

March 30, 2012

MEMORANDUM

To: Shannon Harbour - Nevada Division of Environmental Protection (NDEP)

From: ENVIRON International Corporation

Subject: Proposal to Discontinue Treatment of AP-5 Pond Water at NERT Facility

INTRODUCTION

The Groundwater Extraction and Treatment System (GWETS) at the Nevada Environmental Response Trust (NERT) site in Henderson, Nevada currently comprises three extraction well fields which extract groundwater contaminated with (primarily) perchlorate and hexavalent chromium, and discharge to an on-site treatment facility employing equalization, carbon adsorption, chemical reduction and precipitation, biological treatment, and sand filtration. An 11-acre, lined surface impoundment, the GW-11 Pond, is also present onsite and provides holding capacity for extracted groundwater prior to treatment, as required. The current configuration of the GWETS is shown in Figure 1. The on-site treatment plant discharges to the Las Vegas Wash under NPDES Permit # NV0023060.

The three extraction well fields designated as the Interceptor Well Field (IWF), Athens Road Well Field (AWF), and Seep Well Field (SWF), respectively, comprise a total flow of approximately 927 gallons per minute (gpm)¹. In 2006, Tronox, the former owner of the site, began pumping water contained within an on-site lined surface impoundment (AP-5) to the on-site treatment plant (see Figure 1)², as part of a decommissioning project pursuant to an Administrative Order on Consent signed with NDEP. After initial dewatering of the pond, GWETS operators have periodically pumped non-potable (Lake Mead) water to the pond to solubilize residual ammonium perchlorate solids with subsequent discharge to the GWETS (GW-11). Since the beginning of this operation, an estimated 1,176 tons of perchlorate have been removed from AP-5 through GW-11 and treated in the treatment system.

Based on recent data collected at the site, the AP-5 pumping program appears to have effectively reduced the mass of perchlorate present in the pond to *de minimis* levels. As a result, NERT is proposing to: 1) immediately discontinue the pumping of Lake Mead water into AP-5; 2) continue pumping AP-5 water to the GWETS until the pond is dewatered; and 3) physically remove any residual solids from the pond and dispose off-site. In the remainder of this memorandum, ENVIRON provides the results of our analysis to support the conclusions stated above and offers a conceptual proposal to discontinue discharges of AP-5 pond water to the on-site treatment system.

¹ Average flow during the five-year period June 2006-June 2011.

² The AP-5 Pond had been used historically as part of the active perchlorate manufacturing process at the site and in 2006 contained residual soluble ammonium perchlorate.

DATA PRESENTATION AND ANALYSIS

The three recovery well fields (IWF, AWF, and SWF) collectively comprise approximately 45 extraction wells which have been effective at removing significant quantities of perchlorate from the environment. Since the start of groundwater extraction and treatment operations at the site in 2002, over 3,500 tons of perchlorate have been removed from shallow groundwater via the three well fields. As shown in Figure 2, perchlorate mass extracted from groundwater has declined from approximately 2,500 pounds per day (lbs/d) in 2002, to less than 1,500 lbs/d as of June 2011. This trend suggests a general reduction of perchlorate mass present in shallow groundwater at the site.

In April 2005, Kerr-McGee and NDEP signed an Administrative Order on Consent, which required closure of the AP-5 pond. Subsequent to that AOC, the facility negotiated several amendments to its Operation and Maintenance Agreement with Veolia Water North America Operating Services, LLC (Veolia) to accommodate the planned dewatering of AP-5 and subsequent discharge of its contents to the on-site treatment system. Specifically, on April 15, 2006, the contract was modified (Amendment 5) to add AP-5 Pond transfer equipment and a new Fluidized Bed Reactor (FBR) train to manage and treat the AP-5 Pond water (Schedule C3 and C4). Treatment plant staffing was increased by two operator maintenance technicians for the AP-5 Pond, the new FBR train, and Sand Filters (additional equipment added for effluent clarity) (Schedule B4). Per the contract amendment, an Expansion Fixed Fee and a perchlorate load based Expansion Variable Fee (and a Caustic Variable Fee) were added to the contract Service Fee³.

In August 2006, the facility began pumping water from the AP-5 Pond to the GW-11 holding pond, which subsequently is discharged to the treatment system. After initial dewatering of the pond contents, facility operators began introducing Lake Mead water into the pond to solubilize residual perchlorate solids. This water was subsequently pumped to the GW-11 pond as described above. The introduction of Lake Mead water into AP-5, with the subsequent discharge into GW-11, continues to the present day.

As shown in Figures 3 and 4, the operation described above has resulted in significant quantities of perchlorate being removed from AP-5 and treated in the GWETS. An estimated 1,176 tons of perchlorate were discharged to the treatment system through GW-11 since the onset of pumping from AP-5 in August 2006. Figures 3 and 4 also indicate that perchlorate loading to the treatment system from the GW-11 pond (i.e., the AP-5 Pond contribution) has been decreasing dramatically since reaching a peak in mid-2009. Perchlorate mass loading to the treatment system attributed to AP-5 decreased from approximately 3,000 lbs/d in 2009 to less than 500 lbs/d in 2011 (Figure 3)⁴. Perchlorate mass loading to the treatment system is now predominated (over 75%) by the extraction well fields.

CONCLUSIONS AND PROPOSED PLAN OF ACTION

Since the onset of pumping water from AP-5 to GW-11 (and subsequently the treatment system) an estimated 1,176 tons of perchlorate have been removed. Based on the decline in the perchlorate mass loading contributed by AP-5 since 2009, it appears that residual

³ In 2011, the Expansion Fixed Fee totaled \$356,676.54 and the Expansion Variable Fee was \$84,597.85.

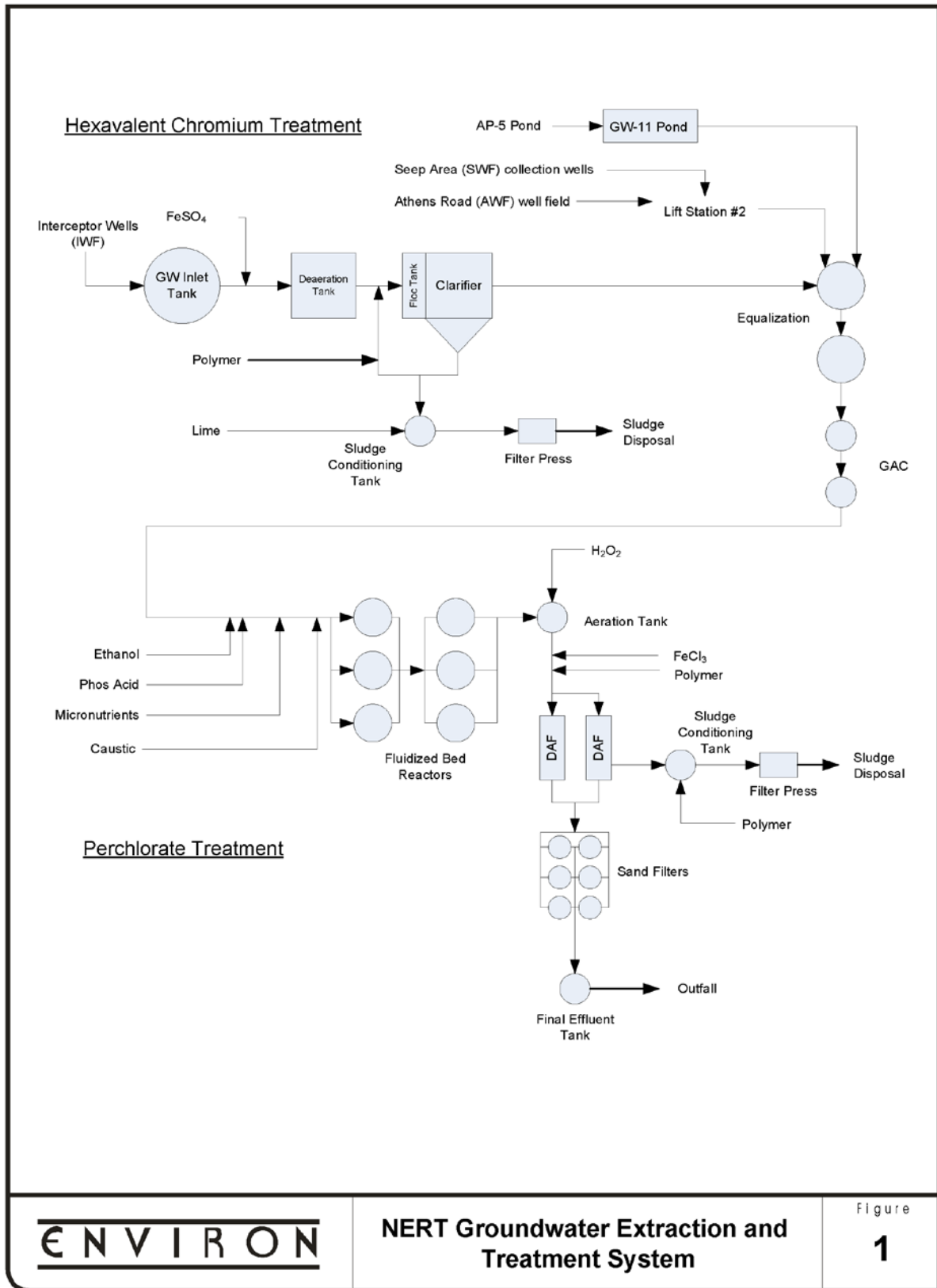
⁴ It should be noted that a portion of the loading attributed in this memo to AP-5 is due to residual perchlorate in the GW-11 pond itself (which has not been quantified).

perchlorate mass present within AP-5 has been reduced to *de minimis* levels. At the present time, over 75% of the perchlorate mass loading to the treatment system is contributed by the groundwater extraction systems (well fields). As such, there appears to be diminishing and only marginal benefit to continuing the pumping of AP-5 contents to the treatment system.

Based on the above analysis, ENVIRON proposes that the following steps be implemented at the site to discontinue the operation of AP-5.

- 1) Permanently close the valve that allows the influent of Lake Mead water to AP-5.
- 2) Pump all remaining water present in AP-5 to the GW-11 pond for treatment. GWETS operators have estimated that approximately 460,000 gallons of water remain in AP-5 presently.
- 3) After all water is removed, characterize residual solids in AP-5 for off-site disposal.
- 4) Remove and dispose off-site residual AP-5 solids at an appropriately permitted disposal facility.

Upon NDEP concurrence of the above conceptual plan, ENVIRON will develop a sampling plan for solids characterization, removal and disposal for NDEP review and approval. NERT proposes that all subsequent decommissioning work regarding AP-5 (e.g., liner removal, underlying soil sampling, remediation as necessary) be undertaken as part of the site-wide RI/FS Work Plan that is currently underway.



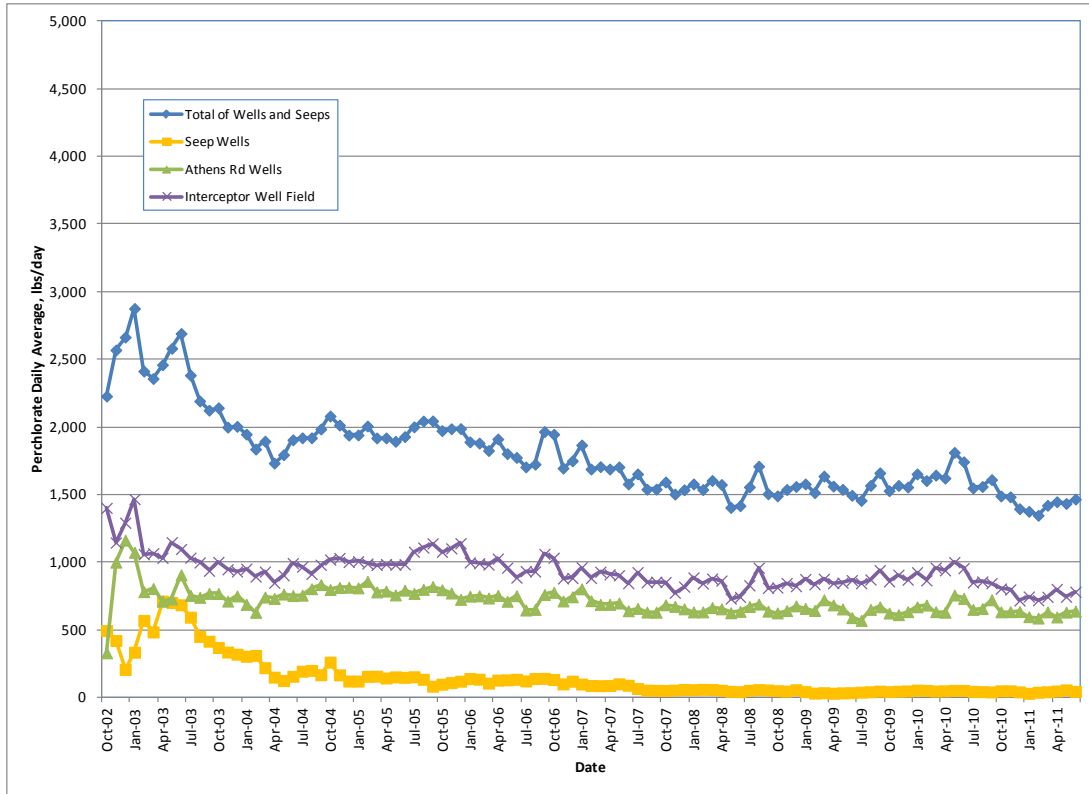


Figure 2. Perchlorate Mass Loading from Wells and Seeps

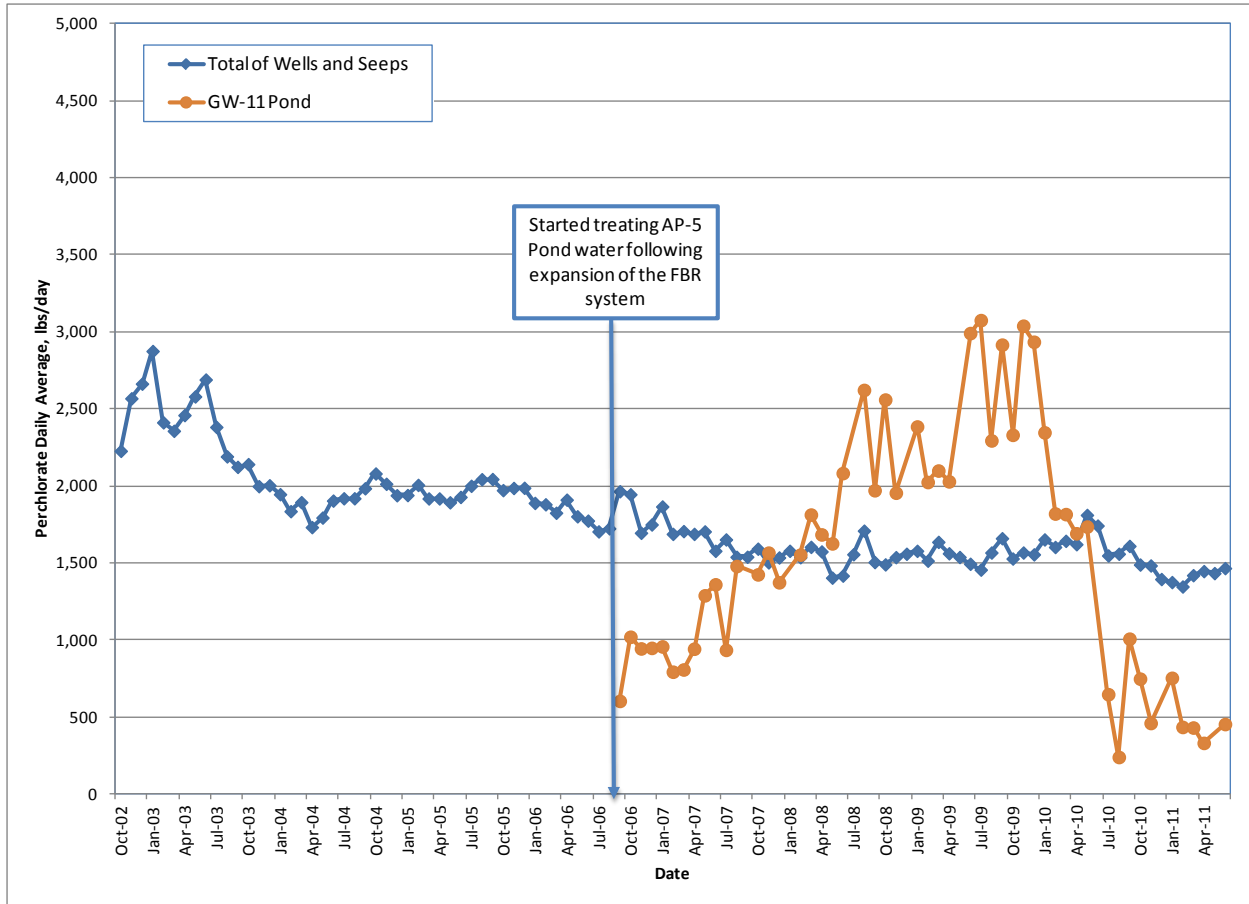


Figure 3. Perchlorate Mass Loading Contribution from GW-11 Pond

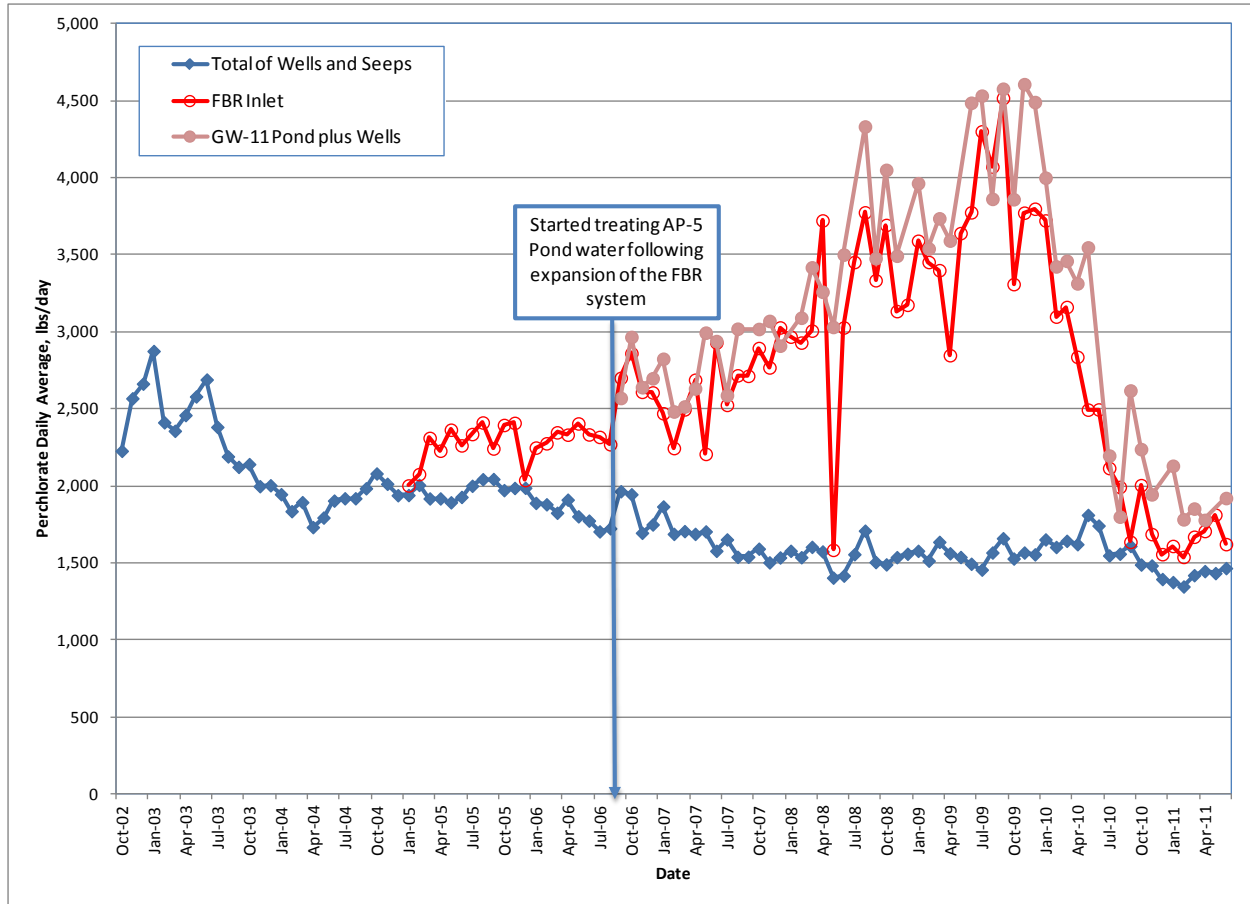


Figure 4. Perchlorate Mass Summation of Load