



## Action Memorandum

For the Lincoln Avenue Water Company (LAWC), Altadena, California  
Associated with Groundwater Cleanup at the National Aeronautics  
and Space Administration, Jet Propulsion Laboratory, Pasadena, California

Final

August 23, 2004

### PURPOSE

This Action Memorandum documents the National Aeronautics and Space Administration's (NASA's) decision to undertake a cleanup action, a Time-Critical Removal Action (TCRA), to address dissolved perchlorate in groundwater extracted from two Lincoln Avenue Water Company (LAWC) drinking water wells (LAWC#3 and LAWC#5). Both wells are located near the Jet Propulsion Laboratory (JPL) site in Pasadena, California.

The TCRA is being funded as a part of the NASA JPL Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Program. NASA is providing

funding and technical support for LAWC's construction and operation of an ion exchange water treatment system to remove perchlorate from the water extracted from LAWC#3 and LAWC#5. This TCRA is being conducted in accordance with Section 104(a)(1)(A) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as prescribed in 40 Code of Federal Regulation (CFR) §300.415. As part of a phased response strategy, TCRAs can be used to respond to threats or releases when planning can be completed in less than 6 months following issuance of an Action Memorandum.

### NATIONAL PRIORITIES LIST STATUS

The JPL site was scored using the CERCLA Hazard Ranking System, and in October 1992 JPL was placed on the Environmental Protection Agency's (EPA's) National Priorities List (NPL) of sites governed or regulated by CERCLA. In 1992, NASA entered into a Federal Facility Agreement (FFA) pursuant to Section 120 of CERCLA, and was designated the lead agency for carrying out the CERCLA cleanup process at JPL. The parties to the FFA include NASA, EPA, California Department of Toxic Substances Control, and California Regional Water Quality Control Board, Los Angeles Region (RWQCB).

NASA has divided the JPL site into three Operable Units (OUs) for purposes of CERCLA investigation and clean up activities: OU-1 consists of on-facility groundwater, OU-2 consists of on-facility soils, and OU-3 consists of off-facility groundwater adjacent to JPL. This Action Memorandum addresses the LAWC wells, which are part of OU-3. NASA plans to implement additional removal actions in OU-3 incrementally, as warranted; LAWC is the first removal action. Separate Action Memoranda for treatment of groundwater extracted from other production wells in OU-3 will be forthcoming as this phased approach is implemented. Actions and decisions relating to OU-1 and OU-2 are addressed separately.

### BACKGROUND

Liquid wastes generated at JPL in the 1940s and 1950s (such as cleaning solvents, solid and liquid rocket propellants, cooling tower chemicals, and analytical laboratory chemicals) were disposed of in seepage pits, a then common and acceptable practice. Some of these wastes contained chemicals (e.g., perchlorate and chlorinated solvents containing volatile organic compounds [VOCs]) that have been found in groundwater beneath and adjacent to JPL, including groundwater extracted from two drinking water wells operated by LAWC (LAWC#3 and LAWC#5). Figure 1 is a location map showing JPL and the LAWC production wells. A description of the JPL site is provided as Attachment A. A summary of previous CERCLA actions taken at the JPL site is provided as Attachment B.

In 1981, VOCs were first detected in LAWC#3 and LAWC#5. By 1984, VOC concentrations were increasing and both wells were shut down. With NASA funding, LAWC installed a

VOC treatment facility for the wells in the early 1990s. NASA funded the ongoing operations of the plant as well. The existing VOC treatment facility consists of four 12-ft-diameter treatment vessels (Calgon Carbon Model 12 Adsorption Systems), each containing 20,000 lb of liquid-phase granular activated carbon (LGAC). The LGAC treatment facility is operated under an Operations Plan approved by the California Department of Health Services (DHS) (revised September 2002).

Perchlorate concentrations were first detected in samples collected from the LAWC wells in 1997, when an improved analytical method, using ion chromatography, was developed to detect low levels of perchlorate. Since 1997, perchlorate concentrations in samples from the LAWC wells have ranged from less than 4 micrograms per liter ( $\mu\text{g/L}$ ) to 25.0  $\mu\text{g/L}$ .

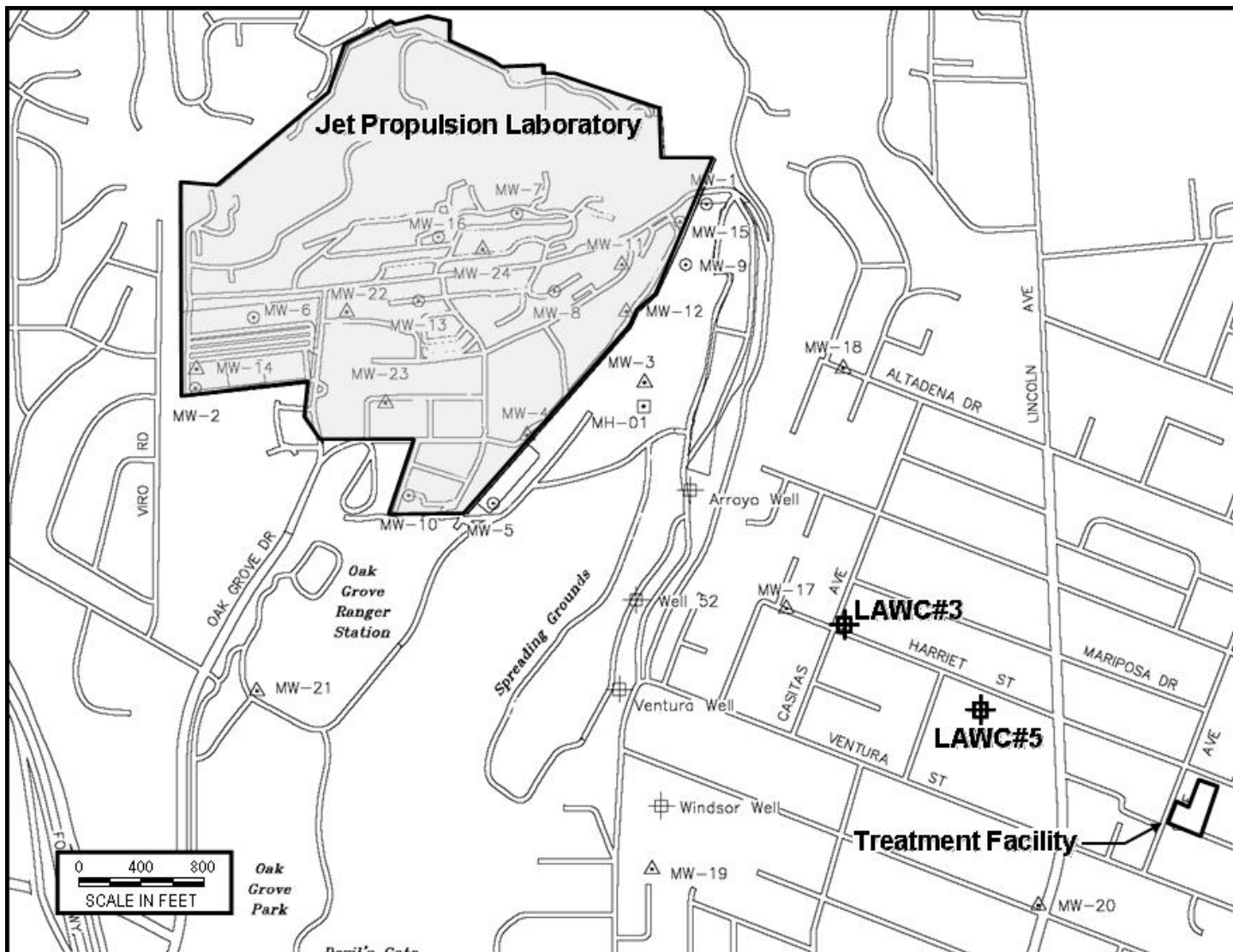


Figure 1. Location Map

A microgram per liter is equivalent to a part per billion, a term also used frequently to describe an amount of perchlorate in water. LAWC has, at all times, ensured that water provided to its customers meets state standards; on occasion, LAWC met the standards by purchasing water from the Foothill Municipal Water District and blending that water with LAWC's wells.

Table 1 summarizes carbon tetrachloride, trichloroethylene, and perchlorate concentrations detected in LAWC#3 LAWC#5. Figure 2 is a graph of historical perchlorate concentrations in groundwater samples collected from

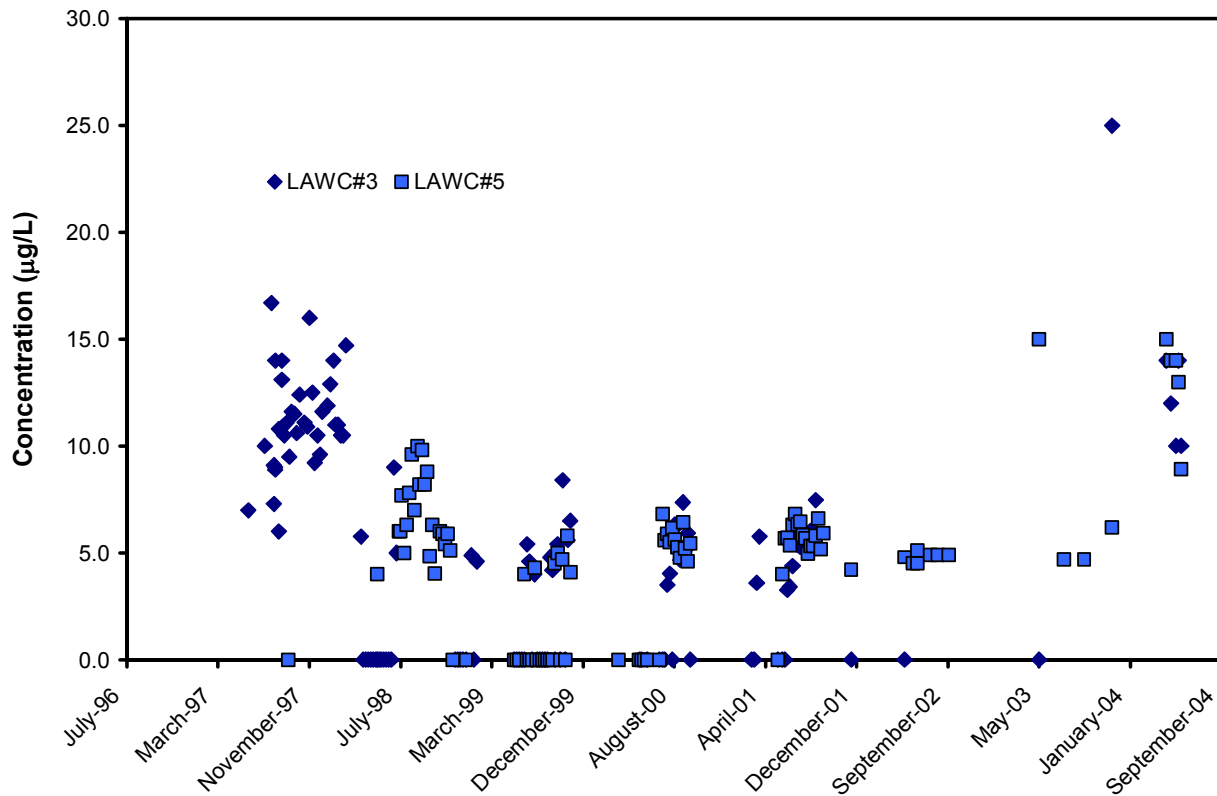
LAWC#3 and LAWC#5, showing an increase in concentrations during late 2003/early 2004.

NASA-JPL has a multiport monitoring well, MW-17, located less than 500 ft upgradient of LAWC#3. Table 1 summarizes maximum VOC and perchlorate detections in samples collected from the five sampling screens (discrete sampling intervals) of MW-17. This monitoring well serves as the best available indicator of near-future (1-2 years) concentrations that may be observed in LAWC wells.

Table 1. Summary of Chemical Data

Analyte	Units	LAWC#3		LAWC#5		MW-17 (Maximum Levels)					Regulatory Level
		Min	Max	Min	Max	S1	S2	S3	S4	S5	
Carbon Tetrachloride	µg/L	<0.5	1.8	<0.5	1.9	<0.5	1.0	13.7	0.8	<0.5	0.5
Trichloroethylene	µg/L	<0.5	20.8	<0.5	57.4	<0.5	6.2	23	15.5	16	5
Perchlorate	µg/L	<4.0	25	<4.0	15	<4.0	15.7	209	17	22	6

Note: MW-17 is a multiport monitoring well containing five separate sampling screens, denoted S1 through S5.



**Figure 2. Historical Perchlorate Concentrations in LAW C#3 and LAW C#5**

### CERCLA DETERMINATION

LAWC must utilize LAW C#3 and LAW C#5 to meet seasonal potable water demands. These two wells are typically operated from May until November. Sampling conducted in the Spring of 2004 revealed perchlorate concentrations in excess of the California Public Health Goal (PHG) and DHS Action Level (AL). DHS issued a letter on May 21, 2004, requesting that LAW C install and operate an ion exchange system as soon as possible to remove perchlorate from groundwater extracted from LAW C#3 and LAW C#5.

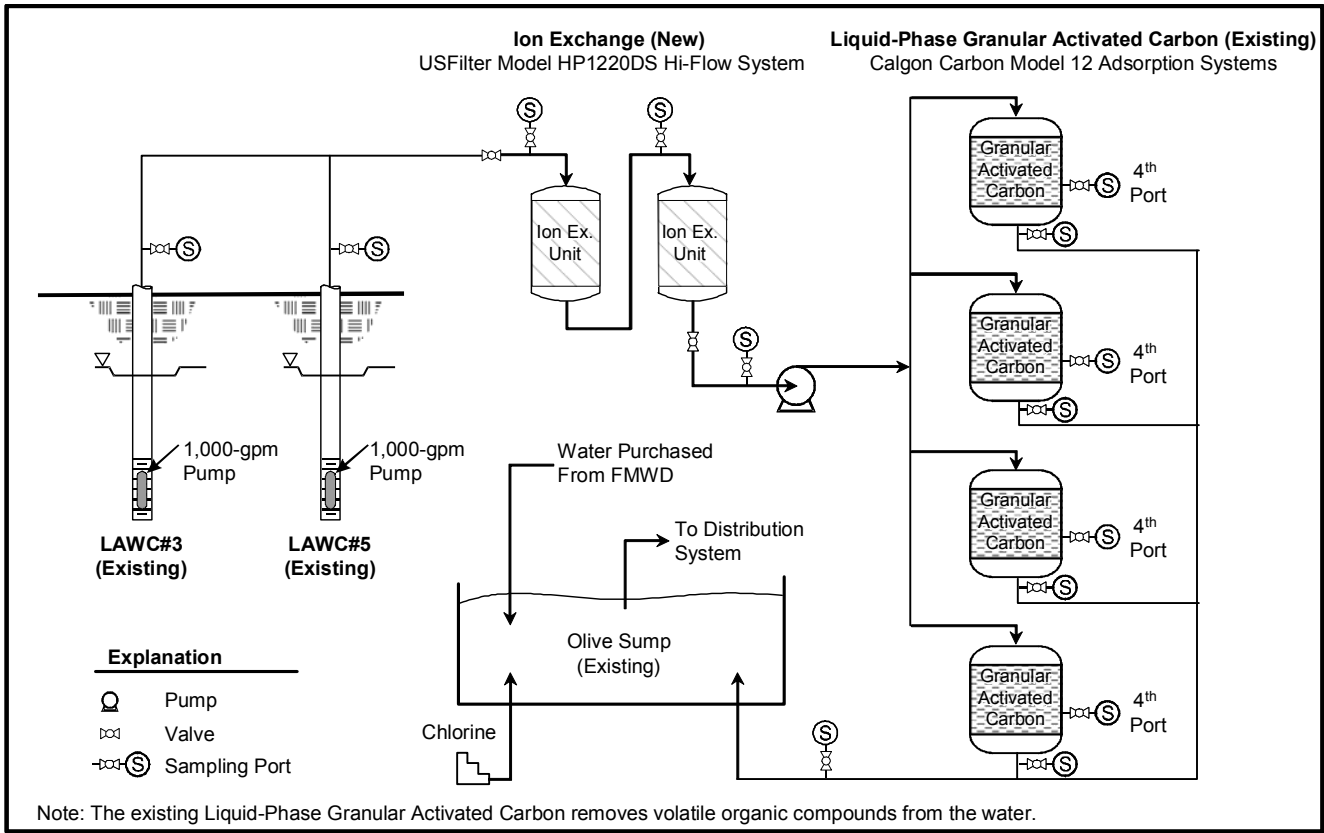
Perchlorate present in groundwater extracted from the LAW C wells is believed to originate from JPL; therefore, removal is part of the NASA JPL CERCLA Program. The removal action is considered time-critical (thus requiring action within 6 months) due to the need for LAW C to meet water demands this summer and the threat of continued chemical migration in the absence of groundwater extraction.

### PROPOSED ACTION

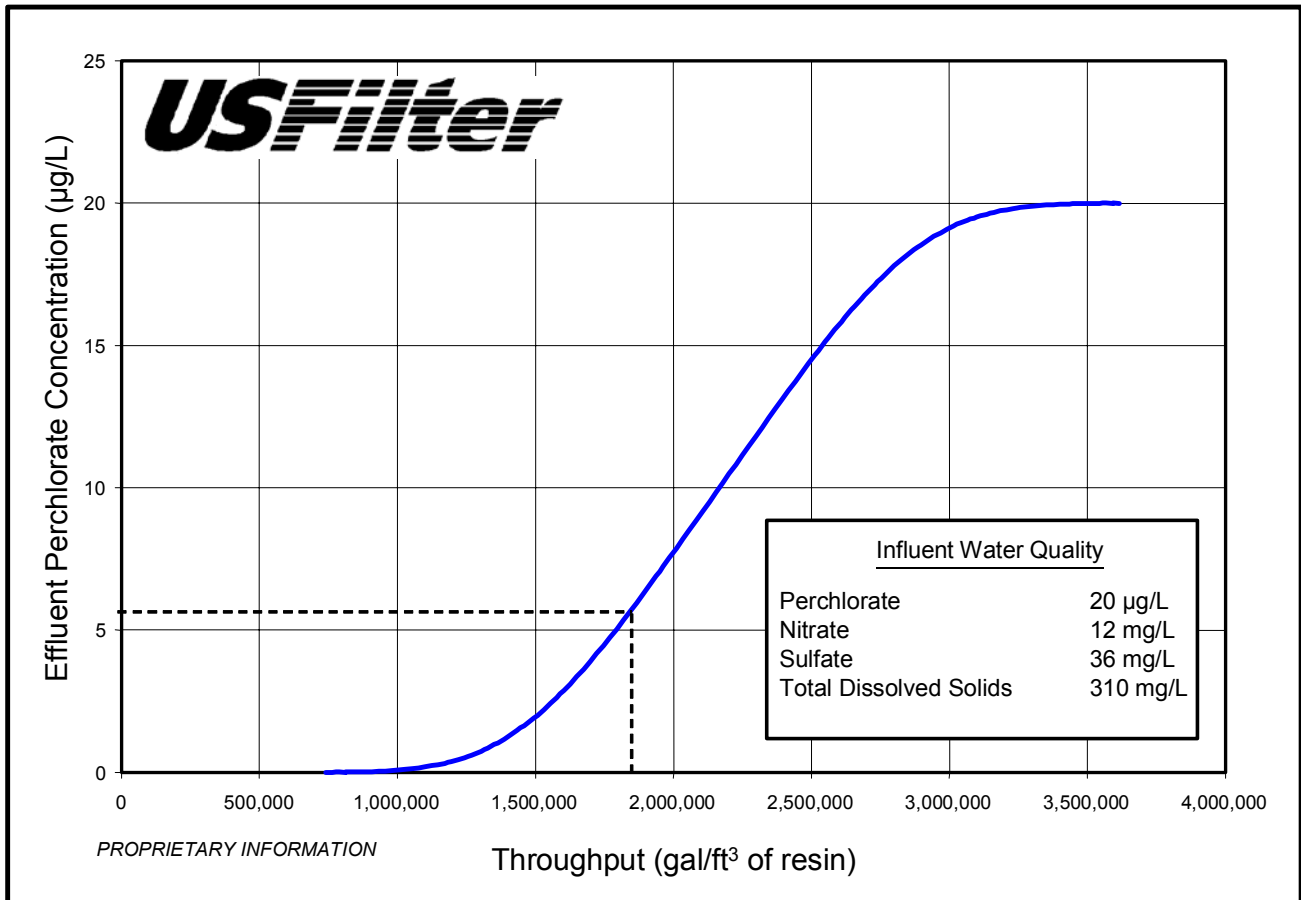
An ion exchange system has been incorporated into the treatment train at LAW C, consisting of LGAC, chlorination, and blending with Foothill Municipal Water District (FMWD) water in the Olive Sump. Water in the Olive Sump is pumped into the distribution system for potable use by LAW C customers. A process flow diagram for this entire treatment system is provided as Figure 3. Ion exchange treatment will consist of a USFilter Model HP1220DS Hi-Flow System. The HP1220DS System has two 12-ft-diameter ion exchange vessels, with a nominal treatment capacity of 2,000 gpm. All piping, valves, and gauges are included within the skid-mounted system. Details on the USFilter treatment system are provided as Attachment C and include a summary of the technology, system specifications, and a general assembly diagram. Attachment D contains the Operations Manual for the LAW C system. Similar USFilter systems are in operation

for perchlorate removal in other areas of California, including the City of Fontana and the City of Rialto.

Each ion exchange unit contains 300 cubic feet of Rohm and Haas, Amberlite™ PWA2 Strongly Basic Anion Exchange Resin, which is designed for selective removal of perchlorate from potable water. Amberlite™ PWA2 has been certified for potable water use according to National Sanitation Foundation (NSF) Standard 61. The estimated breakthrough curve, prepared by USFilter using a proprietary simulation model, is provided as Figure 4. The breakthrough curve was developed assuming an influent perchlorate concentration of 20 µg/L; however, based on discussions with USFilter, the resin would still be effective with perchlorate concentrations as high as 200 µg/L. Details on the ion exchange resin are provided in Attachment E.



**Figure 3. Process Flow Diagram**



**Figure 4. Estimated Breakthrough Curve (Modeled by USFilter)**

Operational guidelines associated with the ion exchange system (recommended to DHS in the Technical Report associated with the permit amendment) include the following:

1. All water extracted from LAWC#3 and LAWC#5 shall be treated by the ion exchange to remove perchlorate.
2. Effluent levels of perchlorate from the ion exchange units shall be below 4 µg/L (the detection limit for EPA Method 314.0), thus meeting the PHG/AL.
3. The ion exchange system shall be operated and maintained according to the manufacturer's specifications.
4. The ion exchange resin shall be replaced in the lead vessel when the effluent perchlorate has reached a concentration of 30% of the influent perchlorate concentration, or if the

- perchlorate concentration leaving the lag vessel exceeds the detection limit of 4 µg/L. During an individual change, the lead vessel will be taken off line and new resin will be loaded into the vessel. The vessel containing the new resin will be placed in the lag/polishing position. Valving will be adjusted so that the former lag vessel will take lead position. This ensures that the newest anion resin is always in the lag/polishing position.
5. The proposed sampling locations and chemical monitoring schedule are provided in Table 2 (includes sampling associated with VOCs and microbiological testing).
6. Operational records shall be submitted to DHS by the 10th of each month.

**Table 2. Sampling Locations and Monitoring Schedule**

Analyte	Method	LAWC#3	LAWC#5	IX Influent	Lead IX Effluent	Lag IX Effluent	LGAC- 4 <sup>th</sup> Port <sup>(a)</sup>	LGAC-Effluent <sup>(a)</sup>	Combined Effluent
Carbon Tetrachloride	EPA 524.2	M	M	-	-	-	W	M	M
Trichloroethylene	EPA 524.2	M	M	-	-	-	W	M	M
Tetrachloroethylene	EPA 524.2	M	M	-	-	-	W	M	M
Perchlorate	EPA 314.0	M	M	W	W	W	-	-	M
Nitrate	EPA 300.0	-	-	M	M	M	-	-	-
Total Coliform	EPA 1604	M	M	-	-	-	-	M	W
Heterotrophic Plate Count	9215B	-	-	-	-	-	-	M	W

(a) Samples will be collected from each of the 4 LGAC vessels

M = Monthly; W = Weekly

Note: Sampling locations are shown on Figure 3.

## TECHNOLOGY SELECTION

Due to operational necessity, LAWC is treating groundwater extracted from LAWC#3 and LAWC#5. LAWC's treatment selection was based on vendor (USFilter) experience, implementation schedule, and costs. The lease costs for the ion exchange system that were provided to NASA are \$9,500/month plus \$159 per acre-foot of treated water. Concrete pad and associated piping construction costs are estimated at \$200,000.

NASA concurs with selection of the ion exchange technology. Ion exchange is the only technology that has been

implemented for removal of perchlorate from drinking water in California. While fluidized bed reactor (FBR) technology has been evaluated for drinking water treatment and DHS has provided conditional acceptance of the technology, no facilities have been approved for drinking water treatment. Additionally, recent improvements in perchlorate selective resins, specifically the resin identified for LAWC system (see Attachment E), have significantly reduced the operational costs associated with ion exchange for perchlorate removal.

## REGULATORY ANALYSIS

A regulatory analysis was conducted to determine applicable and relevant and appropriate requirements (ARARs) for the removal action associated with LAWC production wells (LAWC#3 and LAWC#5).

The ion exchange system was constructed in Altadena on a vacant portion of the same property as the current LGAC system and Olive Sump. No prehistoric sites, historic sites,

historic buildings or landmarks were identified on this property. No endangered or threatened species or critical habitats were present within the area identified for construction of the LAWC system. Finally, the property is not located in a floodplain or wetland.

Fugitive dust was controlled during construction to comply with South Coast Air Quality Management Board (SCAQMD)

Rules 401 and 403. No other SCAQMD rules apply since VOCs are removed using LGAC prior to discharge into the Olive Sump, which is a covered reservoir open to the atmosphere.

As the purveyor of drinking water in California, the LAWC must comply with all applicable regulations associated with drinking water identified in the California Code of Regulations (CCR) Titles 17 and 22. This includes obtaining certification of treatment plant operators and a permit to operate the system from DHS.

Treated water intended for potable use must comply with the most stringent provisions of the Federal and State ARARs associated with domestic use:

- Federal maximum contaminant level (MCL) for trichloroethene in drinking water as promulgated by EPA under the Safe Drinking Water Act at 40 CFR § 141.61(a) and (c).
- State primary MCL for carbon tetrachloride at CCR, Title 22, § 64444.

A Federal or State MCL for perchlorate has not been set. However, the California Health and Safety Code § 116365(a) requires the DHS to set MCLs at a level as close as is technically and economically feasible to its PHG. The PHG is established by the California Office of Environmental Health Hazard Assessment (OEHHA) and is the concentration in drinking water that does not pose any significant risk to health, derived from a human health risk assessment. OEHHA established a final PHG for perchlorate of 6 µg/L in March 2004. Until the perchlorate MCL is in place, DHS will use an AL to protect consumers, which is currently the same level as the PHG. Table 3 summarizes the relevant cleanup standards for chemicals in groundwater extracted from LAWC#3 and LAWC#5.

**Table 3. Standards for Chemicals in Groundwater (units reported in µg/L)**

Analyte	MCL (40 CFR § 141.61)	California MCL (CCR Title 22, § 64444)
Carbon tetrachloride	5	0.5
Trichloroethylene	5	5
Perchlorate	NA	NA <sup>(a)</sup>

(a) An MCL does not exist for perchlorate; however, DHS has established a PHG and AL of 6 µg/L.

**Criteria for Surface Water Discharge**

During initial testing and evaluation of the treatment plant, extracted water may be discharged to the storm sewer. ARARs associated with surface water discharge include:

- Chapters 2 and 3 of the Water Quality Control Plan for the Los Angeles Region (Water Quality Control Plan, Los Angeles Region (4) Basin Plan, 1984). Establishes water quality objectives, beneficial uses, and waste discharge limitations for groundwater.

- The Anti-Degradation Policy of State Water Resources Control Board Resolution 68-16 requires that discharges to existing high quality waters maintain a quality consistent with maximum benefit to the people of California.

These ARARs will be addressed by meeting the substantive requirements identified in RWQCB Order No. R4-2002-0107, *Water Discharge Requirements for Discharges of Treated Groundwater from Investigation and/or Cleanup of Volatile Organic Compounds Contaminated-Sites to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties (General National Pollutant Discharge Elimination System (NPDES) Permit No. CAG914001)*. This order provides applicable waste discharge requirements associated with surface water discharge. Applicable limits for treated water are summarized in Table 4.

**Table 4. Standards for Chemicals in Treated Groundwater Discharged to Surface Water**

Analyte	Units	Discharge Limit RWQCB Order No. R4-2003-0108
Carbon tetrachloride	µg/L	0.5
Trichloroethylene	µg/L	2.7
Perchlorate	µg/L	4

**Raymond Basin Adjudication**

JPL is located in the Monk Hill Subbasin of the Raymond Basin. In 1944, the Superior Court of California approved the Raymond Basin Judgment, which adjudicated the rights to groundwater production to preserve the safe yield of the groundwater basin. Adjudication refers to the practice of landowners and other parties allowing the courts to settle disputes over how much groundwater can rightfully be extracted. The courts determine an equitable distribution of water that will be available for extraction each year. In these adjudicated groundwater basins, the courts appoint a Watermaster to administer the court judgment. The Raymond Basin Management Board, made up of representatives of the water purveyors, oversees the management and protection of the Raymond Basin. A total of six Raymond Basin water purveyors, including LAWC, operate wells in the Monk Hill Subbasin. LAWC will continue to comply with extraction, reporting, and monitoring requirements associated with the Raymond Basin Judgment.

**Off-Site Disposal of Spent Resin**

A relatively small volume of solid waste (300 to 600 cubic feet per year), consisting of spent ion exchange resin beads, will be generated during operation of the ion exchange system. The Off-Site Rule (40 CFR §300.440) applies to any remedial or removal action involving the off-site transfer of CERCLA wastes. The purpose of the Off-Site Rule is to avoid having CERCLA wastes from response actions authorized or funded under CERCLA contribute to present or future environmental problems by directing these wastes to management units determined to be environmentally sound (preamble to final



Off-Site Rule, 58 Federal Registrar 49200, 49201, September 22, 1993). The Off-Site Rule establishes the criteria and procedures for determining whether facilities are acceptable for the receipt of CERCLA wastes. Waste from the LAWC system will be disposed at a properly licensed facility.

**NEPA and CEQA**

The Council on Environmental Quality and the Department of Justice (DOJ) have advised that Federal agencies should integrate National Environmental Policy Act (NEPA) values into the CERCLA process when feasible and appropriate (DOJ, 1995) to ensure that all NEPA values are considered. NASA has prepared a NEPA Values Assessment (Attachment F) to support the recommended removal action and to address NEPA concerns in the decision-making process.

The California Environmental Quality Act (CEQA) is a state environmental protection law that applies to projects undertaken or requiring approval by state or local government agencies. CEQA imposes requirements on those agencies that are similar to the requirements NEPA imposes on Federal agencies. In particular, CEQA requires California public agencies to identify the significant environmental effects of

their actions and either avoid and/or mitigate any significant environmental effects where feasible. CEQA applies to an activity directly undertaken by a public agency; an activity funded by a public agency; or an activity that involves the issuance of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

CEQA applies to this removal action because LAWC must obtain a drinking water permit from DHS to operate the system. However, CEQA is not an ARAR that must be met in the Federal CERCLA process. CEQA compliance requires preparation of an Initial Study to identify the environmental impacts of the project and determine whether the identified impacts are “significant.” Based on its findings of “significance” in the Initial Study, the lead agency (in this case DHS) would prepare a Negative Declaration if it finds no significant impacts, a Mitigated Negative Declaration if it finds significant impacts but revises the project to avoid or mitigate those significant impacts, or an Environmental Impact Report if it finds significant impacts. The environmental checklists associated with the CEQA Initial Study for LAWC are provided as Attachment G.

**SCHEDULE**

Task/Item	Start	End	2004																				
Coordination with Stakeholders	4/8/2004	7/28/2004																					
DHS Permitting	5/21/2004	7/15/2004																					
Technical Report Preparation (LAWC/NASA)	5/21/2004	6/17/2004																					
Submit Technical Report to DHS	6/18/2004	6/18/2004																					
CEQA Initial Study Preparation (LAWC/NASA)	6/8/2004	6/25/2004																					
Submit CEQA Initial Study to DHS	6/28/2004	6/28/2004																					
Permit Amendment Approval	7/15/2004	7/15/2004																					
System Installation	6/1/2004	7/19/2004																					
Concrete Pad Construction and Site Work	6/1/2004	6/24/2004																					
Treatment System Installation	6/24/2004	6/30/2004																					
Electrical and Utilities Installation	6/30/2004	7/27/2004																					
System Startup (Start Pumping)	7/28/2004	7/28/2004																					

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## APPROVAL OF ACTION

This Action Memorandum is a CERCLA decision document that implements a TCRA associated with the NASA-JPL CERCLA program. The Action consists of funding and technical support, provided by NASA, for LAWC's construction and operation of an ion exchange water treatment system to remove perchlorate from the water extracted from two LAWC drinking water production wells. This removal action will reduce the migration of site-related chemicals in the groundwater (i.e., VOCs and perchlorate) to LAWC's unprotected drinking water production wells, and will protect the LAWC customers from exposure to site-related chemicals in groundwater.

This decision document was developed in accordance with CERCLA, and is not inconsistent with the NCP. This decision document is based upon information contained in documents in the Administrative Record for this action. Pursuant to Section 300.415(n)(2) of the NCP, a public notice will be published in a major local newspaper of general circulation within 60 days of the initiation of this removal action, inviting the public to comment on the administrative record.



Dr. Robert Parker



Date



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## ACRONYMS AND ABBREVIATIONS

AL	Action Level	NASA	National Aeronautics and Space Administration
ARAR	applicable or relevant and appropriate requirement	NCP	National Oil and Hazardous Substances Pollution Contingency Plan
CCR	California Code of Regulations	NEPA	National Environmental Policy Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	NPDES	National Pollutant Discharge Elimination System
CEQA	California Environmental Quality Act	NPL	National Priorities List
CFR	Code of Federal Regulations	NSF	National Sanitation Foundation
DHS	(California) Department of Health Services	OEHHA	(California) Office of Environmental Health Hazard Assessment
DOJ	Department of Justice	OU	Operable Unit
EPA	Environmental Protection Agency	PHG	Public Health Goal
FBR	fluidized bed reactor	RWQCB	Regional Water Quality Control Board
FFA	Federal Facilities Agreement	SARA	Superfund Amendments and Reauthorization Act
FMWD	Foothill Municipal Water District	SCAQMD	South Coast Air Quality Management District
JPL	Jet Propulsion Laboratory	TCRA	time-critical removal action
LAWC	Lincoln Avenue Water Company	VOC	volatile organic compound
LGAC	Liquid-Phase Granular Activated Carbon		
MCL	maximum contaminant level		

## INFORMATION REPOSITORIES

Altadena Public Library  
600 East Mariposa Ave.  
Altadena, CA 91001  
(626) 798-0833

LaCanada-Flintridge Public Library  
4545 Oakwood Ave.  
LaCanada-Flintridge, CA 91011  
(818) 790-3330

Pasadena Central Library  
285 East Walnut St.  
Pasadena, CA 91101  
(626) 744-4052

JPL Library (JPL Employees Only)  
Building 111, Room 104  
(818) 354-4200  
<http://cercla.jpl.nasa.gov/NMOWeb/>

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**ATTACHMENT A**  
**JPL Site Description**

# JPL Site Description

## 1.0 Physical Location and Site Characteristics

The JPL is a Federally Funded Research and Development Center in Pasadena, California, currently operated under contract by the California Institute of Technology (Caltech) for NASA. JPL's primary activities include the exploration of the earth and solar system by automated spacecraft and the design and operation of the Global Deep Space Tracking Network.

Located in Los Angeles County, JPL adjoins the incorporated cities of La Cañada-Flintridge and Pasadena, and is bordered on the east by the unincorporated community of Altadena. A NASA-owned facility, JPL encompasses approximately 176 acres of land and more than 150 buildings and other structures.

Of the JPL Facility's 176 acres, approximately 156 acres are federally owned. The remaining land is leased for parking from the City of Pasadena and the Flintridge Riding Club. Development at JPL is primarily located on the southern half, in two regions, an early-developed northeastern area and a later-developed southwestern area.

## 2.0 Regional Demographics

Based on the 2000 United States Census, 9,500 people reside within 1 mile of JPL, 22,500 within 2 miles, and 44,000 within 3 miles of the site. In 2001, the JPL workforce consisted of about 5,175 employees and contractors. Major sources of employment in the area surrounding JPL are office, retail, and service centers, primarily located within the City of Pasadena. Demographics for the three nearest cities to JPL are summarized below.

	<b>Pasadena</b>	<b>Altadena</b>	<b>La Canada Flintridge</b>
Caucasian	53.4%	47.3%	74.5%
Black/African-American	14.4%	31.4%	0.4%
Native American	0.7%	0.6%	0.2%
Asian	10.0%	4.2%	20.6%
Pacific Islander	0.1%	0.1%	0.04%
Multiracial/Other	21.4%	16.3%	4.3%
Population, 2000 Census	133936	42610	20318

## 3.0 Meteorology and Climatology

The climate is semi-arid Mediterranean, characterized by mild, relatively dry winters and hot, dry summers. Rainfall in the vicinity averages about 20 in/yr, roughly 80% of that occurring between November and April. Temperatures range from about 30°F in January to 105°F during the summer months.

## 4.0 Geology and Seismology

JPL is located immediately south of the southwestern edge of the San Gabriel Mountains, which, together with the San Bernardino Mountains to the east and the Santa Monica Mountains to the west, compose a major part of the east-west trending Transverse Ranges province of California.

The Sierra Madre Fault system, located along the southern edge of the San Gabriel Mountains, includes the JPL Thrust Fault located along the northern portion of the JPL.

## 5.0 Hydrology and Groundwater Chemistry

JPL is located in the northwest part of the Raymond Basin watershed, in the Monk Hill Subbasin. Among the communities that use groundwater from the Monk Hill Subbasin are Pasadena, La Cañada-Flintridge, and Altadena.

There are no permanent surface water bodies within the boundaries of JPL. The Arroyo Seco Creek intermittently flows through the Arroyo Seco wash on the east side of the site. Within the Arroyo Seco, a series of surface water impoundments are used as water-collection and spreading basins for groundwater recharge. These impoundments, along with municipal groundwater production wells near JPL, significantly influence local groundwater flow directions and water table elevations. The groundwater table can fluctuate up to 75 feet per year.

The groundwater flow beneath and around JPL is complex, trending generally south to southeast but affected locally by conditions in the Arroyo Seco and by municipal groundwater well flows. The aquifer below JPL is divided into four zones or layers. Groundwater recharge from the mouth of the Arroyo Seco causes a significant groundwater mound to be present year-round at that location. Water table elevations typically are between 80 and 120 feet higher than those under the rest of the JPL site. Groundwater depths under JPL vary from 22 feet to 270 feet below ground surface, but under most of the JPL facility site it is approximately 200 feet.

#### *6.0 Natural and Ecological Resources*

There are no forest resources at JPL; the predominant habitat type is urbanized landscape, with paved roads, parking lots, and buildings. Chaparral vegetation covers the upland banks of the Arroyo Seco, east of JPL, and the convex slopes of the Gould Mesa. The Arroyo Seco contains mostly riparian and desert wash habitat, interspersed with chaparral. Threatened or endangered species identified as having the potential to occur in naturally existing habitats within the USGS Pasadena Quadrangle boundaries include two sensitive natural plant communities, six plant species, and two animal species. Additional endangered animal species that may be found in this area include the Arroyo Southwestern Toad and the Coastal California Gnatcatcher. No potential exposure pathways were identified for species in the vulnerable or sensitive habitats (FWEC 1999a).

#### *7.0 Archaeological and Cultural Resources*

The Hahamongna Watershed Park Master Plan describes three archaeological survey areas and two recorded archaeological sites within one mile of the Hahamongna Watershed Park (City of Pasadena, 2002). However, no prehistoric sites, historic sites, historic buildings, or landmarks in the area that could be impacted by the removal action have been identified.

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**ATTACHMENT B**

**Summary of CERLA Actions at the JPL Site**

## Summary of CERLA Actions at the JPL Site

### 1.0 Previous Actions

A preliminary assessment/site investigation (PA/SI) was performed for the JPL site in November 1988. The PA/SI indicated further site characterization work was needed (Ebasco, 1988). Consequently, an environmental site investigation (ESI) was conducted in May 1990 (Ebasco, 1990).

Remedial investigation (RI) activities were conducted from 1994 to 1998. The RI reports, which characterized the nature and extent of the chemicals of potential concern in the groundwater and soils, were completed in September 1999 (FWEC, 1999a and FWEC, 1999b). The RI for OU-1 and OU-3 also contained a human health and ecological risk assessment. A draft feasibility study (FS) for OU-1 and OU-3 was completed in January 2000 to identify and evaluate remedial alternatives for the JPL site (FWEC, 2000a). However, that draft report was superseded by the current removal actions, which in turn will be supplemented in the future and presented as the FS for OU-3 and OU-1.

The final FS for OU-2, completed in July 2000 (FWEC, 2000c), identified and evaluated two remedial alternatives—no action and *in situ* soil vapor extraction (SVE). A Record of Decision was signed for OU-2 in 2002 using a SVE remedy for on-facility soil (NASA, 2002).

As part of the extensive site investigation activities for both OU-1 and OU-3, NASA began a periodic groundwater monitoring program in August 1996 analyzing for VOCs and inorganics, including metals, anions, cations, and other field parameters.

In addition to the reports discussed above, numerous geotechnical and environmental investigations have been conducted at and adjacent to JPL. The RI report contains descriptions of studies related to JPL geology, hydrogeology, and groundwater (FWEC 1999a).

### 2.0 Current Actions

The groundwater program initiated in 1996 is ongoing. An FS is currently underway to identify and investigate technologies for the final groundwater remedy for OU-1 and OU-3. Other ongoing activities at the JPL site include use of a SVE system for on-site soils as the final remedial action for OU-2 (NASA, 2002) and construction of an Expanded Treatability Study for OU-1.

### 3.0 Administrative Record

An Administrative Record has been established and is available for public review, according to the requirements in the NCP. Site-related documents are available for review at the information repository locations identified below:

**Altadena Public Library**

600 East Mariposa Street  
Altadena, CA 91001  
(626) 798-0833

**JPL Library (JPL Employees Only)**

Building 111, Room 104  
(818) 354-4200

**La Cañada-Flintridge Public Library**

4545 Oakwood Avenue  
La Cañada-Flintridge, CA 91011  
(818) 790-3330

**Pasadena Central Library**

285 East Walnut Street  
Pasadena, CA 91101  
(626) 744-4052

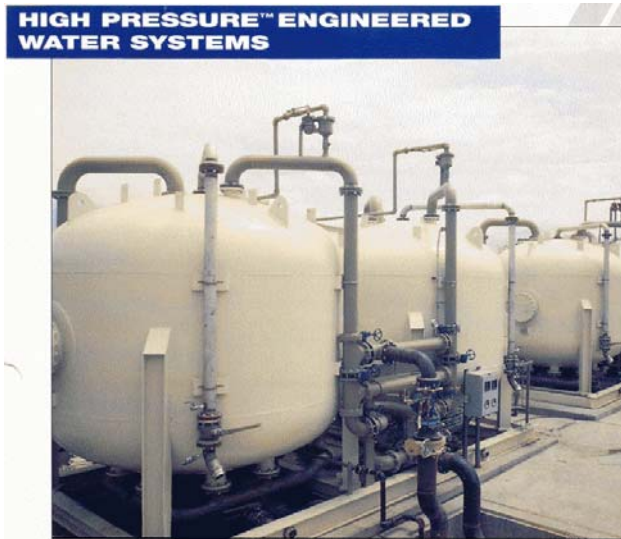
<http://cercla.jpl.nasa.gov/NMOWeb/> (Home page for NASA CERCLA Program at JPL)

<http://cercla.jpl.nasa.gov/NMOWeb/AdminRecord/default.asp> (Administrative Record)

**ATTACHMENT C**

**USFilter Ion Exchange Treatment System**

## SYSTEM SPECIFICATION SUMMARY: HP1220DS Hi-Flow System



**HP1220DS** Hi Flow Ion Exchange Systems are designed to treat a wide range of contaminated process streams. All piping and valves are configured for series, parallel, or vessel isolation flows. System includes inlet and outlet piping, and backwash capabilities. The system consists of two vessels, skid mounted, with all piping, valves, and gauges assembled for ease of operation. The vessels are equipped with underdrains capable of maximum flow rate of 2400 GPM.

### EACH VESSEL:

Vessel Diameter .....	144"
Side Shell Height.....	60"
Overall Height (Approx.).....	15'-4"
Working Pressure .....	125 psi @ 150 °F
Manway:	
Flanged at side shell .....	20"
Elliptical type at head .....	14" x 18"
Vessel Volume .....	7,520 gal
Vessel Resin Capacity .....	300 Ft <sup>3</sup>
Maximum Flow .....	2,400 GPM
Nominal Flow .....	2,000 GPM
Design Criteria .....	ASME
Code Stamping .....	YES
Material.....	Carbon Steel
Supports.....	Wide Flange Legs
Lifting.....	Lifting Lugs
Seismic .....	Zone 4
Interior Surface Prep .....	SSPC-SP5
Interior Surface Coating .....	Plasite 4110 35 mil dft min
Exterior Surface Primer .....	Carboline 893 Rust Preventative Epoxy 3 mil min dft
Exterior Surface Coating .....	Carboline 134 High Solids Urethane 3mil min dft
Standard Color .....	Blue (Federal Standard 15052)

**UNDERDRAINS:**

Hub Lateral Design ..... Stainless Steel  
Resin Screens ..... 304L Stainless Steel V-Wire Screens 1 1/2" Dia

**VALVE ASSEMBLY AND PIPING:**

Piping:

Process Piping ..... 12" Schedule 40 Carbon Steel  
Resin Transfer Piping ..... 4" Sch 10 304L Stainless Steel

Valves:

Process ..... 12" Butterfly, Cast Iron Body w/AL-Brnz Disk, Gear Operator  
Resin Transfer ..... 4" Fanged 316 Stainless Steel Ball Valve  
Vent/Wash ..... 2" Bronze Apollo Ball Valve  
Sample Ports (3) ..... 1/2" Bronze Apollo Ball Valve

**SYSTEM WEIGHT:**

System Shipping weight ..... 40,000 lb  
System Resin Weight ..... 40,000 lb  
Operating Weight ..... 190,000 lb

## ION EXCHANGE FOR PERCHLORATE REMOVAL

### USFILTER EXPERIENCE WITH PERCHLORATE REMOVAL

Through its North American Technology Center and Development Council, USFilter's team of experts is developing and implementing new solutions to solve the world's most daunting water challenges. The company owns or licenses more than 3,000 active patents worldwide and continues to develop technologies for the future at the rate of more than two patents per week. Worldwide, the company invests more than \$50 million a year on research and development.

USFilter started to develop solutions to the perchlorate problem in California in the late 1990s. We established a dedicated team to look at various methods to treat this water contaminant. The USFilter team incorporated people from our operations, research, construction, field application engineering, and marketing groups across multiple product lines. Two existing technologies emerged from this team's work along with a promising third technology from research efforts:

- Fluidized Bed Reactors
- Once Through Media – Ion Exchange Resin
- Once Through Media – Tailored Carbon

Two of these technologies have been approved by the California Department of Health Services (CA DHS) for the removal of perchlorate from drinking water (Fluidized Bed Reactors and Ion Exchange). The third (Tailored Carbon) will be submitted shortly for approval by the CA DHS.

USFilter found that both approved technologies would produce water quality of a level that was below the California Action Limit (AL) for perchlorate. Our studies showed that the application of the ion exchange technology is dependent upon the level of perchlorate and the background anions present in the water. This is generally applied where the perchlorate influent concentration is <500 ppb. In keeping with maintaining "Good Environmental Stewardship," the once through ion exchange resin technology collects the perchlorate and then allows for destruction of the perchlorate through destruction of the ion exchange resin, thus eliminating the "Cradle to Grave" responsibility for this material. There is no brine generated nor is there the need for brine connection fees. And with the pending brine disposal restriction (and/or elimination) rules, the liability for the brine waste material is eliminated.

The Fluidized Bed Reactor (FBR) technology has been applied in Northern California for the past four years, where significant (ppm) levels of perchlorate have been found in the groundwater. This technology consistently maintained perchlorate concentrations that were less than 1 ppb in the treated effluent.

We are recommending the use of ion exchange resin for Lincoln Avenue Water Company (LAWC). Further, we have selected the one time use resin as our technology of choice for perchlorate removal for potable water, since it provides significant advantage over on site regeneration technologies; with the complete thermal destruction of the perchlorate ion as well as the elimination of a new waste stream in the form of spent brine regenerant.

In California, USFilter has been selected as the supplier of resin services to remove Perchlorate and nitrate from well sites for the following:

City of West San Bernardino	Perchlorate removal using on-site vessels. Product water used for municipal supply. DHS operating permit issued.
City of Rialto	Perchlorate removal using on-site vessels at the Chino #2 site. Product water used for municipal supply. DHS permit has been issued and the system went into operation on October 2 <sup>nd</sup> , 2003, at 1500 GPM.



City of Morgan Hill	Two well sites wells for perchlorate removal using exchange units. Product water used for municipal supply. The resin is the same as being recommended for LAWC wells. A DHS permit is in the process of being issued.
West San Martin	Two well sites wells for perchlorate removal using exchange units. Product water used for municipal supply. The resin is also a non-nitrate sloughing resin. A DHS permit will be applied for this summer.
City of Fresno	Four well sites wells for nitrate removal using on-site fixed units and trailers. Product water used for municipal supply DHS permit issued.
Aerojet	Removal of high levels of perchlorate in groundwater for site remediation, using portable vessels. Product water used for groundwater replenishment. Environmental operating permit by State issued.
Shaw Environmental	Client Site remediation of Perchlorate using portable vessels.

*FUTURE ABILITY TO SUPPLY RESIN AND EQUIPMENT*

USFilter is in a unique position to assure that LAWC will receive resin and services now and in the future. We are a strong healthy company that is the single largest supplier of services and equipment for water treatment in the world. This is why cities such as Indianapolis, Atlanta, and Berlin, as well as local cities such as Burlingame, California and Richmond, California have signed long term operating contracts with USFilter over the next 20 years.

In addition we are the single largest purchaser of resins in the world and maintain close and direct relationships at a corporate level with the major suppliers including DOW, Rohm and Haas, and Purolite. In addition the consumption rate of perchlorate resin for these wells represents less than 2% of our current perchlorate resin consumption.

When you need us, whether it is this weekend or in ten years, we will be here.

*ION EXCHANGE (IES) PROCESS DESCRIPTION*

This section describes the design and operation of USFilter’s proposed Perchlorate Ion Exchange System (IES), the separate components, and their operations that comprise this system.

*DESCRIPTION*

We are proposing the following equipment for LAWC. This equipment option is designed to treat a nominal flow of 2,000 gpm of groundwater and will operate utilizing USFilter’s HP1220™ ion exchange Hi-Flow vessels configured in lead / lag. The treatment system will have one vessel in the lead working position and one vessel in the lag polishing position. There would be a total of one (1) lead vessel and one (1) lag vessel online at the well site. Each vessel is 12’ in diameter and will be filled with NSF approved anion exchange resin in the chloride form, selected for optimum capacity of perchlorate removal. This is a tried, proven, and accepted technology for the removal of perchlorate from water.

Perchlorate concentrations leaving the vessels are monitored by routine sampling for breakthrough. The lead vessels will be changed when the product perchlorate has reached a level of 30% of the influent perchlorate level, or if the perchlorate level leaving the lag vessel exceeds 2 ppb. During an individual change, a lead vessel is taken off line. The vessel stays on-site and new, virgin resin is loaded into the

vessel. The vessel containing the new resin is placed in the lag, polishing position. The former lag, polishing vessel is valved into the lead position. This ensures that the newest anion resin is always in the polishing position.

Testing for Perchlorate on the lead vessels will need to be performed on a routine basis. We are recommending a frequency of 7 days between tests after the initial performance-testing period has been completed. The testing of the perchlorate will be the responsibility of the client unless otherwise agreed to by client and USFilter.

Feedwater is fed to each vessel through the top, passes through anion NSF approved ion exchange resin, and leaves the vessel at the bottom (co-current flow). Perchlorate ions in the feedwater are replaced with chloride ions as the water passes through the bed. The spent resin from this process will be removed from the vessels and sent to a facility for destruction by fuel blending once the effluent perchlorate levels indicate that the resin has achieved a predetermined perchlorate saturation level.

The treated water flows to the customer's reservoir and then distribution system for use. This proposed system will maintain an effluent perchlorate level of < 2 ppb.

#### *INDIVIDUAL UNIT / COMPONENT OPERATION*

The proposed IES will use USFilter's HP 1220™ Hi-Flow ion exchange vessels configured in lead/lag. The system at the Lincoln Avenue Water well site will have one (1) vessel in the lead working position and one (1) vessel in the lag polishing position for a total of two (2) vessels online designed to produce a nominal flow rate of 2,000 gpm and is capable of a maximum flow rate of 2,400 gpm.

The system will produce and maintain a maximum product water perchlorate level of < 2 ppb as determined by EPA Method 314 for perchlorate analysis. Each of the vessels will hold 300 cubic feet of anion resin.



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**ATTACHMENT D**

**Operations Manual for Lincoln Avenue Water Company**

# OPERATIONS MANUAL FOR LINCOLN AVENUE WATER COMPANY

## 2000 GPM ION EXCHANGE PERCHLORATE REMOVAL SYSTEM (Manual Provided by USFilter)

### 1.0 INTRODUCTION

This manual covers a general description of the equipment and operating procedures for an Ion Exchange (IX) System. The Ion Exchange (IX) System is designed to provide many years of trouble free service. To achieve this, the IX System equipment must be properly handled and installed to obtain the desired results. Failure to do so can cause premature equipment malfunctions and/or undesirable System performance.

The Purchaser is fully responsible for proper inspection, handling, and installation of the IX System equipment, and shall insure that quality workmanship practices and construction procedures are followed throughout. The Purchaser also accepts all liability for the loss of or damage to any equipment resulting from the improper handling and/or installation, regardless of the inclusion or omission of any applicable suggestions in this manual. Unknown situations or conditions not covered in this manual are the responsibility of the Purchaser.

Section 1.4 provides helpful information for the receiving, unloading, handling and installation of the IX System equipment.

### 1.1 GLOSSARY

**Adsorber** - A vessel designed to hold ion exchange resin media.

**Backwash** - Performed prior to placing system on-line to cleanse the resin bed of fines entrapped air and stratify bed depth. Also used during normal operations to remove particulate build up.

**Backflush** - Performed during normal operations to remove entrapped air from the resin bed.

**Bulk Transport Trailer** - Hopper type trailer used to transport resin, slurry in fresh resin, and remove spent resin from adsorbers.

**Ion Exchange**- The removal of positively or negatively charges ions by way of resin media.

**Lead Adsorber** - The first bed of resin through which a process or a waste stream is passed. (Also called Primary Adsorber.)

**Polishing Adsorber** - The second or last bed of resin through which a process or a waste stream is passed. (Also called Secondary Adsorber.)

**Pneumatic Port** – The air and water connection for service and wash-down of vessel.

**Pressure Port** - The air and water connection for service and wash-down of vessel.

**IX Resin System Rupture Disk** - A relief disk to prevent over pressurization of a vessel.

**Underdrain** - Device designed to permit an evenly distributed flow of water but retain resin in vessel.



**Utility Port** - The air and water connection for service and wash-down of vessel.

**Vent** - A line from each adsorber with automatic vacuum/air release valve (APCO).

**Water Cushion** - The water added to an adsorber before charging it with resin to protect under drain and lining.

## **1.2 IMPORTANT MESSAGES AND WARNINGS**

This Manual should be in the possession of the personnel who operate and maintain the IX System. The purpose of this manual is for instruction and to advise operators and maintenance personnel. This manual will remain a valuable resource for the safe, economical, efficient operation and maintenance of the IX System.

Failure to properly follow instructions, failure to take notice of warnings, and failure to take proper precautions and preventive measures may be dangerous and could cause serious injury, equipment damage, and environmental problems.

Mechanical modifications or substitutions of parts on equipment that may affect structural or operational safety shall not be made without prior manufacturer's approval or engineer's advice. Modifications other than those approved may defeat protective features originally designed into the equipment and its controls; and therefore, shall not be made.

Unauthorized personnel should be kept away from this equipment at all times. Only qualified personnel who have been properly instructed in this equipment's proper operation and maintenance requirements and in its potential hazards shall be allowed to operate and maintain it.

### **IMPORTANT**

**USFILTER MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THE MATERIAL CONTAINED IN THIS MANUAL, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OR FITNESS FOR A PARTICULAR PURPOSE. USFILTER SHALL NOT BE LIABLE FOR ERRORS CONTAINED HEREIN OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE PERFORMANCE OR USE OF THIS MATERIAL.**

**THIS MANUAL CONTAINS CERTAIN PROPRIETARY CRITERIA, IDEAS AND DESIGNS AS AN INSTRUMENT OR PROFESSIONAL SERVICE AND SHALL NOT BE REPRINTED IN WHOLE OR IN PART WITHOUT EXPRESSED WRITTEN AUTHORIZATION FROM USFILTER.**

## 1.3 RECEIVING

Immediately upon receipt and prior to removal from the truck trailer, railcar or shipping container, inspect the IX System equipment for damage. Claiming any damage that may have occurred in transit should be filed promptly with the delivering carrier. The unloading operation should be delayed until the carrier's representative has completed his inspection of the damaged equipment, otherwise a damage claim may not be honored. The inspection should include as a minimum:

1. External surface damage.
2. Damage such as broken nozzles, valves, pipes, underdrain, etc.
3. Equipment damage at contact points.
4. Unpacking and inspection of all packaged equipment and accessories.
5. Internal lining.

## 1.4 UNLOADING AND HANDLING

When unloading and handling the IX System equipment, extreme care should be taken as not to damage it.

Regardless of the type of equipment being handled, certain precautionary measures must be implemented such as:

1. Insure the lifting equipment can withstand the total intended load.
2. Always use lifting eyes and brackets.
3. Never position the lifting equipment where damage to the equipment load may occur.
4. When using a forklift, make sure the forks are long enough to extend past the intended load. This prevents accidental punctures on the underside of the equipment crates, boxes and skids that may damage the equipment itself.
5. Use spreader bars.
6. Do not slide, drag or push equipment across surfaces. Always lift to move into position.
7. Do not roll, drop or throw equipment or accessories.
8. Lifting cables and/or straps must not be attached to, or permitted to come in contact with nozzles, flanges, gussets, pipes, shafts, painted surfaces, or any other accessory that may be damaged by contact.
9. When equipment is being lifted, proper rigging practices should be observed and a guide-line should be attached to prevent impact damage caused by swinging into contact with other object.
10. Never set on or roll over an equipment fitting and never use a fitting as a lifting point.
11. Prevent tools, hooks, etc. from striking the IX System equipment.

## 1.5 ASSEMBLY INSTRUCTIONS

The IX System has been shipped pre-assembled to the greatest extent possible. The attached drawing shows the system after assembly. The piping module skid and vessel skids have drilled holes for placement and mounting. The site foundation should be level, but most importantly flat. Check to see if any bolts that may have come loose during shipment, if so, tighten them. The internal nozzles have been shipped installed. Be sure to use proper flange tightening procedures when assembling the piping.

The IX System should be assembled in the following order:

1. Mark the foundation with guide-lines in order to place the vessels in a straight line.
2. Located the vessels spaced as shown on drawing.
3. Place the piping module appropriately between the face piping connections.
4. If alignment is off, make sure the vessels and piping module are level and in the correct positions. Some shimming of the vessels and piping module may be required.
5. Bolt Tank A to the piping module (bolt loosely until system is fully assembled).

6. Bolt Tank B to the piping module (bolt loosely until system is fully assembled).
7. If alignment is acceptable, tighten all the bolts.
8. Secure the vessels and piping module to the foundation.
9. Assembly is complete.

## **2.0 EQUIPMENT DESCRIPTION**

### **2.1 GENERAL DESCRIPTION**

The IX System consists of (2) two anion resin adsorber vessels, face piping, and piping module with support skid. The piping system comes complete with influent, effluent, backwash, air vent line, resin fill, resin removal, compressed air, and sampling connections.

The carbon steel adsorbers are vertical cylindrical pressure vessels with elliptical tops and bottoms manufactured for a maximum operating pressure of 150 PSIG. The adsorbers are designed for down flow operation with a specially designed underdrain collection system to maximize the utilization of resin as well as allow for efficient and rapid removal of the spent carbon. Three sample valves are used for sampling treated water at various levels through the adsorber.

The process and utility piping to operate the system are mounted on the adsorbers and piping module. The piping options include valving to operate both adsorbers in parallel or series (lead/lag) flow configuration. Each adsorber has its own resin fill, discharge and vent lines. The process piping is equipped with pressure gauges and sample ports at the inlet and outlet of each adsorber. Compressed air connections are provided for use during resin transfer.

### **2.2 PROCESS DESCRIPTION**

The Ion Exchange System is designed to remove dissolved ionic compounds from contaminated feed water using anion exchange resin. The feed water to be treated will be pumped by the client at a controlled rate through the adsorbers in a series or parallel configuration.

Depending on the feed water analysis, a pre-filter may be required to remove any suspended solids from the feed water prior to entering the resin adsorbers.

Each adsorber shall contain 300 cubic ft of USF anion resin, which will provide sufficient contact time at the design flow rate to remove the perchlorate in the feed water.

Feed water enters the adsorber from the top and flows down through the resin bed. The treated water is collected in the underdrain system.

When piped in the series configuration, and the lead adsorber becomes saturated (exhausted) it's taken off-line for replacement of the spent resin. The feed water is directed to the second adsorber, allowing the system to remain in service. The lead adsorber is then pressurized up to 30 psig with air. With the addition of utility water, the spent resin is pneumatically displaced as slurry to a bulk transport trailer. The dewatered spent resin is destroyed.

To refill the adsorber with fresh resin, the resin in the trailer is slurried, using clean water, pressurized up to 15 psig and then transferred to the empty adsorber.

Once the fresh resin is placed in the vessel, this vessel will become the lag vessel.

## 2.3 OPERATING CONDITIONS

The design operating conditions and characteristics for this system are as follows:

Maximum flow rate:	2,000 gpm per vessel
Superficial surface loading:	5.4 min per vessel @ 1,000 gpm
Maximum Pressure:	125 psig
Maximum Temperature:	150 °F
Resin content:	300 cubic ft per vessel
Resin Type:	USF select

## 2.4 GENERAL PROCESS COMMENTS

### OPERATIONAL CHANGES

Optimum operation of the system is obtained if changes to the system occur slowly. Rapid changes in flow will cause upsets to the adsorbers, which could adversely affect the operation. Valves should be turned slowly at all times to prevent hydraulic shock.

## 3.0 START-UP

### 3.1 SAFETY

Any piece of equipment can be dangerous if operated improperly. Safety is ultimately the responsibility of those operating and maintaining the equipment. All personnel operating and maintaining the IX System and its proper implementation must be familiar with all of the Ion Exchange System components, and observe all OSHA, federal, state and local safety codes and requirements. The personnel should also be active participants in an approved plant-wide health and safety program.

Failure to properly follow instructions and failure to take proper safety precautions is dangerous and can cause serious personal injury, needless equipment damage, and unnecessary environmental harm. Mechanical modifications and/or substitutions of parts on equipment that will affect structural, operational, or environmental safety should not be made. Modifications that may defeat protective features originally designed into the equipment and control; and therefore, should not be made.

The following is a partial list of precautions to follow but in no case is the list exhaustive nor is it intended to be. Operators and maintenance personnel should expand on this list after first reviewing the entire IX System and its operation with the appropriate health and safety authorities.

- Keep areas clean. A clean work area is a much safer area.
- Keep all equipment guards in place. If removed to service the equipment, make sure the guards are replaced properly.
- Wear eye and face protection around rotating and pumping equipment and whenever working around or handling chemicals. Be especially cautious for splash when disconnecting piping, valves and fittings.
- Wear ear protection if necessary.
- Wear proper apparel. Do not wear loose clothing, or jewelry, which could be caught in machinery.

- Wear a proper respirator around chemicals and in areas where vapors and/or gases may be present.
- Non-skid footwear is recommended and always wear protective gloves when feasible.
- Remove adjusting screws or wrenches. Form a habit of checking to see that all tools are removed from equipment.
- Make sure all personnel are familiar with OSHA approved Material Safety Data Sheets for all hazardous materials they may come in contact with.

**STAY ALERT**

**WATCH WHAT YOU ARE DOING**

**USE COMMON SENSE**

**DO NOT PERFORM OPERATION OR MAINTENANCE FUNCTIONS  
WHEN YOU  
ARE TIRED OR GROGGY**

**DO NOT ATTEMPT TO SERVICE OR OPERATE MACHINERY YOU  
ARE NOT  
FULLY FAMILIAR WITH**

**DO NOT TAKE CHANCES**

**ASK FOR ASSISTANCE IF IN DOUBT**

**DO NOT TRY TO DO IT ALONE**

**THINK BEFORE YOU ACT AND BE CAREFUL**

**NOTE:**

**ALL CONFINED SPACES, INCLUDING THOSE CONTAINING ION EXCHANGE RESINS, SHOULD BE PRESUMED TO BE HAZARDOUS. APPROPRIATE SAFETY MEASURES SHOULD ALWAYS BE TAKEN BEFORE ENTERING, AS WELL AS WHEN WORKERS ARE IN A CONFINED SPACE. OSHA REGULATIONS APPLICABLE TO RESPIRATORY PROTECTION IN OXYGEN-DEFICIENT ATMOSPHERES SHOULD BE STRICTLY FOLLOWED.**

## 3.2 PLACING THE SYSTEM IN OPERATION

### ADSORPTION SYSTEM START-UP, OPERATION IN SERIES

To put the adsorption system on-stream, the procedure is described below.

The feed to the adsorption system is provided by the user's feed pump. The pump must be started and brought up to operating conditions prior to placing the ion exchange adsorption system in operation. When this has been accomplished, the pump discharge valve is slowly opened. Initially, all valves in the adsorption system are closed.

Prior to placing the ion exchange system on-line, the valves to the system must be set to allow flow through the system as the feed water pump is brought on-line. The system is designed to allow both train (Train A or Train B) to be placed in the lead position and either train (Train A or Train B) to be placed in the lag position. When Train A is in the lead position, Train B must be in the lag position. When Train B is in the lead position, Train A must be in the lag position. This forms a double barrier for production of potable water and ensures that the newest Anion resin is put into the polishing application. The following table **Figure 1** outlines the valve positions depending on which train is in the lead position:

Figure 1	Train A (Lead) / Train B (Lag)		Train B (Lead) / Train A (Lag)	
Valves	Open Position	Close Position	Open Position	Close Position
V-100	X		X	
V-101	X			X
V-102		X	X	
V-103	X		X	
V-104	X		X	
V-105	X		X	
V-106	X		X	
V-107	X		X	
V-108	X		X	
V-109		X	X	
V-110	X			X
V-200		X		X
V-201		X	X	
V-202	X			X
V-203	X		X	
V-204	X		X	
V-205	X		X	
V-206	X		X	
V-207	X		X	
V-208	X		X	
V-209	X			X
V-210		X	X	



Once the valves are placed into position as per the table above, the system is ready for the initial start up. The customer's feed water pump provides water to the ion exchange system. The feed water pump must be started and brought up to operating condition. As water begins to flow through the system, the following sequences must be followed:

1. Allow water to enter into the lead vessel.
2. Manually vent air within the vessel through the vent valves.
3. Once no air is observed discharging through the vent valves (all water), slowly close the vent valves and Open Valve V-100.
4. Allow water to enter into the lag vessel.
5. Manually vent air within the vessel through the vent valves.
6. Once no air is observed discharging through the vent valves (all water), slowly close the vent valves and Open Valve V-200.
7. Refer to **Figure 1**, any DRAWINGS and the valve sequence tag located on the vessels for the desired valve sequence to put the system in operation, remembering to operate each valve slowly.

Normal operation requires no further changes until breakthrough occurs. When this happens, call the USFILTER Service Department at (800) 435-3223 to arrange for RESIN change-out.

### **3.6 BACKWASH**

There will be no backwashing of these vessels. The application is a once through resin operation. Once resin is exhausted, it is replaced and disposed of by way of fuel blending.

### **3.7 SPENT RESIN REMOVAL**

When the lead adsorber becomes saturated (exhausted) it is taken off-line for replacement of the spent resin. The feed water is directed to the second adsorber, allowing the system to remain in service. The lead adsorber is then pressurized up to 30 psig with air. With the addition of utility water, the spent resin is pneumatically displaced as slurry to a bulk transport trailer by slowly opening the slurry outlet valve. To remove the 300 cubic ft of resin, approximately 9,000 gallons of water is required to keep the spent resin in slurry to facilitate removal. This will prevent a line clogging.

### **3.8 RESIN SLUICING PROCEDURE FOR NEW AND SPENT RESIN**

This section describes the operations involved in the resin sluicing process that will be used at the Lincoln Avenue Water Company (LAWC) site. This well site will be treated by USFilter, for the LAWC. The treatment consists of Ion Exchange system for the removal of perchlorate. The system contains multiple tanks that will have their resin changed on a periodic basis.

#### **OPERATIONS OVERVIEW**

US Filter will be supplying the services and equipment for the exchange of resin from the tanks on site. The resin volume in each of the tanks is 300 cubic feet. The exchange of a resin bed will be triggered by the LAWC upon receiving laboratory analysis that indicates the resin has it a targeted breakpoint.

Upon notification by the LAWC that an exchange will need to take place US Filter will schedule the work from our Los Angeles service center. This service center is located at 1441 Washington Street in Los Angeles, California.

A truck / trailer combination configured for resin sluicing will leave the US Filter branch containing 300 cubic feet of virgin USF anion resin. The driver will proceed directly to the well site and back the truck into the well area for the exchange to occur. At that time the following operations will take place:

- The driver will check in with the LAWC staff to confirm which vessel will need the resin exchanged. This confirmation will be noted on the service order.
- The well system will be shut down and the Ion exchange Vessels isolated from the well system.
- The tank to be exchanged will be depressurized and vented to atmosphere.
- Using the media transfer line, the resin will be sluiced from the Ion Exchange Vessel to a holding tank.
- Once all the resin has been evacuated from the vessel the new resin will be transferred from the truck to the ion exchange vessel.
- The vessel will be closed and placed back on line.
- The US Filter Service Technician will wait 15 minutes to observe the vessel and observe that no leaks are occurring.
- We will remove the spent resin from the site and store the hoses for the next transfer.
- The driver will note the time and leave the site following the protocols for securing gates.

## **INDIVIDUAL COMPONENT DISCUSSION**

### ***Resin Transfer Truck***

The resin transfer truck is a US Filter owned trailer that is operated under DOT regulations and meets those requirements. The unit is only used to haul resin that is used for potable water applications, pharmaceutical applications, or other equally high purity applications. It is a dedicated trailer that is never used for other media nor used to haul resins that have been used in waste stream applications.

### ***Transfer Hoses***

The connections between the truck and vessels will be made using food grade hoses that will follow the DHS accepted sanitization procedure established for the City of Fresno mobile ion exchange operation. Trailer connections are Goodyear PLICORD BREWLINE hoses. They have a maximum working pressure of 250 psi and are capable of handling temperatures from -40 to 220 F. The interior construction is white chlorobutyl rubber that conforms to FDA, USDA and 3-A Sanitary Standards and eliminates chance of taste or odor transfer. The hose is reinforced with 6 ply synthetic fabric, and the cover is white Versigard rubber that resists abrasion from dragging over rough, uneven surfaces.

### ***Disinfection Procedure***

The disinfectant kit is called Clean-Gear System, from the Lab Safety Supply Inc. After de-pressuring the equipment as needed, the Hoses can be disconnected from the trailer and prior to setting on the pad, each fitting is sprayed liberally with the disinfectant and placed in a sealed sterile plastic bag. Contact time is achieved while making the trailer exchange. Prior to reinstalling the fittings, wipe off the new trailer fittings using the isopropyl alcohol saturated cleanings pads. Then remove the hose connection from plastic bag, wipe down both the exterior and interior of the fitting with a fresh clean cotton wipe and reconnect.

## **4.0 TROUBLESHOOTING**

The following tables list malfunctions, probable causes, and in most cases, possible corrective action to take for the problem at hand. By no means is this list complete. It is intended only as a guide for the maintenance personnel to help them in properly identifying and isolating equipment malfunctions. If in doubt as to the actual cause of a malfunction, consult the factory or nearest equipment representative for assistance.

**MALFUNCTION**

**PROBLEM CAUSE**

**CORRECTION ACTION**

High pressure drop across adsorber

Bed not flooded  
Bed air bound

Check to see that the air release valve is operating. Make sure there is a constant flow before valve closes.

Feed pump pressure too high

Throttle feed pump

Improper valving

Check valve sequence. Check for obstructions in transfer lines.

Particulate build-up on carbon bed

Backwash per Section 3.6

Leaking flange

Loose bolts

Tighten bolts

Discharge Water From the Backwash/Vent Outlet Line

Broken Rupture Disk

Replace Rupture Disk

<u>MALFUNCTION</u>	<u>PROBLEM CAUSE</u>	<u>CORRECTION ACTION</u>
Leaking Pressure Relief Valve	Leaking or broken Relief Valve	Check to see is resin has collected on the valve seat.  Replace Relief Valve
Resin in the effluent	Internal mechanical failure	To confirm, open effluent sample valve. Collect 1 qt. Effluent sample to check for resin. If the test confirms internal failure, call <b>USFILTER</b> at 800-435-3223
Premature breakthrough	Change of influent concentrations	Confirm by checking influent and effluent samples before changing resin
	Siphoning air in	Check Air Release/Vacuum Relief Valve for correct operation
	Background Perchlorate Colloids	Change resin
Sudden high contamination level in effluent	Check heel due to improper resin change-out	Call <b>USFILTER</b> service department
Frozen lines, broken gauges and valves	Cold weather	Insulate piping and or heat trace process. Call <b>USFILTER</b> at 800-435-3223
System bacteria infections	Disinfect System	See Appendix A – Disinfection Procedures

## **5.0 SYSTEM MONITORING**

It is responsibility of the user to monitor the Ion Exchange System during operation. Spent resin must be properly profiled according to all applicable regulations prior to destruction.

The following is a suggested format for an operating log. This list is meant as a suggestion only and is by no means complete. Record each day the following items for each individual IX System Vessel:

1. Record all equipment maintenance, calibrations, system cleaning, repairing and any parts replacement.
2. Record any unusual occurrences, shutdowns, breakdowns, etc.
3. Record the date and time when each item is logged.
4. Record the pressure drop across the system daily to indicate if any foreign objects have entered the Ion Exchange System.

## **6.0 GENERAL ION EXCHANGE (IX) SYSTEM INFORMATION**

### **6.1 TEMPORARY SHUTDOWNS:**

For shutdown or intermittent operation, the IX System should remain completely full of water and the inlet and outlet should be sealed either by a valve or a cap. Prior to restarting the unit, the IX System should be rinsed using two to three bed volumes of water. Failure to rinse may result in a temporary presence of contaminated water at the outlet of the adsorber.

### **6.2 EXTENDED SHUTDOWNS:**

If the IX System is shutdown for an extended period of time, the following procedure should be followed to reduce potential degradation of bed life.

Drain the IX System of all water. There should be no free standing water left in the vessel. All valves, manways, and vents shall be tightly sealed for the duration of the shutdown to eliminate any supply of oxygen that would promote biological growth. Prior to re-commissioning the units, follow the start-up instructions included.

### **6.3 EMERGENCY PROCEDURES**

In the event something should occur to cause a shutdown of an adsorber, the operation shall be switched over to the other adsorber and steps shall be taken immediately to remedy the situation.

If a major leak or failure occurs which would cause the IX System to be inoperative, then the feed to the system should be shut down immediately. If repairs are beyond the scope of the plant operators, the customer service department at USFilter should be contacted immediately.

### **6.4 USFILTER CONTACTS - HOW TO OBTAIN HELP AND INFORMATION**

**USFILTER (800) 435-3223**

Normal contact concerning the day-to-day operation of the system should be with the Customer Service Department. The telephone number is 800-435-3223.

## **7.0 MAINTENANCE**

### **7.1 MINOR MAINTENANCE**

Minor maintenance is that maintenance to be performed by the plant to ensure continuous and effective operation. This maintenance includes visual check of pressure gauges and adjustments to valves and regulators, tightening flanges and connections to eliminate leakage, backwashing, etc.

### **7.2 MAJOR MAINTENANCE**

Major maintenance is that effort needed to repair or replace equipment in order to continue system operation. The need for major maintenance would result from a major malfunction causing the system to be inoperative. Major maintenance also refers to system design changes and/or maintenance requiring downtime. USFilter can be contacted when any major maintenance is called for.

# STARTUP AND SHUTDOWN PROCEDURES FOR THE GRANULAR ACTIVATED CARBON SYSTEM

## **System Start-Up Procedures**

This procedure applies to any initial start-up after the GAC system has been shut down for carbon bed replacement. At start-up, all treated water through an adsorber shall be discharged to waste to insure that no carbon passes into the water system. Valve arrangement for parallel flow on vessels occurs prior to initial start-up. Each valve's location and function is identified on the revised attached diagram.

For start-up and operation of all four vessels, the step-by-step procedure is as follows:

- Step 1: Check the vent valves (No. 4 & 6) and the backwash valves (No.2 & 8) are closed.
- Step 2: Verify the well inlet valve (No. 9) is closed and should always remains closed.
- Step 3: Open vent line valve (No. 10) to flush well line.
- Step 4: Engage well. Use only one well during start-up.
- Step 5: Open the effluent valve (No. 3)
- Step 6: Slowly open the influent valve (No. 1) to the fully open position.
- Step 7: Open the ¾ inch valve located on the side of each vessel to bleed off any trapped air.
- Step 8: Slowly close vent line (No. 10).
- Step 9: Open effluent valve (No. 7)
- Step 10: Slowly open influent valve (No. 5)
- Step 11: Open valves to bleed any trapped air in vessels #3 and #4.
- Step 12: Equalize flow into each vessel by adjusting influent valves open or closed.

## **System Shut-Down Procedures**

To shut the GAC system down, the following step-by-step procedure is applied:

- Step 1: Turn off well
- Step 2: Slowly close the effluent valves (No. 3 & 7)
- Step 3: Bleed any trapped air through relief valves on side of vessels. Operating pressure within the well line will continue to allow water to flow into the vessels.
- Step 4: Close the influent valves (No. 1 & 5)

The shut-down procedure will maintain all vessels full of water and keep water in the well line.

Names and addresses of chemical, carbon and equipment suppliers whose products are used regularly:

Pioneer Americas, Inc	11600 Pike Street, Santa Fe Spring, CA 90670	800-435-6310
US Filters/Westates	11711 Reading Rd, Red Bluff, CA 96080	530-527-2664x106
Calgon Carbon Corp	Box 360795, Pittsburgh, PA 15251- 6795	800-548-1999

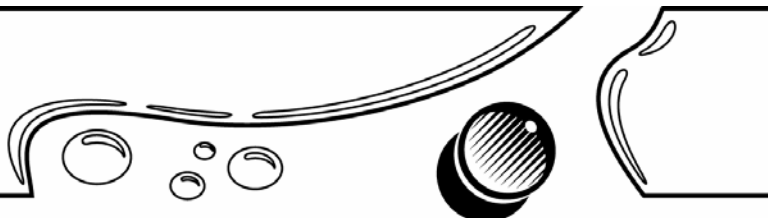


**ATTACHMENT E**

**Rohm and Haas, Amberlite™ PWA2 Strongly Basic Anion Exchange Resin**



# ION EXCHANGE RESINS



## AMBERLITE® PWA2

STRONGLY BASIC ANION EXCHANGE RESIN

Amberlite® PWA2 is a specially designed ion exchange resin for the selective removal of perchlorate from potable water, and as such, Amberlite PWA2 has been certified for potable water use according to NSF/ANSI standard 61 for drinking water system components (for material requirements only).

### PROPERTIES

Matrix	Polystyrene divinylbenzene copolymer
Physical form	Amber translucent beads
Ionic form as shipped	Chloride
Total exchange capacity	0.60 eq/l minimum (Cl <sup>-</sup> form)
Shipping weight	42 lbs/ft <sup>3</sup>

### SUGGESTED OPERATING CONDITIONS

Optimum pH range	0 to 14
Maximum operating temperature	140°F
Minimum bed depth	24 inches
Service flow rate	25 – 50 BV/hour

It is recommended that all potential users seek advice from Rohm and Haas Company to determine the optimum operating conditions.

## SAFE HANDLING INFORMATION

### Material Safety Data Sheets

Material Safety Data Sheets (MSDS) are available for all Rohm and Haas products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products.

We recommend that you obtain copies of our MSDS by calling 1-800-RH-AMBER before using our products in your facilities. We also suggest that you contact your suppliers of other materials recommended for use with our products for appropriate health and safety precautions before using them.

**Caution:** Acidic and basic regenerant solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. In addition, the hazards of other organic solvents should be recognized and steps taken to control exposure.

Nitric acid and other strong oxidizing agents can cause explosive reactions when mixed with ion exchange resins. Proper design of process equipment to prevent rapid build up of pressure is necessary if use of an oxidizing agent such as nitric acid is contemplated. Before using strong oxidizing agents in contact with ion exchange resins, consult sources knowledgeable in the handling of these materials.

**Note:** Ion exchange resins and polymeric adsorbents, as produced, contain by-products resulting from the manufacturing process. The user must determine the extent to which organic by-products must be removed for any particular use and establish techniques to assure that the appropriate level of purity is achieved for that use. The user must ensure compliance with all prudent safety standards and regulatory requirements governing the application. Except where specifically otherwise stated, Rohm and Haas Company does not recommend its ion exchange resins or polymeric adsorbents as supplied as being suitable or appropriately pure for any particular use. Consult your Rohm and Haas technical representative for further information.

*Amberlite is a trademark of Rohm and Haas Company, or of its subsidiaries or affiliates. The Company's policy is to register its trademarks where products designated thereby are marketed by the Company, its subsidiaries or affiliates.*

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. Rohm and Haas Company makes no warranties either express or implied. Rohm and Haas Company expressly disclaims any implied warranty of fitness for a particular purpose. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale.

*Suggestions for use of our products or the inclusion of descriptive material from patents and the citation of specific patents in this publication should not be understood as recommending the use of our products in violation of any patent of the Rohm and Haas Company.*

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WATER QUALITY  
ASSOCIATION



## CERTIFICATE OF VALIDATION

*This is to certify that the drinking water system component herein has been independently tested and certified by the Water Quality Association in accordance with "Drinking Water System Components - Health Effects," NSF/ANSI-61-2002. The material safety of the component listed has earned the Gold Seal.*

<b>Manufacturer:</b>	Rohm and Haas Company
<b>Address:</b>	100 Independence Mall West Philadelphia, PA 19106-2399
<b>Model:</b>	Amberlite PWA2
<b>Product Type:</b>	Process Media
<b>Size:</b>	N/A
<b>Water Contact Temp:</b>	CLD 23
<b>Water Contact Material:</b>	SYN
<b>Listing Notes:</b>	Ion Exchange Resin

<b>Initial Date:</b>	Monday, September 08, 2003
<b>Expiration Date:</b>	Friday, August 29, 2008
<b>Test Unit Number:</b>	03087.001
<b>Certificate Number:</b>	CRT.080803.03087001.R1

  
Joseph F. Harrison, P.E., CWS-VI

12 Sept. 2003  
Date

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**ATTACHMENT F**  
**NEPA Values Assessment**

## NEPA Values Assessment

The following discussion provides a National Environmental Policy Act (NEPA) Values Assessment to accompany the Action Memorandum associated with ion exchange treatment of groundwater extracted from Lincoln Avenue Water Company (LAWC) production wells, LAWC#3 and LAWC#5. The Council on Environmental Quality and the Department of Justice (DOJ) have advised that Federal agencies should integrate NEPA values into the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process when feasible and appropriate (DOJ, 1995). The following discussion serves to accomplish that goal.

### Removal Action

A time-critical removal action (TCRA) is necessary to address dissolved perchlorate in groundwater extracted from two LAWC production wells (LAWC#3 and LAWC#5), which is believed to be associated with past releases from the National Aeronautics and Space Administration's (NASA's) Jet Propulsion Laboratory (JPL). The removal action consists of installing and operating an ion exchange treatment system to remove perchlorate. LAWC is leasing the ion exchange system from USFilter; NASA is providing technical support, as well as funding through an existing legal agreement.

LAWC must utilize LAWC#3 and LAWC#5 to meet seasonal potable water demands between May and November. Sampling conducted in the Spring of 2004 revealed perchlorate concentrations in excess of the California Public Health Goal (PHG) and Department of Health Services (DHS) Action Level (AL). DHS issued a letter on May 21, 2004, requesting that LAWC install and operate an ion exchange system as soon as possible to remove perchlorate from water extracted from LAWC#3 and LAWC#5. LAWC initiated construction and equipment procurement to comply with the request from DHS and to meet seasonal demands.

### Assessment of Removal Action

Under the removal action, an ion exchange system will be incorporated into the existing treatment train at LAWC, consisting of liquid-phase granular activated carbon (LGAC), chlorination, and blending in the Olive Sump with water purchased from the Foothill Municipal Water District (FMWD). The ion exchange system is a USFilter Model HP1220DS Hi-Flow System. The HP1220DS System consists of two 12 ft diameter ion exchange vessels, with a nominal treatment capacity of 2,000 gpm. Each ion exchange vessel will contain 300 cubic feet of Rohm and Haas, Amberlite™ PWA2 Strongly Basic Anion Exchange Resin, which is specially designed for selective removal of perchlorate from potable water. Ion exchange is an effective treatment method for removal of perchlorate from potable water. Similar USFilter systems are in operation for perchlorate removal in other areas of California, including systems in the City of Fontana and the City of Rialto.

Air emissions from the action likely would be limited to small amounts of dust generated during the construction of the concrete pad and associated piping. Dust generation would be minimal and would occur over a short duration; therefore, these emissions are expected to have negligible impacts on local air quality. The perchlorate in the extracted groundwater would be removed in accordance with DHS requirements. A relatively small volume of solid waste (300 to 600 cubic feet per year), consisting of spent ion exchange resin beads, would be generated and transported off-facility for incineration at an approved waste-to-energy facility. Thus, implementation of the selected alternative would have negligible impacts, and would be protective of human health and the environment.

### Socioeconomic Impacts

Installation of the selected removal action is expected to employ a maximum of six people on a short-term basis (less than one month) for construction. Existing LAWC staff would perform operation and maintenance for the system; USFilter would be contracted to provide leased equipment and replace the ion exchange resin. Therefore, no measurable impact on the local economy would be expected and socioeconomic impacts of removal action would be negligible.

## **Transportation Impacts**

Three major freeways serve the Pasadena, Altadena, and La Cañada Flintridge communities. The Pasadena Freeway (California Route 110) connects Pasadena to Los Angeles. The Foothill Freeway (Interstate 210) links communities to the north and east of Pasadena. U.S. Route 134 leads to Ventura County and beyond.

The removal action would create a very small, short-term increase in traffic flow to and from the site because of the movement of equipment and materials during construction and periodic resin replacement. Given the current traffic volume in the Pasadena area, including traffic associated with the 5,175 JPL employees, the increased traffic associated with efforts under the removal action would be negligible.

Most of the traffic around JPL occurs during morning and evening rush hours, 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. Most of the traffic associated with the movement of equipment and materials for the selected alternative would not be present at those peak periods of traffic flow. Further, truck traffic associated with implementation of the selected alternative would occur during daylight hours, further reducing the potential for accidents. Similarly, removal and transport of waste during daylight non-rush hours are expected to have a negligible impact over the entire course of treatment.

## **Natural and Ecological Resources**

Groundwater in the Raymond Basin is an important source of drinking water. The removal action will treat the extracted groundwater from LAWC#3 and LAWC#5 prior to public consumption. Thus, the removal action facilitates beneficial use of the groundwater.

The area identified for the installation of piping and the treatment facilities is located within previously disturbed and developed areas. The ion exchange units will be on the same property as the existing LGAC system and Olive Sump. The minimal land disturbance caused by installation of a new treatment facility is expected to have negligible impacts on vegetation and wildlife. No wetlands are on the LAWC property.

## **Environmental Justice**

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs Federal agencies to identify and address, as appropriate, the disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

The risks from implementation of the removal action are low, and NASA expects no adverse human health impacts from implementation of the selected removal action alternative to occur in any community, including minority and low-income communities. Rather, the system will improve water quality for the LAWC customers.

## **Irreversible and Irretrievable Commitment of Resources**

The commitment of a resource is considered irreversible if primary or secondary impacts of the removal action limit future options for the use of the resource. The commitment of a resource is considered irretrievable if the action uses or consumes the resource during the course of implementation. Under the removal action, extracted groundwater would be treated to remove perchlorate prior to potable use, and would neither limit future options nor consume the resource. Rather, groundwater would be recovered as a resource under this action. Thus, there would be no irreversible or irretrievable commitment of groundwater resources.

Fuel consumption by equipment necessary to construct the treatment facility and replace the resin, as well as electricity associated with operation of the new equipment, does qualify as an irretrievable resource.

## **Cumulative Impacts**

NASA has examined the potential cumulative environmental impacts of the selected action in addition to other past, present, and reasonably foreseeable future actions at the site. NASA has initiated cleanup activities to address on-facility groundwater containing volatile organic compounds (VOCs) and perchlorate and is also in the process of implementing a remedial action for on-facility soil to address the VOCs in the vadose zone, preventing migration of chemicals in soil to the groundwater resources.

Cleanup activities have been and will continue to be conducted in accordance with all Federal, State, and local regulations. Also, research and development activities are conducted in controlled settings in accordance with applicable regulations. NASA therefore does not anticipate any cumulative environmental impacts from the removal action.



**ATTACHMENT G**  
**CEQA Environmental Checklists**

**AESTHETICS:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

**a) Have a substantial adverse effect on a scenic vista?**

According to the California Department of Transportation at [www.dot.ca.gov](http://www.dot.ca.gov), there are no scenic vistas within view of the project site. Therefore, no adverse impacts are anticipated in relation to the project.

**b) Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?**

The system is located in a vacant portion of the same property as an existing system. There are no historic buildings, scenic resources, etc. No adverse impacts are anticipated.

**c) Substantially degrade the existing visual character or quality of the site and its surroundings?**

The project will be keeping with the urbanized character of the City of Altadena. The visual quality will not change due to the project.

**d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?**

New lighting will be used. Light locations will be selected that have no impact on surroundings outside of the project area.

**AGRICULTURAL RESOURCES:**

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:	<b>Potentially Significant Impact</b>	<b>Less Than Significant with Mitigation Incorporation</b>	<b>Less Than Significant Impact</b>	<b>No Impact</b>
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

EXPLANATION:

- a) **Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?**  
The project site is located in an urbanized setting and no farming activities have taken place or are planned for the project site. Therefore, no adverse impacts are anticipated.
- b) **Conflict with existing zoning for agricultural use, or a Williamson Act contract?**  
The project site is located in an urbanized setting and agricultural uses are not near the project site. Based on these conditions, there will be no impacts to agricultural uses or Williamson Act contracts.
- c) **Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?**  
The project site is located in an urbanized setting and agricultural uses are not near the project site. Therefore, no adverse impacts are anticipated.

**AIR QUALITY:**

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create objectionable odors affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

**a) Conflict with or obstruct implementation of the applicable air quality plan?**

Based on the operational configuration of the planned treatment technologies, the proposed project will not conflict with the air quality plan in place.

**b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?**

The completion of the proposed project will not violate any air quality standard or contribute substantially to an existing or projected air quality violation.

**c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?**

The completion of the proposed project will not contribute considerably to any pollutant.

**d) Expose sensitive receptors to substantial pollutant concentrations?**

Sensitive receptors are defined as populations that are more susceptible to the effects of pollution than the population at large. Based on the operational history of the planned treatment technologies no significant pollution is expected.

Therefore, no adverse impacts are expected.

**e) Create objectionable odors affecting a substantial number of people?**

Based on the operational history of the planned treatment technologies no significant odors are expected. Therefore, no adverse impacts will be caused.

**BIOLOGICAL RESOURCES:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?**  
The proposed project does not have the potential to degrade the quality of the environment, reduce the fish and wildlife habitat, threaten plant, fish or wildlife species, or eliminate historical, archeological, or cultural resources. Therefore, no impacts are anticipated.
- b) **Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?**  
The project site is located in an urbanized area with no natural communities. Therefore, no impacts are anticipated.
- c) **Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?**  
No wetland habitat is present on site. As a result, project implementation would have no impact on these resources.
- d) **Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?**  
The majority of the surrounding lands are developed, thereby disrupting any wildlife that may have existed. Therefore, no adverse impacts are anticipated.
- e) **Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?**  
The proposed site location is not in conflict with any local ordinance.
- f) **Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?**  
The project is in an area that has been classified as urbanized. No habitat conservation plans are in place. Therefore, no conflicts with the habitat conservation plans will occur.

**CULTURAL RESOURCES:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in CCR §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to CCR §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

EXPLANATION:

- a) **Cause a substantial adverse change in the significance of a historical resource as defined in CCR §15064.5?**  
The project has not been identified as a “Historic Resource” as defined in CCR §15064.5. There will be no impact.
- b) **Cause a substantial adverse change in the significance of an archaeological resource pursuant to CCR §15064.5?**  
The project has not been identified as an “Archeological Resource” as defined in CCR §15064.5. There will be no impact.
- c) **Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?**  
The proposed project is in an area that has already been disturbed by development. No known paleontological sites or resources exist in the project area. Therefore, no adverse effects are anticipated.
- d) **Disturb any human remains, including those interred outside of formal cemeteries?**  
The proposed project is in an area that has already been disturbed by development. No known religious or sacred sites exist within the project area. No impacts are anticipated.

**GEOLOGY/SOIL:**

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:**
- i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.**  
According to the California Geological Survey ([www.consrv.ca.gov/cgs](http://www.consrv.ca.gov/cgs)), the project site lies south of the southern edge of the San Gabriel Mountains. Along the San Gabriel Mountains is the San Gabriel Fault System. The project, while located near fault systems, will not add any adverse effects to the already known chances of earthquake or rupture to the fault system. No impacts are anticipated.
  - ii. Strong seismic ground shaking?**  
According to the California Geological Survey ([www.consrv.ca.gov/cgs](http://www.consrv.ca.gov/cgs)), the project site lies south of the southern edge of the San Gabriel Mountains. Along the San Gabriel Mountains is the San Gabriel Fault System. The proximity of the site to the active faults could result in ground shaking during moderate to severe seismic activity. All construction will be in compliance with the Uniform Building Code (UBC 1997) and safety-related ordinances adopted by the City of Altadena. Therefore, no adverse impacts are anticipated.
  - iii. Seismic-related ground failure, including liquefaction?**  
The depth to groundwater at the project site is approximately 300 feet. Therefore, no adverse impacts are anticipated.
  - iv. Landslides?**  
The project location is relatively flat and the impact of this system on any landslides is none. No adverse impact anticipated.
- b) Result in substantial soil erosion or the loss of topsoil?**  
The project is located on a concrete pad that has been placed on graded, compact soils. This location offers no erosion issues. No adverse impact is anticipated.

- c) **Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?**  
The soils at the project location have been approved for building of the previous system installation. The new project is using the same building area and will be located on a concrete pad. No adverse impact anticipated.
- d) **Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?**  
All construction will be in compliance with the Uniform Building Code (UBC 1997) and safety-related ordinances adopted by the City of Altadena. Therefore, no impacts are anticipated.
- e) **Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?**  
The area is serviced by local sewer system and the use of alternative systems is not required. There will be no impact to the sewage system.



**HAZARD/HAZARDOUS MATERIALS:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private air-strip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are inter-mixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?**  
The project will not involve the transport, use, or disposal of hazardous materials. No adverse impacts are expected. USFilter stated that spent resin from similar facilities has been classified as nonhazardous based on toxicity characteristic leaching procedure and total threshold limit concentration testing.
- b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?**  
The proposed project does not include the use of hazardous material or volatile fuels. Therefore, no impacts to the project are anticipated.
- c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?**  
No emission or handling of hazardous or acutely hazardous materials will be performed at the project site. No impacts are anticipated.
- d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?**  
The proposed project site is not listed as a hazardous materials site. No impact is anticipated.

- e) **For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?**  
The proposed site is not located in within the airport land use plan. Therefore, no impact is anticipated.
- f) **For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?**  
The proposed site is not located in within the airport land use plan. Therefore, no impact is anticipated.
- g) **Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?**  
The proposed project site is not located adjacent to any emergency evacuation routes. No adverse impacts are anticipated.
- h) **Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?**  
There are no known hazards associated with the project area. No adverse impacts are anticipated.

**HYDROLOGY/WATER QUALITY:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Inundation by seiche, tsunami, or mudflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) **Violate any water quality standards or waste discharge requirements?**  
The project’s main goal is to improve the quality of water; it will not violate any water quality standards or waste discharge requirements. No adverse impact is anticipated.
- b) **Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?**  
The project will be withdrawing up to 1200 ac-ft per year from the Ramon Basin. This amount is consistent with past withdraws from the aquifer and is coordinated through the Raymond Basin Watermaster. No adverse impacts are anticipated.
- c) **Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?**  
No stream beds are present onsite or off-site. No change in erosion is anticipated onsite or off-site.

- d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?**  
An increase in runoff from the site will be negligible and will not create a burden on existing infrastructure. No impacts are anticipated.
- e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?**  
The existing stormwater drainage is sufficient enough to handle the project location. No significant increase of runoff water is anticipated. No adverse impacts are anticipated.
- f) Otherwise substantially degrade water quality?**  
The water quality will not be influenced by the project implementation. Therefore, no adverse impact is anticipated.
- g) Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?**  
According to mapping done on [www.FEMA.org](http://www.FEMA.org), the site location is not located within a 100-year flood hazard area. No adverse impact is anticipated.
- h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?**  
According to mapping done on [www.FEMA.org](http://www.FEMA.org), the site location is not located within a 100-year flood hazard area. No adverse impact is anticipated.
- i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?**  
The addition of the project will not expose people or structures to a significant risk of injury or death. No adverse impact is anticipated.
- j) Inundation by seiche, tsunami, or mudflow?**  
The site is not located near a significant reservoir, and mudflow is not anticipated. Therefore, no adverse impact is anticipated.

**LAND USE/PLANNING:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

**a) Physically divide an established community?**

The project is located in an urbanized location and will be added to an established site. The addition of this project will not divide an established community. No impact is anticipated.

**b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?**

The proposed project will not conflict with any applicable land use plan and will not interfere with any environmental policies. Therefore, no adverse impact is anticipated.

**c) Conflict with any applicable habitat conservation plan or natural community conservation plan?**

There are no habitat conservation plans in the project area. No adverse impact is anticipated.

**MINERAL RESOURCES:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

EXPLANATION:

- a) **Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?**  
The project is located in an urbanized area where no known mineral resources are located. No impacts are anticipated.
- b) **Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?**  
The project is located in an urbanized area where no known mineral resources are located. No impacts are anticipated.

**NOISE:**

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) **Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**  
The project complies with the LA County General Code found at, [www.lacounty.info](http://www.lacounty.info) No adverse impact is anticipated.
- b) **Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?**  
The project will not produce additional groundborne vibration or groundborne noise. As such, no adverse impact is anticipated.
- c) **A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?**  
The project complies with the LA County General Code found at, [www.lacounty.info](http://www.lacounty.info) No adverse impact is anticipated.
- d) **A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?**  
Temporary construction activities associated with the project will minimally increase ambient noise levels. All machinery will be maintained to manufacturer's standards to minimize impact. Normal activities involved with the project are unlikely to increase ambient noise levels.
- e) **For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?**  
The project is not located in an airport land use plan. Therefore, no impacts are anticipated.
- f) **For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?**  
The project is not located in an airport land use plan. Therefore, no impacts are anticipated.

**POPULATION/HOUSING:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

EXPLANATION:

- a) **Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**  
The project is located in a developed area and will not induce population growth. No impacts are anticipated.
- b) **Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?**  
The project site has already been established by an existing treatment facility. No impacts are anticipated.
- c) **Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?**  
The project site has already been established by an existing treatment facility. No impacts are anticipated.



**PUBLIC SERVICES:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
i. Fire protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii. Police protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii. Schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv. Parks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
v. Other public facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

EXPLANATION:

- a) **Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:**
- i. **Fire protection**  
The site is in a developed are, currently served by Los Angeles County Fire Dept. The project will not require any additional services or cause a need for new services. No impact is anticipated.
  - ii. **Police protection**  
The site is in a developed area, which is currently served by the Los Angeles County Police Dept. The project will not require any additional services or cause a need for new services. No impact is anticipated.
  - iii. **Schools**  
The site is in a developed area, which is currently served by Los Angeles City Schools. The project will not require any additional services or cause a need for new services. No impact is anticipated.
  - iv. **Parks**  
The site is in a developed area, which is currently served by Pasadena Parks and Recs. The project will not require any additional services or cause a need for new services. No impact is anticipated.
  - v. **Other public facilities**  
The site is in a developed area, which is currently served by City of Pasadena. The project will not require any additional services or cause a need for new services. No impact is anticipated.

**RECREATION:**

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

EXPLANATION:

- a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?**  
 This project is not proposing new housing or large employment generation that would cause an increase in the use of neighborhood parks and other recreational facilities. No impacts are anticipated.
- b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?**  
 This project is not proposing new housing or large employment generation that would cause an increase in the use of neighborhood parks and other recreational facilities. No impacts are anticipated.

**TRANSPORTATION/TRAFFIC:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Result in inadequate parking capacity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?**  
The project is in a mostly developed area, with all street improvements existing. The project will not create a substantial increase in the number of vehicle trips, traffic volume, or congestion. No impacts are anticipated.
- b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?**  
The project is in a mostly developed area, with all street improvements existing. The project will not create a negative impact on the level of service standards. No impact is anticipated.
- c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?**  
The project will not create a substantial safety risk or interfere with air traffic patterns. No impact is anticipated.
- d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?**  
The system will use the existing roadways and will not require any additional design features. No impact is anticipated.
- e) Result in inadequate emergency access?**  
The project is designed to accommodate access for emergency vehicles, etc. No impacts are anticipated.
- f) Result in inadequate parking capacity?**  
The project is planned to require minimal staffing and will use the existing parking locations. No impacts are anticipated.
- g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?**  
The project does not conflict with any transportation policies, plans, or programs. As such, no impacts are anticipated.

**UTILITIES/SERVICESTYSTEMS:**

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Comply with Federal, state, and local statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?**  
Minimal wastewater will be generated at the startup of the system and it will not exceed the treatment requirements. No impact is anticipated.
- b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?**  
The project will be a water treatment facility and will not require additional treatment or expansion. The project will not cause significant harmful environmental effects. No impact is anticipated.
- c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?**  
The project will not impact existing stormwater management systems.
- d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?**  
The proposed project will have sufficient water supplies available to service the project. No impact is anticipated.
- e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?**  
There is not wastewater treatment provided. No impact is anticipated.
- f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?**  
Current waste disposal provisions will cover any additional waste removal required by the addition of this project. No new impact is anticipated.
- g) Comply with Federal, state, and local statutes and regulations related to solid waste?**  
The project will comply with Federal, state, and local statutes and regulations related to solid waste. No impacts are anticipated.

**MANDATORY FINDINGS OF SIGNIFICANTS:**

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**EXPLANATION:**

- a) **Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?**  
 The proposed project does not have the potential to degrade the quality of the environment, reduce the fish and wildlife habitat, threaten plant, fish or wildlife species, or eliminate historical, archeological, or cultural resources. Therefore, no impacts are anticipated.
- b) **Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?**  
 The project does not have impacts that are cumulatively considerable.
- c) **Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?**  
 Implementation of this project will improve the quality of the environment, specifically through the enhancement of water quality in the Raymond Basin through treatment of impacted groundwater. Although potential human health impacts exist due to constituents of concern present in groundwater, the proposed treatment facility will remove constituents to below the CDHS Action Level. In addition, optimizing the use of local water resources will reduce the need to develop alternative sources of potable supply. No cumulative impacts were identified that could result in adverse environmental effects.

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