39					
I-R	4/18/08	1710.16					
I-R	5/6/08	1710.63		0.72		2470	7670
I-R	6/20/08	1710.24					
I-R	7/22/08	1709.64					
I-R	8/5/08	1709.77		0.80		2210	7170
I-R	9/11/08	1709.72					
I-R	10/16/08	1709.80					
I-R	11/3/08	1718.63		0.50		2610	7260
I-R	12/8/08	1717.34					
I-R	1/16/09	1717.08					
I-R	2/3/09	1717.00		0.59		2170	7060
I-R	3/12/09	1717.09					
I-R	4/17/09	1716.96					
I-R	5/5/09	1715.74		0.57		2110	6850
I-R	6/9/09	1716.63					
I-S	4/18/08	1705.79					
I-S	5/6/08	1706.01		2.50		907	5420
I-S	6/20/08	1705.69					
I-S	7/22/08	1705.76					
I-S	8/5/08	1705.10		2.90		897	4950
I-S	9/11/08	1706.04					
I-S	10/16/08	1705.95					
I-S	11/3/08	1705.92		2.00		947	5630
I-S	12/8/08	1705.96					
I-S	1/16/09	1705.64					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
I-S	2/3/09	1705.92		2.30		933	6060
I-S	3/12/09	1705.64					
I-S	4/17/09	1705.64					
I-S	5/5/09	1705.62		2.40		913	6100
I-S	6/9/09	1705.60					
I-T	4/18/08	1712.63					
I-T	5/6/08	1708.88		32.0		1870	18500
I-T	6/20/08	1708.25					
I-T	7/22/08	1708.38					
I-T	8/5/08	1718.31		31.0		2050	19500
I-T	9/11/08	1708.75					
I-T	10/16/08	1707.90					
I-T	11/3/08	1708.20		32.0		1790	18800
I-T	12/8/08	1708.39					
I-T	1/16/09	1713.65					
I-T	2/3/09	1714.15		31.0		1920	17700
I-T	3/12/09	1708.07					
I-T	4/17/09	1708.13					
I-T	5/5/09	1708.15		31.0		1890	21100
I-T	6/9/09	1708.14					
I-U	4/18/08	1707.65					
I-U	5/6/08	1706.66		32.0		1900	19100
I-U	6/20/08	1707.25					
I-U	7/22/08	1707.19					
I-U	8/5/08	1707.17		30.0		1990	20100
I-U	9/11/08	1707.16					
I-U	10/16/08	1707.26					
I-U	11/3/08	1707.66		30.0		1750	18800
I-U	12/12/08	1707.06					
I-U	1/16/09	1713.20					
I-U	2/3/09	1712.95		21.0		1080	9680
I-U	3/12/09	1707.66					
I-U	4/17/09	1707.86					
I-U	5/5/09	1709.29		29.0		1860	17700
I-U	6/9/09	1707.68					
I-V	4/18/08	1718.16					
I-V	5/6/08	1718.05		24.0		1720	9900
I-V	6/20/08	1718.06					
I-V	7/22/08	1718.26					
I-V	8/5/08	1718.45		24.0		1980	10000
I-V	9/11/08	1718.20					
I-V	10/16/08	1718.22					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
I-V	11/3/08	1718.92		24.0		1840	14800
I-V	12/12/08	1718.84					
I-V	1/16/09	1719.01					
I-V	2/3/09	1719.03		22.0		1790	11100
I-V	3/12/09	1719.22					
I-V	4/17/09	1719.12					
I-V	5/6/09	1719.09		21.0		1870	13500
I-V	6/9/09	1719.21					
I-W	4/18/08	1720.61					
I-W	5/6/08	1720.77					
I-W	6/20/08	1720.61					
I-W	7/22/08	1720.63					
I-W	8/5/08	1720.69					
I-W	9/11/08	1720.71					
I-W	10/16/08	1720.63					
I-W	11/3/08	1720.91					
I-W	12/8/08	1720.83					
I-W	1/16/09	1720.81					
I-W	2/3/09	1720.59					
I-W	3/12/09	1720.87					
I-W	4/17/09	1720.86					
I-W	5/5/09	1720.94					
I-W	6/9/09	1720.97					
I-X	4/18/08	1718.05					
I-X	5/6/08	1718.08					
I-X	6/20/08	1720.46					
I-X	7/22/08	1718.14					
I-X	8/5/08	1717.99					
I-X	9/11/08	1719.54					
I-X	10/16/08	1719.48					
I-X	11/3/08	1718.26					
I-X	12/8/08	1718.15					
I-X	1/16/09	1718.11					
I-X	2/3/09	1718.19					
I-X	3/12/09	1717.92					
I-X	4/17/09	1718.19					
I-X	5/5/09	1718.04					
I-X	6/9/09	1718.16					
I-Y	4/18/08	1721.25					
I-Y	5/6/08	1720.80					
I-Y	6/20/08	1721.21					
I-Y	7/22/08	1721.28					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
I-Y	8/5/08	1721.09					
I-Y	9/11/08	1721.17					
I-Y	10/16/08	1721.19					
I-Y	11/3/08	1721.83					
I-Y	12/8/08	1721.59					
I-Y	1/16/09	1721.54					
I-Y	2/3/09	1721.44					
I-Y	3/12/09	1720.93					
I-Y	4/17/09	1721.57					
I-Y	5/5/09	1721.45					
I-Y	6/9/09	1721.45					
I-Z	4/18/08	1709.76					
I-Z	5/6/08	1709.91		11.0		575	9400
I-Z	6/20/08	1711.06					
I-Z	7/22/08	1712.52					
I-Z	8/5/08	1712.86		12.0		606	8500
I-Z	9/11/08	1711.10					
I-Z	10/16/08	1711.84					
I-Z	11/3/08	1710.56		12.0		534	9390
I-Z	12/12/08	1710.36					
I-Z	1/16/09	1709.87					
I-Z	2/3/09	1710.48		12.0		518	8180
I-Z	3/12/09	1712.84					
I-Z	4/17/09	1712.12					
I-Z	5/6/09	1715.47		11.0		519	8480
I-Z	6/9/09	1710.84					
L-635	4/16/08	1605.37				<0.004	7360
L-635	5/13/08	1605.35		<0.01		<0.004	6800
L-635	6/17/08	1605.32				<0.004	7700
L-635	7/16/08	1605.40				<0.004	6400
L-635	8/14/08	1605.62		<0.01		<0.004	7850
L-635	9/9/08	1605.47				<0.004	7500
L-635	10/14/08	1605.44				0.19	7320
L-635	11/11/08	1605.45		<0.01		0.02	7530
L-635	12/9/08	1605.44				<0.004	7500
L-635	1/13/09	1605.53					9860
L-635	2/10/09	1605.70					7800
L-635	3/10/09	NR					
L-635	4/14/09	NR					
L-635	5/13/09	1605.39		<0.01		0.01	7760
L-635	6/9/09	1605.45					6200
L-637	4/16/08	1611.06				<0.004	6620

Table A-1

Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009

Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
L-637	5/13/08	1611.02		<0.01		<0.004	6400
L-637	6/17/08	1611.01				<0.004	6940
L-637	7/16/08	1611.04				<0.004	5950
L-637	8/14/08	1611.15		<0.01		0.02	7100
L-637	9/9/08	1610.98				0.03	6700
L-637	10/14/08	1610.92				0.05	6700
L-637	11/11/08	1610.94		<0.01		0.01	8440
L-637	12/10/08	1611.08				<0.004	6740
L-637	1/13/09	1611.17					
L-637	2/10/09	1611.34					
L-637	3/10/09	NR					
L-637	4/14/09	NR					
L-637	5/12/09	NR					
L-637	6/9/09	NR					
LK-3	5/8/08	1619.13				0.03	2880
LK-3	5/20/09	destroyed					
M-2A	5/8/08	1739.04		20.0		486	11400
M-2A	5/5/09	1739.87		20.0		514	11300
M-5A	5/6/08	1712.76		<0.01		24.1	11100
M-5A	8/5/08	1715.06		<0.01		<0.004	11300
M-5A	5/5/09	1713.26		<0.01		0.40	14800
M-6A	5/6/08	1694.44		<0.01		27.2	7050
M-6A	8/5/08	1694.25					8100
M-6A	6/10/09	1694.97		<0.02		21.4	5600
M-7B	5/6/08	1696.69		<0.01		55.2	8100
M-7B	8/5/08	1696.38					9300
M-7B	6/8/09	NR		<0.01		52.4	8950
M-10	4/18/08	1788.49					
M-10	5/8/08	1788.78	233	0.99	2.5	26.8	3050
M-10	6/20/08	1788.72					
M-10	7/22/08	1788.72					
M-10	8/7/08	1788.76		0.81		27.5	3260
M-10	9/11/08	1788.78					
M-10	10/16/08	1788.73					
M-10	11/5/08	1787.93		0.84		23.6	3080
M-10	12/12/08	1789.08					
M-10	1/19/09	1789.42					
M-10	2/4/09	1789.86		0.97		21.9	2600
M-10	3/13/09	1789.34					
M-10	4/17/09	1789.30					
M-10	5/7/09	1789.33	200	0.62	<0.1	23.9	3210
M-10	6/11/09	1789.37					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-11	4/18/08	1772.18					
M-11	5/8/08	1772.42	470	2.80	4.0	34.3	3350
M-11	6/20/08	1772.60					
M-11	7/22/08	1772.89					
M-11	8/7/08	1773.12		3.10		43.1	3260
M-11	9/11/08	1772.74					
M-11	10/16/08	1772.82					
M-11	11/5/08	1773.28		3.60		50.4	3520
M-11	12/12/08	1773.01					
M-11	1/19/09	1772.96					
M-11	2/4/09	1773.01		3.80		57.9	3750
M-11	3/13/09	1773.04					
M-11	4/17/09	1772.98					
M-11	5/6/09	1773.27	649	3.90	<0.1	48.6	3580
M-11	6/11/09	1773.26					
M-12A	5/7/08	1771.55	2770	14.0	17.0	308	6650
M-12A	8/6/08	1772.18		13.0		354	8250
M-12A	11/5/08	1772.38		13.0		289	8100
M-12A	2/4/09	1772.24		11.0		259	6210
M-12A	5/6/09	1772.50	2040	10.0	<0.1	254	7340
M-13	5/7/08	1769.24	337	1.30	5.3	21.0	3310
M-13	5/6/09	1769.85	289	0.84	4.4	20.1	3260
M-14A	4/18/08	1727.56					
M-14A	5/8/08	1727.65		0.06		28.2	3110
M-14A	6/20/08	1727.49					
M-14A	7/22/08	1727.58					
M-14A	8/7/08	1727.61		0.06		27.9	3230
M-14A	9/11/08	1727.37					
M-14A	10/16/08	1727.68					
M-14A	11/5/08	1727.90		0.06		26.0	3230
M-14A	12/12/08	1727.88					
M-14A	1/19/09	1728.22					
M-14A	2/4/09	1728.15		0.05		25.6	3210
M-14A	3/13/09	1728.12					
M-14A	4/17/09	1727.94					
M-14A	5/8/09	1727.82		0.05		24.7	3100
M-14A	6/11/09	1728.68					
M-17A	4/18/08	1735.42					
M-17A	5/8/08	1735.52		30.0		826	9500
M-17A	6/20/08	1735.63					
M-17A	7/22/08	1735.87					
M-17A	8/7/08	1735.89		31.0		857	13600

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-17A	9/11/08	1735.51					
M-17A	10/16/08	1735.86					
M-17A	11/5/08	1735.88		29.0		824	16600
M-17A	12/12/08	1735.86					
M-17A	1/19/09	1735.92					
M-17A	2/4/09	1735.88		30.0		873	13800
M-17A	3/13/09	1736.10					
M-17A	4/17/09	1736.08					
M-17A	5/8/09	1736.07		27.0		895	12400
M-17A	6/11/09	1736.20					
M-18	4/18/08	1710.79					
M-18	5/8/08	1710.71					
M-18	6/20/08	1710.67					
M-18	7/22/08	1710.63					
M-18	8/7/08	1710.56					
M-18	9/11/08	1710.47					
M-18	10/16/08	1710.62					
M-18	11/5/08	1710.69					
M-18	12/12/08	1710.57					
M-18	1/19/09	1710.59					
M-18	2/4/09	1710.69					
M-18	3/13/09	1710.66					
M-18	4/17/09	1710.61					
M-18	5/11/09	1710.63					
M-18	6/11/09	1710.61					
M-19	4/18/08	1731.49					
M-19	5/8/08	1731.77		0.33		1.40	3640
M-19	6/20/08	1731.49					
M-19	7/22/08	1732.54					
M-19	8/7/08	1732.15		0.35		1.88	3940
M-19	9/11/08	1731.41					
M-19	10/16/08	1732.49					
M-19	11/5/08	1732.03		0.52		2.52	5040
M-19	12/12/08	1732.06					
M-19	1/19/09	1732.36					
M-19	2/4/09	1732.38		0.43		2.17	5720
M-19	3/13/09	1732.78					
M-19	4/17/09	1732.60					
M-19	5/6/09	1731.35		0.35		1.74	3830
M-19	6/11/09	1732.31					
M-21	5/7/08	1750.30		1.4		28	3710
M-21	5/6/09	1750.85		0.84		25.0	3680

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-22A	4/18/08	1728.44					
M-22A	5/8/08	1728.49		34.0		1730	18000
M-22A	6/20/08	1728.45					
M-22A	7/22/08	1729.09					
M-22A	8/7/08	1728.79		35.0		1810	15200
M-22A	9/11/08	1728.49					
M-22A	10/16/08	1728.39					
M-22A	11/5/08	1728.89		34.0		1730	19500
M-22A	12/12/08	1728.89					
M-22A	1/19/09	1729.04					
M-22A	2/4/09	1729.07		32.0		1740	16200
M-22A	3/13/09	1729.17					
M-22A	4/17/09	1729.19					
M-22A	5/7/09	1729.15		32.0		1750	10800
M-22A	6/11/09	1729.18					
M-23	4/18/08	1691.51					
M-23	5/8/08	1691.45	433	0.73	53.0	487	4430
M-23	6/20/08	1691.37					
M-23	7/22/08	1691.34					
M-23	8/7/08	1691.84		0.77		493	5260
M-23	9/11/08	1691.04					
M-23	10/16/08	1691.51					
M-23	11/5/08	NR					
M-23	12/12/08	NR					
M-23	1/19/09	NR					
M-23	2/4/09	1691.47		0.73		245	<10
M-23	3/13/09	1691.83					
M-23	4/17/09	1691.41					
M-23	5/4/09	1691.34	359	0.71	61.7	476	5120
M-23	6/11/09	1691.17					
M-25	4/18/08	1726.14					
M-25	5/8/08	1726.11	3490	13	64	413	9000
M-25	6/20/08	1726.14					
M-25	7/22/08	1726.26					
M-25	8/7/08	1726.29		13		452	9300
M-25	9/11/08	1726.11					
M-25	10/16/08	1726.17					
M-25	11/5/08	1726.25		12		427	9400
M-25	12/12/08	1726.19					
M-25	1/19/09	1726.29					
M-25	2/4/09	1726.32		13		441	9080
M-25	3/13/09	1726.49					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-25	4/17/09	1726.37					
M-25	5/5/09	1726.35	3370	12	<0.1	444	9360
M-25	6/11/09	1726.31					
M-29	6/16/09	1772.80	6.5	0.08	7.0	2.79	4520
M-31A	4/18/08	1750.54					
M-31A	5/8/08	1750.88		11.0		1280	8900
M-31A	6/20/08	1751.58					
M-31A	7/22/08	1751.58					
M-31A	8/7/08	1751.48		11.0		1470	9200
M-31A	9/11/08	1751.48					
M-31A	10/16/08	NR					
M-31A	11/5/08	1751.70		11.0		1310	8490
M-31A	12/12/08	1751.51					
M-31A	1/19/09	1751.35					
M-31A	2/4/09	1751.25		10.0		1280	8600
M-31A	3/13/09	1752.05					
M-31A	4/17/09	1752.04					
M-31A	5/6/09	1752.74		13.0		1270	7810
M-31A	6/11/09	1753.28					
M-33	5/7/08	1750.78		0.45		192	5480
M-33	5/6/09	1751.99		0.28		218	4020
M-34	5/12/08	1739.17		15.0		1570	8700
M-34	8/6/08	1739.72		15.0		1730	8150
M-34	11/5/08	1739.88		14.0		1450	9640
M-34	2/4/09	1739.79		15.0		1520	10300
M-34	5/6/09	1740.12		14.0		1500	9200
M-35	4/18/08	1739.89					
M-35	5/8/08	1739.96		2.80		130	3360
M-35	6/20/08	1740.37					
M-35	7/22/08	1740.71					
M-35	8/7/08	1740.77		7.60		313	5860
M-35	9/11/08	1739.94					
M-35	10/16/08	1740.64					
M-35	11/5/08	1740.93		6.50		275	5540
M-35	12/12/08	1740.86					
M-35	1/19/09	1740.85					
M-35	2/4/09	1740.84		5.30		203	3690
M-35	3/13/09	1740.98					
M-35	4/17/09	1741.04					
M-35	5/6/09	1741.06		5.20		212	4500
M-35	6/11/09	1741.29					
M-36	4/18/08	1727.01					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-36	5/8/08	1727.10	8150	35.0	55.2	1510	16700
M-36	6/20/08	1727.04					
M-36	7/22/08	1727.19					
M-36	8/7/08	1727.26		33.0		1590	13400
M-36	9/11/08	1726.59					
M-36	10/16/08	1727.41					
M-36	11/5/08	1727.33		34.0		1500	19500
M-36	12/12/08	1727.35					
M-36	1/19/09	1727.44					
M-36	2/4/09	1727.45		35.0		1490	17100
M-36	3/13/09	1727.59					
M-36	4/17/09	1727.60					
M-36	5/7/09	1727.52	7040	32.0	52.7	1560	11700
M-36	6/11/09	1727.56					
M-37	4/18/08	1728.33					
M-37	5/8/08	1728.26	19.2	0.03	119.0	2200	4930
M-37	6/20/08	1728.13					
M-37	7/22/08	1728.39					
M-37	8/7/08	1728.51		0.03		2100	6070
M-37	9/11/08	1727.73					
M-37	10/16/08	1728.58					
M-37	11/5/08	1728.61		0.02		1770	4600
M-37	12/12/08	1728.71					
M-37	1/19/09	1728.82					
M-37	2/4/09	1728.87		0.03		1830	5470
M-37	3/13/09	1729.07					
M-37	4/17/09	1728.94					
M-37	5/5/09	1728.82	16.7	0.03	130.0	1690	4360
M-37	6/11/09	1728.64					
M-38	4/18/08	1728.20					
M-38	5/8/08	1728.27		28.0		952	11800
M-38	6/20/08	1728.21					
M-38	7/22/08	1728.34					
M-38	8/7/08	1728.36		29.0		1140	13500
M-38	9/11/08	1718.75					
M-38	10/16/08	1728.32					
M-38	11/5/08	1728.36		28.0		944	16900
M-38	12/12/08	1728.34					
M-38	1/19/09	1728.31					
M-38	2/4/09	1728.43		29.0		963	13500
M-38	3/13/09	1728.60					
M-38	4/17/09	1728.52					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-38	5/7/09	1728.36		26.0		1100	10200
M-38	6/11/09	1728.48					
M-39	4/18/08	1728.67					
M-39	5/8/08	1728.58	1480	4.90	16.0	439	6870
M-39	6/20/08	1728.74					
M-39	7/22/08	1728.84					
M-39	8/7/08	1729.05		5.20		490	6180
M-39	9/11/08	1727.92					
M-39	10/16/08	1728.88					
M-39	11/5/08	1729.10		5.70		458	7790
M-39	12/12/08	1729.15					
M-39	1/19/09	1729.29					
M-39	2/4/09	1729.28		5.00		445	8040
M-39	3/13/09	1729.45					
M-39	4/17/09	1729.42					
M-39	5/6/09	1729.41	1380	4.70	<0.1	453	6940
M-39	5/19/09	NR	1370	4.70	10.0	434	7760
M-39	6/11/09	1729.37					
M-44	4/18/08	1678.63					
M-44	5/8/08	1678.59		0.86		644	8070
M-44	6/20/08	1678.39					
M-44	7/22/08	1678.16					
M-44	8/7/08	1678.14		0.84		720	7930
M-44	9/11/08	1678.24					
M-44	10/16/08	1678.12					
M-44	11/5/08	1677.69		0.83		676	8140
M-44	12/12/08	1677.68					
M-44	1/19/09	1677.65					
M-44	2/4/09	1677.53		0.84		646	9080
M-44	3/13/09	1677.77					
M-44	4/17/09	1677.67					
M-44	5/4/09	1677.64		0.78		683	8520
M-44	6/11/09	1677.59					
M-48	4/18/08	NR					
M-48	5/8/08	1693.04	491	1.50	17.8	227	3120
M-48	6/20/08	1692.76					
M-48	7/22/08	1692.69					
M-48	8/7/08	1692.59		1.50		225	3270
M-48	9/11/08	1692.81					
M-48	10/16/08	1692.61					
M-48	11/5/08	1692.60		1.20		222	2940
M-48	12/12/08	1692.54					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-48	1/19/09	1692.46					
M-48	2/4/09	1692.42		1.20		194	2960
M-48	3/13/09	1692.44					
M-48	4/17/09	1692.25					
M-48	5/5/09	1691.73					
M-48	6/11/09	1691.61					
M-50	4/18/08	1748.91					
M-50	5/8/08	1749.13		31		922	14300
M-50	6/20/08	1749.42					
M-50	7/22/08	1749.41					
M-50	8/7/08	1749.32		32		1140	14800
M-50	9/11/08	1749.26					
M-50	10/16/08	1748.94					
M-50	11/5/08	1749.29		32		1070	16100
M-50	12/12/08	1749.08					
M-50	1/19/09	1749.08					
M-50	2/4/09	1749.12		32		1170	13500
M-50	3/13/09	1749.32					
M-50	4/17/09	1749.30					
M-50	5/5/09	1749.47		38		1200	15100
M-50	6/11/09	1749.71					
M-52	5/7/08	1761.25		7.1		806	6960
M-52	11/5/08	1761.94		6.3		940	7560
M-52	2/4/09	1761.70		6.1		795	6240
M-52	5/5/09	1762.54		5.6		864	6930
M-55	4/18/08	1721.39					
M-55	5/8/08	1721.09					
M-55	6/20/08	1721.12					
M-55	7/22/08	1721.21					
M-55	8/7/08	1720.87					
M-55	9/11/08	1721.34					
M-55	10/16/08	1721.13					
M-55	11/5/08	1720.76					
M-55	12/8/08	1720.70					
M-55	1/19/09	1720.74					
M-55	2/4/09	1720.76					
M-55	3/13/09	1720.80					
M-55	4/17/09	1720.82					
M-55	5/5/09	1720.58					
M-55	6/11/09	1720.64					
M-56	4/18/08	1719.39					
M-56	5/8/08	1721.19					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-56	6/20/08	1720.34					
M-56	7/22/08	1719.36					
M-56	8/7/08	1719.26					
M-56	9/11/08	1720.45					
M-56	10/16/08	1720.92					
M-56	11/5/08	1719.94					
M-56	12/8/08	1719.29					
M-56	1/19/09	1719.18					
M-56	2/4/09	1719.22					
M-56	3/13/09	1719.01					
M-56	4/17/09	1719.17					
M-56	5/5/09	1719.18					
M-56	6/11/09	1719.14					
M-57A	4/18/08	1723.23					
M-57A	5/8/08	1723.32		0.08		27.2	3160
M-57A	6/20/08	1723.33					
M-57A	7/22/08	1723.39					
M-57A	8/7/08	1723.49		0.08		26.1	3090
M-57A	9/11/08	1722.68					
M-57A	10/16/08	NR					
M-57A	11/5/08	1723.69		0.07		26.8	3120
M-57A	12/8/08	1723.59					
M-57A	1/19/09	1723.59					
M-57A	2/4/09	1723.67		0.07		25.6	3390
M-57A	3/13/09	1723.63					
M-57A	4/17/09	1723.52					
M-57A	5/5/09	1723.42		0.08		26.2	3260
M-57A	6/11/09	1723.27					
M-58	4/18/08	1720.73					
M-58	5/8/08	1721.06					
M-58	6/20/08	1720.68					
M-58	7/22/08	1720.74					
M-58	8/7/08	1720.81					
M-58	9/11/08	1720.76					
M-58	10/16/08	1720.78					
M-58	11/5/08	1720.89					
M-58	12/8/08	1720.71					
M-58	1/19/09	1720.93					
M-58	2/4/09	1720.98					
M-58	3/13/09	1720.99					
M-58	4/17/09	1721.03					
M-58	5/5/09	1721.04					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-58	6/11/09	1721.09					
M-60	4/18/08	1719.00					
M-60	5/8/08	1720.05					
M-60	6/20/08	1718.70					
M-60	7/22/08	1718.35					
M-60	8/7/08	1718.38					
M-60	9/11/08	1718.71					
M-60	10/16/08	1718.43					
M-60	11/5/08	1718.50					
M-60	12/8/08	1719.03					
M-60	1/19/09	1719.22					
M-60	2/4/09	1718.48					
M-60	3/13/09	1718.32					
M-60	4/17/09	1718.38					
M-60	5/5/09	1718.43					
M-60	6/11/09	1718.46					
M-61	4/18/08	1721.86					
M-61	5/8/08	1721.87		1.3		97	5240
M-61	6/20/08	1721.72					
M-61	7/22/08	1721.86					
M-61	8/7/08	1721.92		1.4		110	5780
M-61	9/11/08	1721.98					
M-61	10/16/08	1721.93					
M-61	11/5/08	1721.96		1.6		115	5890
M-61	12/12/08	1721.97					
M-61	1/19/09	1721.98					
M-61	2/4/09	1721.99		1.5		110	5320
M-61	3/13/09	destroyed					
M-64	4/18/08	1720.05					
M-64	5/8/08	1720.12		9.60		668	8400
M-64	6/20/08	1720.23					
M-64	7/22/08	1719.35					
M-64	8/7/08	1720.14		8.30		605	7570
M-64	9/11/08	1720.00					
M-64	10/16/08	1719.96					
M-64	11/5/08	1720.17		9.80		639	8500
M-64	12/8/08	1720.02					
M-64	1/19/09	1720.05					
M-64	2/4/09	1720.08		11.00		720	9680
M-64	3/13/09	1720.13					
M-64	4/17/09	1720.27					
M-64	5/21/09	1718.76		9.30		680	9320

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-64	5/21/09	1720.08					
M-64	6/11/09	1720.05					
M-65	4/18/08	1720.72					
M-65	5/8/08	1722.12		36.00		1320	13800
M-65	6/20/08	1721.68					
M-65	7/22/08	1720.83					
M-65	8/7/08	1720.86		35.00		1410	17500
M-65	9/11/08	1720.80					
M-65	10/16/08	1720.80					
M-65	11/5/08	1721.03		33.00		1360	18100
M-65	12/8/08	1720.84					
M-65	1/19/09	1720.82					
M-65	2/4/09	1720.87		32.00		1290	5900
M-65	3/13/09	1720.89					
M-65	4/17/09	1720.96					
M-65	5/8/09	1720.93					
M-65	5/20/09	1720.61		30.00		1260	16400
M-65	6/11/09	1720.88					
M-66	4/18/08	1722.39					
M-66	5/8/08	1722.47		36.00		1640	13000
M-66	6/20/08	1722.41					
M-66	7/22/08	1722.42					
M-66	8/7/08	1722.82		35.00		1740	10100
M-66	9/11/08	1721.90					
M-66	10/16/08	1722.76					
M-66	11/5/08	1722.71		34.00		1630	10900
M-66	12/8/08	1722.71					
M-66	1/19/09	1722.71					
M-66	2/4/09	1722.69		34.00		1700	16100
M-66	3/13/09	1722.71					
M-66	4/17/09	1722.83					
M-66	5/20/09	1722.83		31.00		1640	18100
M-66	6/11/09	1722.88					
M-67	4/18/08	1723.40					
M-67	5/8/08	1723.40		6.80		521	7600
M-67	6/20/08	1723.34					
M-67	7/22/08	1723.47					
M-67	8/7/08	1723.58		7.10		561	8000
M-67	9/11/08	1723.53					
M-67	10/16/08	1723.66					
M-67	11/5/08	1723.60		8.00		512	8510
M-67	12/12/08	1723.62					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-67	1/19/09	1723.65					
M-67	2/4/09	1723.64		7.00		487	6160
M-67	3/13/09	1723.77					
M-67	4/17/09	1723.74					
M-67	5/20/09	1723.74		6.50		463	7710
M-67	6/11/09	1723.80					
M-68	4/18/08	1723.17					
M-68	5/8/08	1723.13		1.10		69.3	5710
M-68	6/20/08	1723.09					
M-68	7/22/08	1723.18					
M-68	8/7/08	1723.30		1.10		83.2	6960
M-68	9/11/08	1723.32					
M-68	10/16/08	1723.38					
M-68	11/5/08	1723.36		1.20		79.2	5920
M-68	12/12/08	1723.37					
M-68	1/19/09	1723.47					
M-68	2/4/09	1723.49		1.10		84.9	5650
M-68	3/13/09	1723.64					
M-68	4/17/09	1723.60					
M-68	5/6/09	1723.58		1.10		87.7	6050
M-68	6/11/09	1723.54					
M-69	4/18/08	1718.34					
M-69	5/8/08	1719.02		0.08		420	4040
M-69	6/20/08	1719.82					
M-69	7/22/08	1720.13					
M-69	8/7/08	1720.43		0.12		740	4920
M-69	9/11/08	1719.99					
M-69	10/16/08	1720.17					
M-69	11/5/08	1719.96		0.14		724	4760
M-69	12/8/08	1719.42					
M-69	1/19/09	1718.98					
M-69	2/4/09	1718.96		0.10		531	4580
M-69	3/13/09	1718.65					
M-69	4/17/09	1718.18					
M-69	5/5/09	1717.76		0.08		371	4160
M-69	6/11/09	1717.31					
M-70	4/18/08	1722.21					
M-70	5/8/08	1723.55		4.00		367	5020
M-70	6/20/08	1723.23					
M-70	7/22/08	1724.82					
M-70	8/7/08	1725.54		1.20		112	2800
M-70	9/11/08	1722.24					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-70	10/16/08	1725.36					
M-70	11/5/08	1722.13		0.51		106	3180
M-70	12/12/08	1721.12					
M-70	1/19/09	1720.62					
M-70	2/4/09	1720.57		0.35		88.6	2700
M-70	3/13/09	1720.29					
M-70	4/17/09	1717.98					
M-70	5/7/09	1717.70		0.55		118	2780
M-70	6/11/09	1717.26					
M-71	4/18/08	1715.99					
M-71	5/8/08	1717.83		4.90		674	8160
M-71	6/20/08	1718.89					
M-71	7/22/08	1718.01					
M-71	8/7/08	1718.70		4.70		608	6410
M-71	9/11/08	1718.81					
M-71	10/16/08	1718.66					
M-71	11/5/08	1715.41		5.00		608	8240
M-71	12/12/08	1714.62					
M-71	1/19/09	1714.17					
M-71	2/4/09	1714.12		5.00		599	7370
M-71	3/13/09	1713.97					
M-71	4/17/09	1713.42					
M-71	5/7/09	1712.96		5.10		636	6060
M-71	6/11/09	1712.37					
M-72	4/18/08	1715.34					
M-72	5/8/08	1715.67		4.30		899	7950
M-72	6/20/08	1715.80					
M-72	7/22/08	1715.65					
M-72	8/7/08	1715.52		4.00		865	8800
M-72	9/11/08	1715.48					
M-72	10/16/08	1715.58					
M-72	11/5/08	1714.96		4.30		842	9370
M-72	12/12/08	1715.05					
M-72	1/19/09	1714.83					
M-72	2/4/09	1714.54		4.80		928	8560
M-72	3/13/09	1714.76					
M-72	4/17/09	1714.58					
M-72	5/7/09	1714.58		4.60		944	7780
M-72	6/11/09	1714.65					
M-73	4/18/08	1711.89					
M-73	5/8/08	1712.01		3.80		249	4900
M-73	6/20/08	1711.86					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-73	7/22/08	1711.77					
M-73	8/7/08	1711.80		3.90		290	4716
M-73	9/11/08	1711.84					
M-73	10/16/08	1711.73					
M-73	11/5/08	1711.82		5.10		345	5410
M-73	12/12/08	1711.92					
M-73	1/19/09	1711.85					
M-73	2/4/09	1711.88		4.90		324	4780
M-73	3/13/09	1711.93					
M-73	4/17/09	1711.85					
M-73	5/6/09	1711.99		4.80		341	4970
M-73	6/11/09	1711.95					
M-74	4/18/08	1714.79					
M-74	5/8/08	1714.93		0.91		47.5	5870
M-74	6/20/08	1714.66					
M-74	7/22/08	1714.59					
M-74	8/7/08	1714.56		0.89		60.0	5940
M-74	9/11/08	1714.65					
M-74	10/16/08	1714.58					
M-74	11/5/08	1714.61		0.99		60.4	5640
M-74	12/10/08	1714.66					
M-74	1/19/09	1714.74					
M-74	2/4/09	1714.77		0.96		61.8	7010
M-74	3/13/09	1714.94					
M-74	4/17/09	1714.93					
M-74	5/6/09	1715.03		0.95		69.3	5930
M-74	6/11/09	1716.29					
M-75	5/8/08			3.90		63.0	4420
M-75	11/5/08	1741.65		4.90		72.6	4780
M-75	2/4/09	1741.73		4.20		68.6	4880
M-75	5/8/09	1741.82		3.70		70.9	4720
M-76	4/18/08	1745.61					
M-76	5/8/08	1745.67		2.80		102	4060
M-76	6/20/08	1745.90					
M-76	7/22/08	1745.89					
M-76	8/7/08	1745.76					
M-76	9/11/08	1745.88					
M-76	10/16/08	1745.83					
M-76	11/5/08	1745.63		2.80		120	3880
M-76	12/12/08	1745.68					
M-76	1/19/09	1745.77					
M-76	2/4/09	1745.81		2.80		126	4640

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-76	3/13/09	1745.79					
M-76	4/17/09	1745.77					
M-76	5/8/09	1745.81		2.50		126	5600
M-76	6/11/09	1745.94					
M-77	4/18/08	1762.05					
M-77	5/8/08	1762.26		0.4		237	3490
M-77	6/20/08	destroyed					
M-78	4/18/08	1717.66					
M-78	5/8/08	1720.67					
M-78	6/20/08	1719.89					
M-78	7/22/08	1718.58					
M-78	8/7/08	1718.65					
M-78	9/11/08	1716.79					
M-78	10/16/08	1718.60					
M-78	11/5/08	1718.64					
M-78	12/8/08	1718.60					
M-78	1/19/09	1718.57					
M-78	2/4/09	1718.64					
M-78	3/13/09	1718.62					
M-78	4/17/09	1719.85					
M-78	5/8/09	1718.79					
M-78	6/11/09	1718.63					
M-79	4/18/08	1715.84					
M-79	5/8/08	1716.87		0.42		79.7	1640
M-79	6/20/08	1718.02					
M-79	7/22/08	1718.78					
M-79	8/7/08	1719.08		0.10		15.1	4270
M-79	9/11/08	1718.02					
M-79	10/16/08	1719.02					
M-79	11/5/08	1717.57		0.04		6.38	876
M-79	12/8/08	1716.81					
M-79	1/19/09	1716.20					
M-79	2/4/09	1716.01		0.05		7.16	6780
M-79	3/13/09	1715.67					
M-79	4/17/09	1714.73					
M-79	5/5/09	1714.20		0.12		30.6	1800
M-79	6/11/09	1713.58					
M-80	4/18/08	1718.87					
M-80	5/8/08	1721.13					
M-80	6/20/08	1720.32					
M-80	7/22/08	1720.74					
M-80	8/7/08	1720.89					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-80	9/11/08	1719.18					
M-80	10/16/08	1720.87					
M-80	11/5/08	1717.69					
M-80	12/10/08	1716.77					
M-80	1/19/09	1716.41					
M-80	2/4/09	1716.27					
M-80	3/13/09	1716.21					
M-80	4/15/09	1714.70					
M-80	5/7/09	1714.46					
M-80	6/11/09	1713.95					
M-81A	4/18/08	1712.25					
M-81A	5/8/08	1712.94					
M-81A	6/20/08	1713.47					
M-81A	7/22/08	1713.14					
M-81A	8/7/08	1712.64					
M-81A	9/11/08	1712.04					
M-81A	10/16/08	1712.55					
M-81A	11/5/08	1711.27					
M-81A	12/10/08	1710.80					
M-81A	1/19/09	1710.43					
M-81A	2/4/09	1710.24					
M-81A	3/13/09	1709.95					
M-81A	4/15/09	1709.83					
M-81A	5/7/09	1709.68					
M-81A	6/11/09	1709.18					
M-83	4/17/08	1719.34				41.6	1370
M-83	5/8/08	1721.54		0.18		47.4	2220
M-83	5/12/08	1721.75		0.11		<0.004	2650
M-83	6/20/08	1720.90					
M-83	7/22/08	1722.07					
M-83	8/7/08	1723.07					
M-83	9/11/08	1720.87					
M-83	10/15/08	1720.82					
M-83	11/5/08	1719.39					
M-83	12/10/08	1718.30					
M-83	1/14/09	1717.71					
M-83	2/10/09	1717.53					
M-83	3/11/09	1717.27					
M-83	4/15/09	1715.22					
M-83	5/7/09	1714.92					
M-83	6/10/09	1714.76					
M-84	4/18/08	1716.18					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-84	5/8/08	1718.20		0.12		16.0	1040
M-84	6/20/08	1718.37					
M-84	7/22/08	1718.57					
M-84	8/7/08	1718.84		0.07		9.36	1210
M-84	9/11/08	1717.62					
M-84	10/16/08	1718.82					
M-84	11/5/08	1716.41		0.07		8.93	1020
M-84	12/10/08	1715.48					
M-84	1/19/09	1714.88					
M-84	2/4/09	1714.91		0.04		6.97	980
M-84	3/13/09	1714.75					
M-84	4/15/09	1713.61					
M-84	5/7/09	1713.25		0.06		8.40	874
M-84	6/11/09	1712.79					
M-85	4/18/08	1713.00					
M-85	5/8/08	1714.28		0.065		19.7	970
M-85	6/20/08	destroyed					
M-86	4/18/08	1711.20					
M-86	5/8/08	1711.90		2.7		649	5270
M-86	6/20/08	destroyed					
M-87	4/17/08	1707.15				270	3330
M-87	5/8/08	1707.44		2.90		279	3700
M-87	5/12/08	1707.41		2.90		277	3270
M-87	6/17/08	1707.57				173	2450
M-87	7/15/08	1707.60				278	3580
M-87	8/7/08	1707.47		2.80		285	3260
M-87	8/13/08	NR		3.00		336	4560
M-87	9/11/08	1707.23				308	4600
M-87	10/15/08	1707.23				287	4460
M-87	11/11/08	1706.99		3.30		324	4040
M-87	12/10/08	1706.87				318	3780
M-87	1/14/09	1706.80				347	4040
M-87	2/10/09	1706.78		3.40		336	4090
M-87	3/11/09	1706.73				345	4420
M-87	4/15/09	1706.80				323	4120
M-87	5/7/09	1706.77		3.00		339	4190
M-87	5/12/09	1706.77		3.20		346	4530
M-87	6/10/09	1706.69					
M-88	4/18/08	1707.32					
M-88	5/8/08	1707.48		0.88		45.8	5780
M-88	6/20/08	1707.29					
M-88	7/22/08	1707.27					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-88	8/7/08	1707.21		0.87		50.5	6530
M-88	9/11/08	1707.16					
M-88	10/16/08	1707.17					
M-88	11/5/08	1707.06		0.91		41.1	6400
M-88	12/12/08	1707.21					
M-88	1/19/09	1706.96					
M-88	2/4/09	1707.07		0.83		42.2	5730
M-88	3/13/09	1707.07					
M-88	4/17/09	1706.96					
M-88	5/6/09	1708.60		0.83		43.8	6080
M-88	6/11/09	1707.03					
M-89	4/18/08	1732.22					
M-89	5/8/08	1732.32		25.00		807	13400
M-89	6/20/08	1732.34					
M-89	7/22/08	1732.60					
M-89	8/7/08	1732.62		27.00		875	13000
M-89	9/11/08	1732.42					
M-89	10/16/08	1732.61					
M-89	11/5/08	1732.62		25.00		857	15800
M-89	12/12/08	1732.60					
M-89	1/19/09	1732.66					
M-89	2/4/09	1732.68		25.00		877	12100
M-89	3/13/09	1734.18					
M-89	4/15/09	1732.87					
M-89	5/7/09	1732.81		25.00		968	12800
M-89	6/11/09	1732.81					
M-92	4/18/08	1763.25					
M-92	5/8/08	1763.31		<0.01		0.77	1990
M-92	6/20/08	1763.35					
M-92	7/22/08	1763.51					
M-92	8/7/08	1763.51		<0.01		0.89	1950
M-92	9/11/08	1763.85					
M-92	10/16/08	1763.48					
M-92	11/5/08	1763.59		<0.01		0.88	1970
M-92	12/12/08	1763.62					
M-92	1/19/09	1763.65					
M-92	2/4/09	1763.69		<0.01		0.91	2150
M-92	3/13/09	1763.78					
M-92	4/16/09	1763.82					
M-92	5/6/09	1764.22		<0.01		0.90	2000
M-92	6/11/09	1763.94					
M-93	4/18/08	1760.96					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-93	5/8/08	1761.08					
M-93	6/20/08	1761.15					
M-93	7/22/08	1761.17					
M-93	8/7/08	1761.20					
M-93	9/11/08	1761.13					
M-93	10/16/08	1761.19					
M-93	11/5/08	1761.28					
M-93	12/12/08	1761.35					
M-93	1/19/09	1761.70					
M-93	2/4/09	1761.42					
M-93	3/13/09	1761.50					
M-93	4/16/09	1761.55					
M-93	5/6/09	1761.63					
M-93	6/11/09	1761.80					
M-94	4/18/08	buried					
M-95	4/18/08	1682.34					
M-95	5/8/08	1682.78		1.30		541	7240
M-95	6/20/08	1682.00					
M-95	7/22/08	1681.84					
M-95	8/7/08	1681.80		1.30		508	7390
M-95	9/11/08	1681.96					
M-95	10/16/08	1681.79					
M-95	11/5/08	1681.47		1.30		512	7220
M-95	12/12/08	1681.33					
M-95	1/19/09	1681.44					
M-95	2/4/09	1681.46		1.20		478	7510
M-95	3/13/09	1681.50					
M-95	4/16/09	1681.30					
M-95	5/4/09	1681.34		1.10		445	6950
M-95	6/11/09	1681.30					
M-96	4/18/08	1681.63					
M-96	5/8/08	1681.66		1.30		321	6500
M-96	6/20/08	1681.34					
M-96	7/22/08	1681.15					
M-96	8/7/08	1683.06		1.20		312	6490
M-96	9/11/08	1681.16					
M-96	10/16/08	1681.17					
M-96	11/5/08	1680.84		1.10		284	6340
M-96	12/12/08	1680.69					
M-96	1/19/09	1680.75					
M-96	2/4/09	1680.76		1.10		277	6620
M-96	3/13/09	1680.81					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-96	4/16/09	1680.65					
M-96	5/4/09	1680.67		0.96		260	6240
M-96	6/11/09	1680.63					
M-97	4/18/08	1760.11					
M-97	5/8/08	1760.69		0.05		72.3	3380
M-97	6/20/08	1760.43					
M-97	7/22/08	1760.42					
M-97	8/7/08	1760.44		0.04		75.6	3710
M-97	9/11/08	1760.28					
M-97	10/16/08	1760.42					
M-97	11/5/08	1760.44		0.04		74.4	3560
M-97	12/12/08	1760.49					
M-97	1/19/09	1760.48					
M-97	2/4/09	1760.52		0.04		69.7	3170
M-97	3/13/09	1760.63					
M-97	4/16/09	1760.64					
M-97	5/4/09	1760.72		0.04		69.6	3530
M-97	5/6/09	1760.72		0.04		69.6	3530
M-97	6/11/09	1760.84					
M-98	4/18/08	1698.59					
M-98	5/8/08	1698.71					
M-98	6/20/08	1698.55					
M-98	7/22/08	1698.52					
M-98	8/7/08	1698.52					
M-98	9/11/08	1698.91					
M-98	10/16/08	1698.51					
M-98	11/5/08	1698.80					
M-98	6/12/09	1698.89					
M-99	4/18/08	1697.07					
M-99	5/8/08	1697.14		0.27		217	3570
M-99	6/20/08	1698.31					
M-99	7/22/08	1698.71					
M-99	8/7/08	1698.82		0.32		251	4210
M-99	9/11/08	1698.33					
M-99	10/16/08	1698.87					
M-99	11/5/08	1699.59		0.34		327	4350
M-99	12/8/08	1699.57					
M-99	1/19/09	1699.39					
M-99	2/4/09	1699.16		0.39		368	4730
M-99	3/13/09	1699.22					
M-99	4/17/09	1699.24					
M-99	5/5/09	1698.84		0.43		405	4650

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
M-99	6/11/09	1698.37					
M-100	4/18/08	1698.01					
M-100	5/8/08	1698.21					
M-100	6/20/08	1699.69		0.26		49.8	
M-100	7/22/08	1699.95					
M-100	8/7/08	1700.16		0.28		45.9	1860
M-100	9/11/08	dry					
M-100	10/16/08	dry				44.0	
M-100	11/5/08	1700.51		0.27		43.7	1880
M-100	12/12/08	1700.40					
M-100	1/19/09	1700.35					
M-100	2/4/09	1700.12		0.19		36.2	1690
M-100	3/13/09	1700.12					
M-100	4/17/09	1699.98					
M-100	5/7/09	1699.66		0.15		32.3	1440
M-100	6/11/09	1698.22					
M-101	4/18/08	1699.00					
M-101	5/8/08	1699.06					
M-101	6/20/08	dry					
M-101	7/22/08	dry					
M-101	8/7/08	dry					
M-101	9/11/08	dry					
M-101	10/16/08	dry					
M-101	11/5/08	dry					
M-101	12/12/08	dry					
M-101	1/19/09	dry					
M-101	2/4/09	dry					
M-101	3/13/09	dry					
M-101	4/17/09	dry					
M-101	5/5/09	dry					
M-101	6/11/09	dry					
M-102	4/18/08	1698.16					
M-102	5/8/08	1698.19					
M-102	6/20/08	1697.89		1.90		173	
M-102	7/22/08	1696.83					
M-102	8/7/08	1696.93					
M-102	9/11/08	dry					
M-102	10/16/08	dry					
M-102	11/5/08	1697.01					
M-102	12/12/08	1698.07					
M-102	1/19/09	1697.07					
M-102	2/4/09	1697.13					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-102	3/13/09	1697.07					
M-102	4/17/09	1697.07					
M-102	5/7/09	1697.03					
M-102	6/11/09	1696.93					
M-103	5/13/08	1797.65		0.02		0.34	1880
M-103	6/1/09	1797.81		<0.01		0.26	1970
M-111A	5/12/08	1733.84		0.07		364	4080
M-111A	5/26/09	1733.77		0.06		409	4868
M-115	4/18/08	1749.29					
M-115	5/8/08	1749.08		0.03		29.1	3170
M-115	6/20/08	1749.18					
M-115	7/22/08	1749.37					
M-115	8/7/08	1749.29		0.03		27.8	3030
M-115	9/11/08	1748.73					
M-115	10/16/08	NR					
M-115	11/5/08	1749.30		0.03		24.5	3090
M-115	12/12/08	1749.33					
M-115	1/19/09	1749.62					
M-115	2/4/09	1749.54		0.02		20.9	3060
M-115	3/13/09	1749.57					
M-115	4/17/09	1749.50					
M-115	5/8/09	1749.49		0.03		18.3	2430
M-115	6/11/09	1749.65					
M-117	5/13/08	1804.49		<0.01		<0.004	736
M-117	6/1/09	1805.56		0.014		<0.004	726
M-118	5/13/08	1805.37		0.028		0.008	784
M-118	6/1/09	1806.73		0.031		<0.004	756
M-120	5/10/08	1802.01		<0.01		0.82	1980
M-120	6/2/09	1801.97		<0.01		0.17	1980
M-121	5/10/08	1799.44		0.08		2.19	2190
M-121	6/2/09	1799.98		0.09		1.94	2270
M-123	5/22/09	NR				0.10	12600
M-124	5/22/09	NR		0.07		2.16	2538
M-125	5/22/09	NR				0.84	14700
M-126	5/11/08	1723.50		<0.01		<0.004	13700
M-126	5/21/09	1723.59		<0.01		0.02	17300
M-127	5/21/09	NR		0.04		<0.2	15000
M-128	5/22/09	NR				14.1	2708
M-129	5/9/08	1714.50		0.55		35.8	5840
M-129	6/2/08	1715.91		0.67		37.0	6450
M-129	1/6/09	1715.77					
M-129	5/20/09	1714.95		0.77		46.8	6092

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
M-130	5/9/08	1721.11		0.02		35.5	5190
M-130	6/2/08	1721.16		0.05		37.8	6300
M-130	1/6/09	1721.32					
M-130	5/20/09	1721.31		0.71		49.8	7310
M-131	5/11/08	NR		0.08		62.9	3100
M-131	8/5/08	1721.71		0.09		70.2	2940
M-131	11/5/08	1721.81		0.09		62.6	3170
M-131	2/4/09	1721.59		0.08		58.3	3260
M-131	5/5/09	1721.19		0.08		60.9	3280
M-132	5/12/08	1716.99		<0.01		15.7	2350
M-132	12/10/08	1717.54					
M-132	5/21/09	1716.77					
M-133	5/12/08	1715.63		0.97		10.6	6270
M-133	8/5/08	NR					
M-133	11/6/08	1715.05		0.77		11.4	5900
M-133	12/10/08	1715.05					
M-133	5/21/09	1716.39					
M-134	5/11/08	1718.92		0.12		122	2810
M-134	8/5/08	NR					
M-134	12/10/08	1719.42					
M-134	5/20/09	1718.14					
M-135	5/11/08	1718.71		0.09		42.8	3430
M-135	8/5/08	1719.68		0.09		46.7	3380
M-135	11/5/08	1719.72		0.08		49.7	3470
M-135	2/4/09	1718.87		0.09		45.8	3840
M-135	5/5/09	1718.06		0.08		43.3	3440
M-136	5/11/08	1722.71		<0.01		109	1400
M-136	8/5/08	NR					
M-136	11/5/08	NR					
M-136	12/10/08	1723.05					
M-136	5/21/09	1722.52					
M-142	5/26/09	NR				24.7	2938
MC-3	5/10/08	1691.79				<0.004	27100
MC-3	5/15/09	1691.87				<0.004	25500
MC-6	5/10/08	1685.74				5.33	13300
MC-6	5/14/09	1685.78				9.26	13200
MC-7	5/10/08	1692.02				8.90	15700
MC-7	5/14/09	1692.36				13.1	5200
MC-29	5/10/08	1688.94				0.66	16500
MC-29	5/15/09	1689.05				4.71	12600
MC-45	5/15/09	1684.46				9.93	9400
MC-50	5/10/08	1685.45				3.03	11400

Table A-1

Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009

Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
MC-50	5/15/09	1685.57				2.68	10200
MC-51	5/10/08	1686.93				6.18	11800
MC-51	5/15/09	1686.88				7.17	9300
MC-53	5/11/08	1685.51		<0.01		4.87	10300
MC-53	6/15/09	1687.67		0.04		8.56	10500
MC-65	5/10/08	1672.45				75.0	7400
MC-65	5/14/09	1672.37		0.14		84.4	10800
MC-69	5/10/08	1689.19				5.31	13100
MC-69	5/14/09	1689.46				9.00	11700
MC-93	5/10/08	1688.06				11.4	8450
MC-93	5/15/09	1687.94				11.7	11700
MC-97	5/11/08	1689.34				4.59	9300
MC-97	5/15/09	1689.50				10.4	8700
MW-16	5/12/08	1717.71		<0.01		<0.04	11100
MW-16	5/21/09	1717.71		<0.01		0.05	12600
MW-K4	4/17/08	1586.68				76.2	7260
MW-K4	5/15/08	1586.70		0.03		59.8	6150
MW-K4	6/17/08	1586.74				57.8	7060
MW-K4	7/17/08	1587.00				89.4	5100
MW-K4	8/14/08	1587.15		0.04		88.6	7300
MW-K4	9/9/08	1587.14				104	6500
MW-K4	10/14/08	1587.05				98.8	6230
MW-K4	11/11/08	1587.33		0.05		100	6780
MW-K4	12/11/08	1587.51				77.8	6940
MW-K4	1/13/09	1587.32				123	5760
MW-K4	2/10/09	1587.37		0.07		138	6060
MW-K4	3/10/09	1587.19				146	6290
MW-K4	4/15/09	1587.12				159	6420
MW-K4	5/12/09	1587.01		0.11		181	6760
MW-K4	6/10/09	1586.95		0.12		192	6290
MW-K5	4/17/08	1569.26				15.5	7150
MW-K5	5/15/08	1569.91	53.9	0.27	11	14.1	7050
MW-K5	6/17/08	1570.82				11.5	7200
MW-K5	7/17/08	1571.60				13.2	6550
MW-K5	8/14/08	1570.12		0.032		17.7	6630
MW-K5	9/9/08	1569.43				15.2	7200
MW-K5	10/14/08	1569.37				14.2	6630
MW-K5	11/11/08	1580.53		<0.01		0.19	1420
MW-K5	12/11/08	1571.75				9.84	6600
MW-K5	1/15/09	1573.50				11.4	7460
MW-K5	2/11/09	1569.48		<0.01		9.49	5360
MW-K5	3/11/09	1568.92				9.69	7260

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
MW-K5	4/15/09	1567.90				10.9	7280
MW-K5	5/12/09	1567.78	53.1	0.022	12.1	14.3	7280
MW-K5	6/10/09	1568.12				14.7	6000
PC-1	5/8/08	1574.44		0.08		12.1	5960
PC-1	6/25/09	DRY					
PC-2	5/8/08	1573.63	22.2	<0.01	10.2	4.12	5870
PC-2	5/8/09	1570.67	30.4	0.13	11.0	5.51	7020
PC-2	6/25/09	1570.12		0.21		5.59	6050
PC-4	5/8/08	1574.96	82.1	0.10	27.0	6.62	6590
PC-4	6/25/09	1567.93	107	0.13	23.5	8.26	7540
PC-12	4/16/08	1586.75					
PC-12	5/13/08	1586.74					
PC-12	6/17/08	1586.68					
PC-12	7/15/08	1586.70					
PC-12	8/13/08	1586.73					
PC-12	9/9/08	1586.66					
PC-12	10/14/08	1586.66					
PC-12	11/11/08	1586.45					
PC-12	12/9/08	1587.28					
PC-12	1/13/09	NR					
PC-12	2/10/09	NR					
PC-12	3/10/09	NR					
PC-12	4/14/09	1587.60					
PC-12	5/12/09	1587.58					
PC-12	6/9/09	1588.58					
PC-17	4/16/08	1588.68				233	9640
PC-17	5/13/08	1588.64		0.11		194	9250
PC-17	6/17/08	1588.54				204	9780
PC-17	7/15/08	1588.78				173	8900
PC-17	8/13/08	1589.01		0.08		171	9600
PC-17	9/9/08	1588.97				164	9700
PC-17	10/14/08	1589.01				167	8180
PC-17	11/11/08	1589.11					
PC-17	12/9/08	1589.28				150	9740
PC-17	1/13/09	1589.21				13.0	9000
PC-17	2/10/09	buried					
PC-17	3/10/09	NR					
PC-17	4/14/09	NR					
PC-17	5/12/09	NR					
PC-17	6/9/09	NR					
PC-18	4/16/08	1589.69				227	9920
PC-18	5/13/08	1589.71		0.14		202	4270

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-18	6/17/08	1589.65				232	9800
PC-18	7/15/08	1589.80				196	8150
PC-18	8/13/08	1590.03		0.14		219	10600
PC-18	9/9/08	1589.96				97.6	9900
PC-18	10/14/08	1589.86				191	9760
PC-18	11/11/08	1590.10		0.14		194	9620
PC-18	12/9/08	1590.32				180	9880
PC-18	1/13/09	1590.21				201	10300
PC-18	2/10/09	1590.43		0.13		189	7220
PC-18	3/10/09	1590.46				209	9940
PC-18	4/14/09	1590.36				192	10300
PC-18	5/13/09	1590.09		0.14		188	10000
PC-18	6/9/09	1590.02					8700
PC-21A	5/12/08	1695.13	703	0.34	18.4	3.74	13700
PC-21A	5/14/09	1693.82	561	0.27	33.5	3.71	14600
PC-24	5/8/08	1612.37		0.08		16.4	10800
PC-24	5/12/09	1612.48		0.11		15.3	9800
PC-28	5/10/08	1638.92		1.00		509	6370
PC-28	5/13/09	1638.05		1.30		536	7580
PC-31	5/10/08	1646.92		<0.01		4.63	6300
PC-31	5/13/09	1647.06		<0.01		6.85	6160
PC-37	4/18/08	1682.10					
PC-37	5/5/08	1682.09		0.15		277	6900
PC-37	6/23/08	1681.81					
PC-37	7/21/08	1681.63					
PC-37	8/4/08	1681.63		0.18		319	6810
PC-37	9/15/08	1681.71					
PC-37	10/12/08	1681.60					
PC-37	11/4/08	1681.30		0.18		316	6640
PC-37	12/12/08	1681.19					
PC-37	1/20/09	1681.09					
PC-37	2/2/09	1681.03		0.20		324	7370
PC-37	3/12/09	1681.11					
PC-37	4/16/09	1681.08					
PC-37	5/4/09	1681.09		0.18		317	7490
PC-37	6/11/09	1681.00					
PC-40	5/10/08	1656.69		<0.01		24.5	12000
PC-40	5/13/09	1656.83		<0.01		13.1	13000
PC-50	5/8/08	1620.83		0.10		222	9200
PC-50	5/12/09	1621.06		0.09		212	10500
PC-53	4/17/08	1569.14				3.20	4520
PC-53	5/15/08	1569.54		0.03		2.54	4190

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-53	6/17/08	1571.54				2.60	4080
PC-53	7/17/08	1572.02				1.85	4340
PC-53	8/14/08	1569.62		0.03		1.79	4690
PC-53	9/9/08	1568.75				3.56	4800
PC-53	10/15/08	1568.73				4.88	5200
PC-53	11/12/08	1582.00		<0.01		1.03	3520
PC-53	12/11/08	1571.82				1.34	4040
PC-53	1/15/09	1574.39				1.15	4220
PC-53	2/11/09	1569.43		0.02		1.28	4320
PC-53	3/11/09	1569.11				1.37	4130
PC-53	4/15/09	1567.58				3.53	4848
PC-53	5/12/09	1567.12		0.03		4.47	5050
PC-53	6/10/09	1567.17				4.47	5030
PC-54	4/18/08	1686.67					
PC-54	5/5/08	1685.58		2.30		275	6020
PC-54	6/23/08	1686.24					
PC-54	7/21/08	1686.10					
PC-54	8/4/08	1686.04		2.20		276	6270
PC-54	9/15/08	1686.22					
PC-54	10/12/08	1686.22					
PC-54	11/4/08	1685.76		2.10		241	5980
PC-54	12/12/08	1685.62					
PC-54	1/20/09	1685.59					
PC-54	2/2/09	1685.58		2.00		251	6200
PC-54	3/12/09	1685.57					
PC-54	4/16/09	1685.47					
PC-54	5/4/09	1685.47		1.80		226	6050
PC-54	6/11/09	1685.40					
PC-55	4/16/08	1590.67				1.01	7680
PC-55	5/13/08	1590.73		<0.01		4.43	7000
PC-55	6/17/08	1590.65				1.00	8120
PC-55	7/15/08	1590.83				0.91	6900
PC-55	8/11/08	1590.95		<0.01		0.93	7400
PC-55	9/9/08	1590.98				0.83	7900
PC-55	10/14/08	1590.81				0.52	6980
PC-55	11/11/08	1591.06		<0.01		0.79	8200
PC-55	12/10/08	1591.23				0.74	8120
PC-55	1/13/09	1591.21				0.69	8540
PC-55	2/10/09	1591.47		<0.01		0.77	7980
PC-55	3/10/09	1591.33				0.84	8340
PC-55	4/14/09	1591.30				0.83	8420
PC-55	5/13/09	1591.06		<0.02		0.81	8300

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-55	6/9/09	1590.97					6800
PC-56	4/17/08	1556.53				2.99	2690
PC-56	5/14/08	1556.31		<0.01		1.88	2210
PC-56	6/17/08	1556.16				2.44	3260
PC-56	7/14/08	1556.59				4.95	3500
PC-56	8/12/08	1556.04		<0.01		4.39	3230
PC-56	9/9/08	1555.67				1.01	2800
PC-56	10/14/08	1555.74				6.53	7050
PC-56	11/10/08	1558.96		0.02		8.50	6800
PC-56	12/8/08	1557.88				7.01	4700
PC-56	1/12/09	1557.86				1.34	2360
PC-56	2/9/09	1556.81		<0.01		1.51	1990
PC-56	3/9/09	1555.92				1.42	2180
PC-56	4/14/09	1554.73				1.70	2070
PC-56	5/12/09	1554.23		0.06		5.16	2810
PC-56	6/10/09	1553.81				3.31	2868
PC-58	4/17/08	1557.16				6.28	5950
PC-58	5/14/08	1556.87		0.17		8.47	5850
PC-58	6/17/08	1556.38				2.85	4060
PC-58	7/14/08	1556.64				4.08	5570
PC-58	8/12/08	1556.05		<0.01		5.66	6210
PC-58	9/9/08	1555.56				6.08	5900
PC-58	10/14/08	1555.54				4.42	3180
PC-58	11/10/08	1557.58		0.12		10.9	7510
PC-58	12/8/08	1557.42				9.62	7230
PC-58	1/12/09	1557.10				9.65	6450
PC-58	2/9/09	1556.52		0.09		8.98	6590
PC-58	3/9/09	1555.57				8.98	7750
PC-58	4/14/09	1554.51				8.99	7820
PC-58	5/12/09	1553.94		0.11		10.3	7530
PC-58	6/10/09	1553.49				9.61	6990
PC-59	4/17/08	1556.01				7.58	4420
PC-59	5/14/08	1555.76		<0.01		4.42	4120
PC-59	6/17/08	1555.50				7.09	4330
PC-59	7/14/08	1555.87				7.40	4290
PC-59	8/12/08	1555.66		<0.01		7.59	4210
PC-59	9/9/08	1555.42				6.64	4300
PC-59	10/14/08	1555.42				6.85	4230
PC-59	11/10/08	1556.98		<0.01		6.94	4330
PC-59	12/8/08	1557.18				7.02	4290
PC-59	1/12/09	1556.90				7.07	7750
PC-59	2/9/09	1556.27		0.02		7.20	4240

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-59	3/9/09	1555.77				6.60	4480
PC-59	4/14/09	1554.91				6.17	4588
PC-59	5/12/09	1554.40		0.03		6.79	4520
PC-59	6/10/09	1554.06				6.24	4320
PC-60	4/17/08	1556.70				5.82	4300
PC-60	5/14/08	1556.47		<0.01		6.40	4100
PC-60	6/17/08	1556.33				6.25	3930
PC-60	7/14/08	1556.90				6.44	4160
PC-60	8/12/08	1556.29		<0.01		6.79	4160
PC-60	9/9/08	1555.91				6.37	4200
PC-60	10/14/08	1555.88				6.52	4280
PC-60	11/10/08	1559.26		0.02		6.69	3980
PC-60	12/8/08	1558.12				7.34	4620
PC-60	1/12/09	1558.10				7.73	4280
PC-60	2/9/09	1557.02		<0.01		6.23	3950
PC-60	3/9/09	1556.17				5.86	4130
PC-60	4/14/09	1554.96				6.40	4240
PC-60	5/12/09	1554.43		<0.01		7.84	4220
PC-60	6/10/09	1554.03				7.80	4210
PC-62	4/17/08	1556.02				2.77	3510
PC-62	5/9/08	1555.71		<0.01		2.32	3150
PC-62	5/14/08	1555.30				2.37	3450
PC-62	6/17/08	1555.30				2.59	3410
PC-62	7/14/08	1555.74				2.86	3210
PC-62	8/12/08	1555.64		<0.01		2.53	3140
PC-62	9/9/08	1555.49				2.16	3000
PC-62	10/14/08	1555.48				2.07	3090
PC-62	11/10/08	1556.29		<0.01		1.14	2900
PC-62	12/8/08	1556.80				2.55	2910
PC-62	1/12/09	1556.44				3.75	4130
PC-62	2/9/09	1556.24		0.04		3.36	3240
PC-62	3/9/09	1555.80				2.96	2880
PC-62	4/14/09	1555.14				2.54	3056
PC-62	5/12/09	1554.74		<0.01		2.87	3230
PC-62	6/10/09	1554.36				2.41	3260
PC-64	5/11/08	1667.70		3.20		708	9530
PC-64	5/20/09	1667.09		2.30		570	7150
PC-65	5/11/08	1667.99		2.40		454	6950
PC-65	5/13/09	1667.41		1.60		332	6900
PC-66	5/11/08	1662.40		3.60		438	7570
PC-66	5/13/09	1661.83		2.60		388	7740
PC-67	5/11/08	1661.95		0.63		58.8	8750

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-67	5/13/09	1661.32		0.80		70.0	12500
PC-68	4/17/08	1556.28				<0.004	2030
PC-68	5/14/08	1556.06		<0.01		0.08	2030
PC-68	6/17/08	1555.68				<0.01	1990
PC-68	7/14/08	1555.88				0.89	2000
PC-68	8/12/08	1555.98		<0.01		0.14	1850
PC-68	9/9/08	1555.83				0.06	2100
PC-68	10/14/08	1555.85				0.64	2050
PC-68	11/10/08	1556.43		<0.01		0.16	2000
PC-68	12/8/08	1557.01				0.06	1940
PC-68	1/12/09	1556.73				0.10	3100
PC-68	2/9/09	1556.61		<0.01		0.78	2000
PC-68	3/9/09	1556.04				0.04	2070
PC-68	4/14/09	1555.59				0.02	2100
PC-68	5/12/09	1555.11		0.03		0.14	2110
PC-68	6/10/09	1554.84					1990
PC-71	4/18/08	1675.59					
PC-71	5/5/08	1675.52		0.43		464	8080
PC-71	6/23/08	1675.37					
PC-71	7/21/08	1675.20					
PC-71	8/4/08	1675.11		0.39		468	8270
PC-71	9/15/08	1675.27					
PC-71	10/12/08	1675.45					
PC-71	11/4/08	1674.87		0.73		577	8650
PC-71	12/12/08	1674.78					
PC-71	1/20/09	1674.68					
PC-71	2/2/09	1673.93		0.41		454	8780
PC-71	3/12/09	1674.81					
PC-71	4/16/09	1674.75					
PC-71	5/4/09	1674.75		0.37		423	7980
PC-71	6/11/09	1674.72					
PC-72	4/18/08	1671.81					
PC-72	5/5/08	1671.89		0.29		286	6990
PC-72	6/23/08	1671.61					
PC-72	7/21/08	1671.54					
PC-72	8/4/08	1671.49		0.28		293	7880
PC-72	9/15/08	1671.62					
PC-72	10/12/08	1671.63					
PC-72	11/4/08	1671.34		0.26		287	7040
PC-72	12/12/08	1671.30					
PC-72	1/20/09	1671.24					
PC-72	2/2/09	1671.26		0.27		297	7510

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-72	3/12/09	1671.44					
PC-72	4/16/09	1671.49					
PC-72	5/4/09	1671.47		0.24		257	7090
PC-72	6/11/09	1671.44					
PC-73	4/18/08	1669.47					
PC-73	5/5/08	1669.49		0.40		343	6910
PC-73	6/23/08	1669.31					
PC-73	7/21/08	1669.21					
PC-73	8/4/08	1669.16		0.40		358	6270
PC-73	9/15/08	1669.29					
PC-73	10/12/08	1669.17					
PC-73	11/4/08	1669.15		0.39		339	6560
PC-73	12/12/08	1669.13					
PC-73	1/20/09	1669.11					
PC-73	2/2/09	1669.14		0.42		347	6680
PC-73	3/12/09	1669.34					
PC-73	4/16/09	1669.35					
PC-73	5/4/09	1669.41		0.41		354	7250
PC-73	6/11/09	NR					
PC-74	5/7/08	1551.30				0.56	2630
PC-74	5/6/09	1550.84				1.35	4230
PC-74	6/9/09	1535.27					
PC-76	5/7/08	1550.29					
PC-76	6/2/09	buried					
PC-77	5/7/08	1558.71				2.40	4990
PC-77	5/6/09	1557.90				2.13	4570
PC-78	5/7/08	1559.02					
PC-78	5/6/09	1558.42					
PC-79	5/7/08	1554.68		<0.01		0.09	2400
PC-79	5/11/09	1553.56		<0.01		2.98	3140
PC-80	5/7/08	1554.79					
PC-80	5/18/09	1553.67					
PC-81	5/7/08	1554.62					
PC-81	5/18/09	1553.54					
PC-82	5/7/08	1551.84	0.086		<0.1	0.40	2630
PC-82	5/19/09	1548.64	0.208		<1.0	0.78	3208
PC-83	5/7/08	1552.28					
PC-83	6/2/09	1551.01					
PC-86	4/17/08	1548.70				1.14	2610
PC-86	5/14/08	1548.28	0.202	<0.01	<0.1	1.11	2620
PC-86	6/17/08	1548.11				1.20	2670
PC-86	7/15/08	1548.40				1.29	2520

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-86	8/13/08	1548.40		<0.01		1.25	2580
PC-86	9/9/08	1548.34				1.19	2600
PC-86	10/14/08	1548.36				1.12	2560
PC-86	11/11/08	1547.76		<0.01		0.91	2450
PC-86	12/9/08	1549.46				1.12	2500
PC-86	1/13/09	1549.32				1.60	2490
PC-86	2/10/09	1549.18		<0.01		1.86	2560
PC-86	3/10/09	1548.68				1.55	2570
PC-86	4/14/09	1548.02				1.40	2552
PC-86	5/12/09	1547.53	0.231	<0.01	<0.1	1.38	2560
PC-86	6/9/09	1547.18				1.33	2560
PC-87	5/7/08	1548.46					
PC-87	6/2/09	1547.22					
PC-88	5/7/08	1544.48					
PC-88	6/2/09	1542.94					
PC-90	4/17/08	1543.85				11.2	4300
PC-90	5/14/08	1543.59	22	<0.01	8.2	2.38	4070
PC-90	6/17/08	1543.27				8.20	3910
PC-90	7/15/08	1543.82				9.11	3640
PC-90	8/13/08	1543.63				8.12	3790
PC-90	9/9/08	1543.51				8.11	3900
PC-90	10/14/08	1543.48				9.83	4490
PC-90	11/11/08	1544.37		<0.01		7.71	3696
PC-90	12/9/08	1544.60				7.49	3870
PC-90	1/13/09	1544.40				7.51	4150
PC-90	2/10/09	1544.21		0.01		7.38	3880
PC-90	3/10/09	1543.49				7.53	3920
PC-90	4/14/09	1543.34				7.06	3880
PC-90	5/12/09	1542.83	15		6.9	7.33	3900
PC-90	6/9/09	1542.45				7.05	3820
PC-91	4/16/08	1543.01				16.8	7400
PC-91	5/14/08	1542.74	69.4	<0.01	15.0	13.4	6930
PC-91	6/17/08	1541.99				12.2	5800
PC-91	7/15/08	1541.99				11.1	7150
PC-91	8/13/08	1541.52		<0.01		12.5	7730
PC-91	9/9/08	1541.35				12.4	7700
PC-91	10/14/08	1541.39				12.6	7080
PC-91	11/11/08	1541.41		<0.01		14.1	7440
PC-91	12/9/08	1541.86				16.9	7670
PC-91	1/13/09	1541.60				20.8	6900
PC-91	2/10/09	1541.61		<0.01		27.2	7750
PC-91	3/10/09	1541.23				28.6	7760

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-91	4/14/09	1540.82				30.4	7970
PC-91	5/12/09	1540.41	64.4	<0.02	9.1	30.2	7510
PC-91	6/9/09	1539.95				30.9	6940
PC-92	5/7/08	1543.13					
PC-92	5/13/09	1540.49		<0.01		2.59	3410
PC-93	5/7/08	buried					
PC-93	5/8/09	1537.26	58.5	0.06	17.0	7.89	5360
PC-94	5/7/08	1540.00					
PC-94	5/8/09	1536.85				5.43	5270
PC-94	6/25/09	1536.25		0.07		4.93	5880
PC-96	5/7/08	1546.00				0.67	2790
PC-96	5/7/09	1545.27				2.63	3350
PC-97	4/16/08	1543.55				0.58	2470
PC-97	5/14/08	1543.22		<0.01		0.51	2600
PC-97	6/17/08	1542.87				0.55	2610
PC-97	7/15/08	1543.72				0.48	2230
PC-97	8/13/08	1543.21		<0.01		0.36	2610
PC-97	9/9/08	1542.96				0.30	2600
PC-97	10/14/08	1542.93				0.06	2460
PC-97	11/11/08	1543.70		<0.01		0.24	2470
PC-97	12/9/08	1543.97				0.26	2450
PC-97	1/13/09	1543.77				0.26	2500
PC-97	2/10/09	1543.76		<0.01		0.27	2250
PC-97	3/10/09	1543.34				0.33	2400
PC-97	4/14/09	1542.87				0.43	2500
PC-97	5/12/09	1542.33		<0.01		0.71	2500
PC-97	6/10/09	1541.96				1.08	2590
PC-98R	4/17/08	1570.43				20.6	6950
PC-98R	5/15/08	1570.62		0.03		21.2	6550
PC-98R	6/17/08	1571.71				19.0	7440
PC-98R	7/17/08	1572.59				19.1	6850
PC-98R	8/14/08	1568.60		0.02		18.3	6800
PC-98R	9/9/08	1570.82				15.1	7000
PC-98R	10/15/08	1570.87				14.7	6660
PC-98R	11/12/08	1580.64		<0.01		2.25	2500
PC-98R	12/11/08	1572.66				13.80	6700
PC-98R	1/15/09	1574.06				9.10	6230
PC-98R	2/11/09	1570.36		<0.01		13.5	6590
PC-98R	3/11/09	1570.86				13.5	7110
PC-98R	4/15/09	1569.23				17.4	7380
PC-98R	5/12/09	1569.26		0.03		17.8	7600
PC-98R	6/10/09	1569.59				18.6	6100

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-99R2/R3	4/7/08	1535.16				10.5	4660
PC-99R2/R3	5/12/08	1534.29		<0.01		7.77	3870
PC-99R2/R3	6/9/08	1534.39				8.67	4280
PC-99R2/R3	7/24/08	1534.70				11.5	4620
PC-99R2/R3	8/14/08	1534.12		<0.01		11.5	4980
PC-99R2/R3	9/15/08	1534.39				11.4	4780
PC-99R2/R3	10/16/08	1534.39				9.08	4810
PC-99R2/R3	11/17/08	1534.56		<0.01		10.8	4870
PC-99R2/R3	12/11/08	1534.72				11.0	4960
PC-99R2/R3	1/19/09	1534.41				5.92	3820
PC-99R2/R3	2/12/09	1534.06		<0.01		5.14	3370
PC-99R2/R3	3/16/09	1533.98				5.86	3780
PC-99R2/R3	4/6/09	1533.66				5.82	3540
PC-99R2/R3	5/11/09	1533.55		<0.01		7.18	4120
PC-99R2/R3	6/8/09	1533.43				7.64	4550
PC-101R	4/16/08	1588.93				158	9720
PC-101R	5/13/08	1588.35		0.08		177	9600
PC-101R	6/17/08	buried					
PC-101R	7/14/08	NR					
PC-101R	8/13/08	NR					
PC-101R	9/9/08	NR					
PC-101R	10/14/08	NR					
PC-101R	11/11/08	NR					
PC-101R	12/9/08	NR					
PC-101R	1/13/09	NR					
PC-101R	2/10/09	NR					
PC-101R	3/10/09	NR					
PC-101R	4/14/09	1590.84				196	10480
PC-101R	5/13/09	1589.86		0.09		190	10300
PC-101R	6/9/09	1590.43					9500
PC-103	4/17/08	1575.71				12.0	5230
PC-103	5/15/08	1575.83	2.25	<0.01	4.6	9.59	4780
PC-103	6/17/08	1574.20				9.65	4440
PC-103	7/17/08	1577.16				10.3	4600
PC-103	8/14/08	1576.92		<0.01		9.00	4390
PC-103	9/9/08	1576.54				9.70	4700
PC-103	10/15/08	1576.48				12.6	5090
PC-103	11/12/08	1580.47		<0.01		11.1	4330
PC-103	12/11/08	1576.82				9.47	4180
PC-103	1/15/09	1576.84				9.57	4320
PC-103	2/11/09	1575.10		<0.01		11.6	4760
PC-103	3/11/09	1574.90				12.5	5260

Table A-1

Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009

Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-103	4/15/09	1575.16				13.6	5810
PC-103	5/12/09	1575.64	3.53	<0.01	5.7	14.2	5730
PC-103	6/10/09	1575.77				13.2	5380
PC-104	5/8/08	1567.20		0.03		1.53	2600
PC-104	5/8/09	1565.68		<0.01		2.42	3420
PC-107	5/8/08	1607.62				45	3400
PC-107	5/7/09	1610.84				60	4020
PC-108	5/8/08	1572.46				<0.004	2520
PC-108	5/11/09	1571.83				<0.01	3090
PC-110	5/6/08	1579.08				3.50	4520
PC-110	5/7/09	1577.87				1.63	4040
PC-111	5/20/09	--					
PC-112	5/9/08	1561.16				<0.004	2380
PC-112	5/7/09	1560.25				<0.004	2600
PC-115R	4/7/08	1542.28				11.1	4780
PC-115R	5/12/08	1541.98		<0.01		9.23	4040
PC-115R	6/9/08	1541.75				9.53	4300
PC-115R	7/24/08	1545.98				12.0	4530
PC-115R	8/14/08	1542.04		<0.01		12.8	4810
PC-115R	9/15/08	1542.24				10.6	4610
PC-115R	10/16/08	1542.04				10.3	4560
PC-115R	11/17/08	1541.94		<0.01		10.1	4450
PC-115R	12/11/08	1543.49				10.6	4700
PC-115R	1/19/09	1543.44				6.60	3840
PC-115R	2/12/09	1542.99		<0.01		5.18	3590
PC-115R	3/16/09	1542.73				6.82	3750
PC-115R	4/6/09	1535.00				6.93	3710
PC-115R	5/11/09	1541.87		<0.01		7.81	4330
PC-115R	6/8/09	1535.72				8.23	4560
PC-116R	4/7/08	1535.54				6.67	4090
PC-116R	5/12/08	1532.79		<0.01		5.10	3970
PC-116R	6/9/08	1534.40				5.48	4180
PC-116R	7/24/08	1531.99				8.38	4090
PC-116R	8/14/08	1531.59		<0.01		8.78	4500
PC-116R	9/15/08	1531.39				7.70	4780
PC-116R	10/16/08	1531.99				6.53	4300
PC-116R	11/17/08	1531.93		<0.01		7.82	4440
PC-116R	12/11/08	1532.65				9.71	4860
PC-116R	1/19/09	1534.43				6.63	4080
PC-116R	2/12/09	1533.54		<0.01		4.84	3540
PC-116R	3/16/09	1532.55				4.98	3630
PC-116R	4/6/09	1539.97				4.49	3350

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-116R	5/11/09	1532.72		<0.01		4.94	4360
PC-116R	6/8/09	1539.12				5.00	3880
PC-117	4/7/08	1540.23				1.93	3100
PC-117	5/12/08	1539.65		<0.01		1.93	3030
PC-117	6/9/08	1539.37				2.03	3240
PC-117	7/24/08	1539.55				2.69	3190
PC-117	8/14/08	1540.13		<0.01		2.92	3280
PC-117	9/15/08	1539.73				2.30	3270
PC-117	10/16/08	1540.13				2.23	3140
PC-117	11/17/08	1540.01		<0.01		2.89	3170
PC-117	12/11/08	1541.52				4.44	3580
PC-117	1/19/09	1541.07				3.13	3200
PC-117	2/12/09	1540.35		<0.01		2.54	3110
PC-117	3/16/09	1540.09				2.19	2920
PC-117	4/6/09	1539.88				1.87	2780
PC-117	5/11/09	1538.35		<0.01		1.93	3180
PC-117	6/8/09	1538.05				1.89	2890
PC-118	4/7/08	1546.21				7.72	4160
PC-118	5/12/08	1545.86		<0.01		7.63	3910
PC-118	6/9/08	1545.54				7.46	4070
PC-118	7/24/08	1546.30				8.29	4140
PC-118	8/14/08	1545.80		<0.01		9.85	4190
PC-118	9/15/08	1545.90				8.58	4430
PC-118	10/16/08	1545.54				7.75	4170
PC-118	11/17/08	1545.50		<0.01		8.07	4140
PC-118	12/11/08	1546.96				9.73	4350
PC-118	1/19/09	1546.89				7.96	4100
PC-118	2/12/09	1546.61		<0.01		6.92	3990
PC-118	3/16/09	1546.24				6.27	3830
PC-118	4/6/09	1545.86				5.80	3650
PC-118	5/11/09	1545.46		<0.01		5.55	3910
PC-118	6/8/09	1545.38				5.37	3710
PC-119	4/7/08	1547.93				2.73	3030
PC-119	5/12/08	1547.60		<0.01		2.98	3060
PC-119	6/9/08	1547.39				2.89	1940
PC-119	7/24/08	1547.97				4.08	3200
PC-119	8/14/08	1547.68		<0.01		3.67	3060
PC-119	9/15/08	1547.63				3.01	3140
PC-119	10/16/08	1547.97				2.78	3060
PC-119	11/17/08	1548.08		<0.01		3.58	3200
PC-119	12/11/08	1548.62				5.00	3550
PC-119	1/19/09	1548.97				3.72	3170

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-119	2/12/09	1548.42		<0.01		4.27	3620
PC-119	3/16/09	1548.01				3.33	3460
PC-119	4/6/09	1547.85					
PC-119	5/11/09	1547.08		<0.01		2.05	3410
PC-119	6/8/09	1546.88				1.73	2760
PC-120	4/7/08	1549.84				0.96	2570
PC-120	5/12/08	1549.53		<0.01		0.80	2530
PC-120	6/9/08	1549.27				1.04	2480
PC-120	7/24/08	1549.77				2.77	3010
PC-120	8/14/08	1549.52		<0.01		2.76	2850
PC-120	9/15/08	1549.53				2.57	3040
PC-120	10/16/08	1549.43				2.77	3070
PC-120	11/17/08	1549.47		<0.01		0.85	2450
PC-120	12/11/08	1550.50				0.86	2490
PC-120	1/19/09	1550.50				0.82	2530
PC-120	2/12/09	1550.07		<0.01		1.33	2530
PC-120	3/16/09	1549.69				1.92	2720
PC-120	4/6/09	1549.65				1.75	2600
PC-120	5/11/09	1548.73		<0.01		1.07	2780
PC-120	6/8/09	1548.63				1.02	2620
PC-121	4/7/08	1549.35				0.83	2580
PC-121	5/12/08	1549.08		<0.01		0.95	2560
PC-121	6/9/08	1548.80				1.24	2630
PC-121	7/24/08	1549.24				1.35	2540
PC-121	8/14/08	1549.01		<0.01		1.05	2374
PC-121	9/15/08	1548.99				0.99	2640
PC-121	10/16/08	1548.92				1.31	2640
PC-121	11/17/08	1548.99		<0.01		0.85	2570
PC-121	12/11/08	1550.04				1.05	2500
PC-121	1/19/09	1549.99				1.08	2530
PC-121	2/12/09	1549.51		<0.01		1.72	2610
PC-121	3/16/09	1549.14				1.87	2710
PC-121	4/6/09	1549.07				1.17	2490
PC-121	5/11/09	1548.26		<0.01		1.45	3110
PC-121	6/8/09	1548.17				1.40	2620
PC-122	4/18/08	1585.08				12.2	11100
PC-122	5/5/08	1584.96		0.08		9.86	9800
PC-122	6/17/08	1584.97				9.73	10300
PC-122	7/17/08	1585.05				11.6	8200
PC-122	8/14/08	1585.20		0.08		11.2	11000
PC-122	9/9/08	NR					
PC-122	10/14/08	NR					

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-122	11/11/08	1585.38		0.10		12.1	9900
PC-122	12/9/08	1586.68				13.4	9520
PC-122	1/13/09	1586.51				12.2	8740
PC-122	2/2/09	NR					
PC-122	3/9/09	NR					
PC-122	4/14/09	NR					
PC-122	5/13/09	1585.42		0.08		10.7	8550
PC-122	6/9/09	1585.42				10.4	8500
PC-123	5/5/08	1604.13		1.80		415	7240
PC-123	8/4/08	1603.20		1.80		415	5030
PC-123	11/3/08	1603.04		1.80		387	7620
PC-123	2/10/09	1603.68		1.80		410	8780
PC-123	5/4/09	1603.49		1.70		405	8170
PC-124	5/5/08	1610.92	82.7	0.03	17.0	4.54	6120
PC-124	8/4/08	1610.70		0.03		4.58	6190
PC-124	11/3/08	1610.54		0.04		4.68	6280
PC-124	2/10/09	1610.80		0.04		5.50	6520
PC-124	5/4/09	1610.77	114	0.04	20.0	5.31	7350
PC-125	5/5/08	1611.63		0.03		5.50	6430
PC-125	8/4/08	1611.49		0.03		5.78	6950
PC-125	11/3/08	1611.51		0.03		5.22	6520
PC-125	2/10/09	1611.86		0.02		3.27	4880
PC-125	5/4/09	1611.77		0.02		4.11	5920
PC-126	5/5/08	1611.79	191	0.08	37.0	9.94	8750
PC-126	8/4/08	1611.71		0.10		12.7	11600
PC-126	11/3/08	1611.80		0.11		13.3	10800
PC-126	2/10/09	1612.37		0.11		14.5	13200
PC-126	5/4/09	1612.04	214	0.09	32.0	11.2	10400
PC-127	5/5/08	1613.24		1.90		430	7350
PC-127	8/4/08	1613.13		1.80		438	7450
PC-127	11/3/08	1613.25		1.80		435	7670
PC-127	2/10/09	1613.19		1.90		438	8650
PC-127	5/4/09	1613.47		1.70		417	8190
PC-128	5/5/08	1614.45	191	0.15	8.6	193	5610
PC-128	8/4/08	1613.89		0.15		198	5610
PC-128	11/3/08	1614.57		0.16		187	5620
PC-128	2/10/09	1613.42		0.18		210	5680
PC-128	5/4/09	1614.75	246	0.18	17.0	208	5890
PC-129	5/5/08	1615.10		0.73		415	6640
PC-129	8/4/08	1615.00		0.70		418	7660
PC-129	11/3/08	1615.15		0.72		418	8340
PC-129	2/10/09	1615.59		0.78		463	7220

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
Units							
PC-129	5/4/09	1615.03		0.79		460	7130
PC-130	5/5/08	1613.70	646	0.77	110.0	453	6700
PC-130	8/4/08	1613.93		0.78		458	6710
PC-130	11/3/08	1613.74		0.74		453	6900
PC-130	2/10/09	1613.98		0.81		474	7770
PC-130	5/4/09	1615.06	741	0.77	34.0	461	6610
PC-131	5/5/08	1622.19		<0.01		8.47	8800
PC-131	8/4/08	1622.26		<0.01		7.83	7200
PC-131	11/3/08	1622.23		<0.01		7.28	9340
PC-131	2/10/09	1622.43		<0.01		7.32	10200
PC-131	5/4/09	1622.47		<0.01		6.60	10200
PC-132	5/5/08	1624.92	2.18	<0.01	<0.01	3.47	8800
PC-132	8/4/08	1624.82		<0.01		2.42	5950
PC-132	11/3/08	1624.98		<0.01		2.46	7760
PC-132	2/10/09	1625.01		<0.01		1.28	9760
PC-132	5/4/09	1625.06	1.85	<0.01	<0.1	2.17	9650
PC-133	4/7/08	1539.91				2.04	2810
PC-133	5/12/08	1536.50		<0.01		2.64	2820
PC-133	6/9/08	NR				2.62	3010
PC-133	7/24/08	1541.39				2.22	3050
PC-133	8/14/08	1540.22		<0.01		1.65	2830
PC-133	9/15/08	1540.87				1.33	2670
PC-133	10/16/08	1540.82				1.13	2620
PC-133	11/17/08	1540.73		<0.01		0.96	2540
PC-133	12/11/08	NR				0.97	2580
PC-133	1/19/09	NR				1.07	2560
PC-133	2/12/09	NR		<0.01		1.04	2610
PC-133	3/16/09	NR				1.04	2550
PC-133	4/6/09	NR				1.06	2470
PC-133	5/11/09	NR		<0.01		0.97	2640
PC-133	6/8/09	NR				1.01	2610
PC-135	6/26/08	1588.70					
PC-135	8/13/08	1589.03		<0.01		9.6	7950
PC-135	11/11/08	1588.76					
PC-135	12/10/08	1589.19					
PC-135	5/12/09	buried					
PC-136	5/14/08	1584.22		4.0		169	6920
PC-136	8/13/08	buried					
PC-136	11/11/08	buried					
PC-136	5/12/09	buried					
PC-133	4/7/08	1539.91				2.04	2810
PC-133	5/12/08	1536.50		<0.01		2.64	2820

Table A-1
Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009
Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
PC-133	6/9/08	NR				2.62	3010
PC-133	7/24/08	1541.39				2.22	3050
PC-133	8/14/08	1540.22		<0.01		1.65	2830
PC-133	9/15/08	1540.87				1.33	2670
PC-133	10/16/08	1540.82				1.13	2620
PC-133	11/17/08	1540.73		<0.01		0.96	2540
PC-133	12/11/08	NR				1.0	2580
PC-133	1/19/09	NR				1.07	2560
PC-133	2/12/09	NR		<0.01		1.04	2610
PC-133	3/16/09	NR				1.04	2550
PC-133	4/20/09	NR				1.06	2470
PC-133	5/14/09	NR		<0.01		1.0	2640
PC-133	6/8/09	NR				1.01	2610
PC-134	5/11/08	1591.06		<0.01		0.04	1640
PC-134	8/13/08	1591.17		<0.01		0.05	1820
PC-134	12/10/08	1591.47					
PC-134	5/12/09	NR					
PC-137	5/11/08	1586.72		<0.01		0.054	2590
PC-137	8/13/08	buried					
PC-137	11/11/08	buried					
PC-137	5/12/09	buried					
TR-1	5/14/08	1754.14		<0.01	1.2	<0.004	740
TR-1	6/1/09	1777.70		0.02	1.0	<0.004	718
TR-2	5/14/08	1724.66		0.02	1.5	<0.004	566
TR-2	5/29/09	1724.36		0.02	1.3	0.004	574
TR-3	5/14/08	1773.30		<0.01	0.9	<0.004	656
TR-3	6/4/09	1782.08		0.02	1.1	<0.004	630
TR-4	5/14/08	1735.87		0.032	1.5	<0.004	868
TR-4	6/2/09	1735.86		0.03	1.34	<0.004	874
TR-5	5/14/08	1800.50		<0.01	1.3	<0.004	748
TR-5	5/29/09	1802.67		0.02	0.97	<0.004	760
TR-6	5/14/08	1762.25		<0.01	<0.1	0.210	8750
TR-6	5/29/09	1762.73		0.01	<0.1	0.201	13700
TR-7	5/14/08	1811.20		<0.01	1.2	<0.004	800
TR-7	5/29/09	1813.03		0.01	1.0	<0.004	802
TR-8	5/14/08	1777.43		<0.01	2.3	0.087	1180
TR-8	5/29/09	1778.23		0.013	2.3	0.095	1250
TR-9	5/14/08	1810.51		0.025	1.3	<0.004	834
TR-9	5/29/09	1812.44		0.012	1.1	<0.004	816
TR-10	5/14/08	1794.19		0.10	2.5	1.53	1740
TR-10	6/1/09	1794.88		0.10	2.2	1.98	1740
TR-11	5/14/08	1723.25		<0.01	1.2	<0.004	722

Table A-1

Groundwater Elevation and Analytical Data for Five Quarters, April 2008 - June 2009

Tronox LLC, Henderson, Nevada

Well ID Units	Collection Date	GW Elevation ft amsl	Chlorate mg/l	Chromium mg/l	Nitrate (as N) mg/l	Perchlorate mg/l	TDS mg/l
TR-11	6/1/09	1725.79		0.015	1.0	<0.004	696
TR-12	5/14/08	1716.85		0.05	2.8	<0.004	468
TR-12	6/1/09	1727.26		0.046	2.57	<0.004	510

Notes

ft amsl : Feet above mean sea level

mg/L: Milligrams per liter

NR: Not recorded

NA: Not analyzed

<: Concentration is less than the indicated laboratory method reporting limit