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3 May 1999

Mr. Wayne Praskins
U.S. EPA – Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Praskins:

Attached is the proposal to implement the Phase 2 Perchlorate Treatability Study at Aerojet's Sacramento Facility.

Sincerely,

Donald E. Vanderkar
Director, Environmental
Restoration Programs

cc: SL Phinney, Aerojet
RC Anderson, Aerojet
PR Taft, Munger, Tolles & Olson
J Catts, HLA
C Williams, Watermaster
M Berlien, La Puente Valley Water District
BPOU SC

MGM/H0599-03

PROPOSAL

Implementation of Phase 2 Perchlorate Treatability Study At Aerojet Sacramento Facility

INTRODUCTION

In June 1997 concentrations of perchlorate ion above the State of California Department of Health Services (DHS) provisional action level of 18 micrograms per liter (ug/L) were found in groundwater within the Baldwin Park Operable Unit (BPOU) and other portions of the San Gabriel Basin. Additionally, perchlorate has been detected in groundwater at other facilities in California, Nevada, Utah, and in locations throughout the US.

At that time no treatment technology had been demonstrated to be effective in reducing concentrations of perchlorate in water to the provisional action level. Since this discovery, the BPOU Steering Committee has worked with EPA to define the extent of perchlorate migration in the groundwater and to evaluate and develop treatment technologies for removal of perchlorate.

In September 1997 the report titled Technology Screening for the Treatability of Perchlorate in Groundwater, prepared by the BPOU Steering Committee, was submitted to EPA. This report contained a review and ranking of technologies with the potential to successfully remove perchlorate from water. Subsequently, a two-phase perchlorate treatability study was proposed and a Phase 1 Treatability Study Workplan submitted to EPA. In November 1997, the Phase 1 Treatment Study was started and testing continued until June 1998. Based upon preliminary data, in May 1998, a Draft Phase 1 Treatability Study Report and Draft Phase 2 Treatability Study Workplan were submitted to EPA. In April 1999, a Final Phase 1 Treatability Study Report was submitted to EPA.

Following issuance of the Draft Phase 2 Treatability Study Workplan in May 1998, NDMA and 1,4 dioxane were detected in San Gabriel Basin groundwater. These discoveries required a change in the treatment strategy proposed for the Phase 2 treatment system. The Phase 1 treatment system had included a bioreactor to remove perchlorate and nitrate, and an air stripper to remove Volatile Organic Compounds (VOCs). Neither of these unit processes reduces concentrations of NDMA or 1, 4 dioxane in water. To augment the Phase 2 treatment system, UV irradiation was proposed for removal of NDMA and UV/oxidation was proposed for removal of 1, 4 dioxane. This treatment train was modified to replace air stripping for VOC treatment with the now required UV/oxidation and to add liquid-phase granular activated carbon (GAC) to remove carbon tetrachloride and to polish the finished water.

Following the discovery of perchlorate in June 1997, the Main San Gabriel Watermaster established the Perchlorate Coordinating Committee to facilitate and oversee the development of perchlorate treatment technology. The BPOU actively supported the Watermaster in this effort and coordinated its work with the Watermaster.

Beginning with the initiation of the Phase 1 Treatability Study, the BPOU Steering Committee contacted the La Puente Valley County Water District (La Puente). The purpose of this contact was to explore conducting the Phase 2 Treatability Study at the La Puente well site. The Steering Committee worked vigorously toward this goal. Numerous meetings were held involving La Puente, DHS, and EPA. Also, draft agreements were developed and designs were prepared.

In the mean time, beginning in the late fall of 1998, members of the BPOU Steering Committee entered into negotiations with Watermaster regarding a program to construct and operate groundwater extraction and treatment facilities in the Basin. These facilities would satisfy the conditions defined in the Record of Decision prepared by EPA in March 1994 and meet Watermaster water supply concerns. Constructing the Phase 2 facilities at La Puente was included as part of the overall program being negotiated between PRPs and the Watermaster. Due to factors associated with the negotiations, it recently became impossible to proceed with the construction of the Phase 2 treatment system at the La Puente site. It is now necessary to define another site for the construction and operation of the Phase 2 Treatability Study.

PROPOSAL

It is proposed that the Phase 2 Treatability Study be constructed and operated on the Aerojet Sacramento Facility at the Groundwater Extraction and Treatment Facility (GET) F.

The objective of this proposal is to take advantage of this operating treatment facility which includes biological treatment for perchlorate removal and air stripping for VOC removal, and construct modifications to the plant. Modifications would allow chemicals found in San Gabriel groundwater, but not found in GET F water, to be injected at the start of the treatment train. The modifications would also include additions of unit processes to remove the array and concentrations of chemicals present in San Gabriel Basin groundwater. A treatability study would then be conducted to demonstrate the efficacy of removing perchlorate, NDMA, VOCs, and 1, 4 dioxane. The effort would be directed to achieving potability standards and to obtaining a DHS operating permit for use of the process in a public water supply.

Treatment technologies are demonstrated and accepted for use through scientific studies carried out in controlled conditions. The performance of the technology is documented for the target chemicals on water of known composition. The location is important only in the need to define the conditions associated with the process. New and emerging technologies are often developed and permitted at one location and then once permitted applied routinely at other locations. Completing the technology demonstration the first time requires the most work. For some technologies, permitting at other locations may require limited additional studies, while for other technologies additional studies may not be required. It is important that the conditions being evaluated reasonably match the

target site needs. With the addition of selected chemicals to the water to be treated, conditions at GET F match well the conditions in the San Gabriel Basin. Therefore the demonstration of a treatment technology at a site removed from the San Gabriel Basin (Sacramento) will allow DHS to permit this technology for a public water supply in the BPOU. With a permitted facility operating in Sacramento, obtaining an operating permit for a treatment system in San Gabriel Basin should be straight forward.

BASIS FOR PROPOSAL

In developing the proposal described above for the Phase 2 Treatability Study, several alternatives were considered. Alternatives in addition to the recommended project included the following:

> Construction and operation of a new treatment system at another wellhead site in the San Gabriel Valley (e.g. Big Dalton or Lante).
>
> Construction and operation of a new treatment system using water extracted from monitoring wells numbers 2 and 4 at the Aerojet Azusa Facility.
>
> Construction and operation of a new treatment system at a well site near Aerojet's Sacramento facility. This alternative considered both Arden Cordova Water Service and County of Sacramento Wells.

In the process of evaluating the alternatives described above and the selection of the GET F Perchlorate Treatment Facility as the site proposed for the Phase 2 Treatability Study, the following advantages of GET F became obvious:

> The existing GET F facility has already successfully demonstrated perchlorate removal using exactly the same biological treatment technology.
>
> To achieve the goals of the Phase 2 Treatability Study, construction of minimal new facilities would be required.
>
> Groundwater containing most of the primary chemicals of concern is available in any volume needed.
>
> The site contains most of the treatment units to be evaluated already constructed and operating.
>
> There is adequate room available to construct and operate the new facilities.
>
> Working conditions within the existing facility are excellent.
>
> There are no neighboring facilities or residents that could be affected by construction or operation activities.

Access to the site is immediately available. No access agreements are required and there are no restrictions on hours of operation.

Trained and skilled operators who have participated in the construction and operation of the GET F facility are already present at the site.

The site is secure.

There is appropriate infrastructure for water disposal. There are no additional permitting requirements governing water or waste disposal.

All of the other alternatives considered would require the design and construction of entire new facilities. All would require either negotiation of access agreements or the purchase of land. In addition all other alternatives would require addressing impacts on neighboring facilities and residents, permitting for discharge of treated water, limitations on hours of operation, and site security. These considerations would not only affect the cost of the Phase 2 Treatability Study but more importantly would lengthen the time required to complete design, permitting, construction, and operation.

EXISTING PERCHLORATE TREATMENT FACILITY

The existing GET F Treatment Facility is on the Aerojet Sacramento site and is part of an ongoing CERCLA investigation and remediation activity overseen by US EPA Region 9, California Department of Toxic Substances Control, and California Regional Water Quality Control Board. The GET F Treatment Facility was originally constructed in 1987 to extract and treat groundwater containing VOCs and in so doing intercept a groundwater plume and create a hydraulic barrier. The facility was modified in 1998 by the construction of a perchlorate treatment component of the treatment system.

The GET F Facility extracts groundwater from the southwestern portion of the 8,500-acre Sacramento operating facility via a system of three extraction wells. The extraction rate averages 1,400 gallons per minute (gpm). The water passes through the treatment system originally composed of air stripping (with GAC emission control), pH control, and bag filters. The water is then injected into the ground; a process which contributes to the hydraulic control of groundwater flow. The 1998 modification added biological reactors, and sand filters to the treatment train.

The source groundwater contains chemicals of concern in the following concentrations:

VOCs		
TCE-	2,500ug/L GET F	500ug/L GET E
1, 2 DCE-	10ug/L GET F	10ug/L GET E
Chloroform	200ug/L GET F	50ug/L GET E
Perchlorate	6,000 ug/L GET F	1,000 ug/L GET E

NDMA	ND @20 ppt GET F	200ppt GET E
1, 4 dioxane	N/D at 10 ppb GET F	ND @ 10ppb GET E

The GET F Facility has operated continuously since 1987 with minor outages for equipment repair. The flow rate has been in the range of 1,400 to 1,600 gpm. The effluent water quality has been maintained at or below detection level (with a few minor excursions above detection level) for all chemicals of concern.

FACILITY MODIFICATIONS CURRENTLY UNDERWAY

Modifications to the GET F facilities are underway. These modifications are not directly related to this proposal for implementing the Phase 2 Treatability Study. The current modifications have three primary goals. One is to accommodate water to be conveyed to GET F from GET E. This water contains perchlorate that will be removed by the GET F biological treatment facility. The second primary goal is to reconstruct the treatment train to optimize the effectiveness and throughput of the biological treatment system. The third primary goal is to optimize NDMA and VOC removal by using UV oxidation.

The water to be conveyed from GET E will increase the flow through the treatment plant by 2,200 gpm to a total of 3,600 gpm. The GET E water contains approximately 200 ppt of NDMA. The combined flow of approximately 3,600 gpm through the GET F treatment plant will contain approximately 100 ppt of NDMA. GET E water does not contain detectable levels of 1, 4 dioxane.

The reconstruction of the GET F treatment train will result in the following treatment elements. The biological reactors will be first and will receive water directly from the wells. Water will then pass through the sand filters, which will operate with filtering aids including polymers and flocculants. Ultra violet irradiation in conjunction with oxidation using hydrogen peroxide will follow. Although the UV/oxidation is expected to remove most of the VOCs, stripping towers will be employed next to remove any VOCs remaining. The final treatment element will be bag filters to remove particulate matter that might, over time, impact the injection wells.

These modifications to the GET F facility are under construction and scheduled to be completed by the end of July 1999.

IMPLEMENTATION OF PHASE 2 PROJECT

The Phase 2 Treatment Study will be performed using a treatment system operating parallel to the existing GET F perchlorate facility. A bypass system would be constructed by connecting into the effluent piping of the existing biological reactors. Piping would convey the water to and through the treatment train as defined in the Phase 2 Treatability Work Plan and as shown on Figure 5.1 of that document beginning with the multi-media filters. The flow rate through the system will be designed for 300 gpm.

Water currently treated at the GET F facility contains high levels of oxygen after it passes through the air stripping towers and as it enters and passes through the bioreactors. After the modifications described above are completed, the water will not have passed through the air strippers before entering the bio-reactors and will therefore contain much lower levels of oxygen. The results of the Phase 1 Treatability Study indicated that anoxic conditions in the bioreactors allow for more complete removal of perchlorate. Therefore reducing the dissolved oxygen level influent to the bioreactor will allow lower proportions of recycled water, and higher bioreactor throughput.

Water entering the Phase 2 system will initially contain NDMA and 1, 4 dioxane below or near the detection level. This water will be spiked with these compounds to establish concentrations of approximately 100 ppt of NDMA and 10 ppb of 1, 4, dioxane. These concentrations are representative of the concentrations found in the BPOU. After the GET F modifications are complete and GET E water is diverted to the GET F treatment system, the addition of NDMA should no longer be required.

The existing GET F Facility is designed to discharge either to ground surface or to groundwater via recharge wells. The Phase 2 System will be constructed to reconnect to the GET F treatment system to allow either discharge alternative to be employed. Until the Phase 2 System is fully operational and treating groundwater to meet discharge requirements, the effluent will be discharged to the ground surface. After discharge requirements have been demonstrated, the effluent will be recharged to the groundwater.

The construction and operation of the Phase 2 facility would follow the Phase 2 Treatability Study Work Plan with only minor modifications. The Work Plan will be revised to include the necessary modification to allow the system to be installed and operated at the GET F Facility in Sacramento.

COORDINATION CONSIDERATIONS

The Aerojet Sacramento facility is situated on a CERCLA site. Investigations, feasibility studies, and remediation activities are being conducted per an existing Partial Consent Decree involving US EPA, and the State of California Regional Water Quality Control Board and the Department of Toxic Substances Control. These governmental agencies will be apprised of this proposal and asked to approve the project.

The State of California Department of Health Services (DHS) has been an integral part of the perchlorate treatability efforts to date. The Drinking Water Field Operations Branches of DHS, in both Los Angeles and Sacramento, will be apprised of this proposal and asked to monitor the Phase 2 Treatability Study effort. A meeting of the key representatives of DHS will be requested to discuss the best approach for involving the Department and ultimately obtaining DHS approval of the treatment process for potable use.

SCHEDULE

Submit revised Phase 2 Treatability Work Plan	May 21,1999
Initiate project per Work Plan Schedule	June 14. 1999