Engineering Report

For Consideration of an Amended Water Supply Permit for
The Valley County Water District
Serving the City of Baldwin Park, and Portions of the
Cities of West Covina and Irwindale
Los Angeles County

July 11, 2007

Drinking Water Field Operations Branch
California Department of Public Health
Metropolitan District

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TABLE OF CONTENTS

I. INTRODUCTION

1.1 Purpose of Report

The Valley County Water District (District), by application dated April 16, 2007, has applied for a permit amendment to install and operate liquid-phase granular activated carbon (LGAC) treatment equipment at the Lante Plant site for removal of 1,2,3-Trichloropropane (1,2,3-TCP). A copy of the application is included in Appendix A of this report. [redacted]

The groundwater sources for the Lante Plant are located in a portion of the Main San Gabriel Basin known to contain contaminants associated with of the United States Environmental Protection Agency's (EPA's) National Priority List (NPL) site in the Baldwin Park area. This NPL site is known as the Baldwin Park Operable Unit (BPOU). The pumping and subsequent treatment of the groundwater is consistent with the groundwater cleanup plan developed by EPA for the NPL site.

The purpose of this report is to document the sanitary engineering review, to evaluate the proposed operation of the LGAC treatment equipment, and to make recommendations regarding the issuance of an amended domestic water supply permit to the District.

1.2 Background Information

Permit amendment 1910009PA-003 effective November 7, 2005 authorized the operation of the recently constructed Lante Plant water treatment facility, for removal of contaminants from the District's Lante Well (also known as SA1-3) and two new extraction wells, SA1-1 and SA1-2. Wells SA1-1 and SA1-2 are located east and southeast, respectively, of the Lante Well and have water quality characteristics similar to that of Lante Well. Appendix A includes a process flow diagram showing the treatment equipment in the Lante Plant including the new LGAC vessels.

In summary, the Lante Plant permit amendment authorized operation of four air-strippers operating in parallel for the removal of volatile organic compounds (VOCs), an Ion Separation (ISEP®) facility primarily for the removal of perchlorate, and a low pressure ultraviolet light facility with hydrogen peroxide injection, for the removal of 1,4-dioxane and N-nitrosodimethylamine (NDMA). The design capacity of the treatment facility is 7,800 gallons per minute (gpm). Following treatment and hypo-chlorination, the fully treated effluent will be pumped through two separate water mains to supply the District's Upper Baldwin pressure zone and Suburban Water Systems' Plant 121. A complete description of the BPOU and the equipment and operation of the Lante Plant is included in the Engineering Report for the November 2005 permit amendment.

In early 2006, 1,2,3-TCP was detected in all three of the District's wells feeding the Lante plant as well as several upstream monitoring wells sampled by the USEPA. The Department has established a notification level for 1,2,3-TCP at 5 ng/L. Historically peak levels of 1,2,3-TCP detected in the Lante well, SA1-1 and SA1-2 are 89, 11, and 9 ng/L. Since 1,2,3-TCP is not sufficiently removed by the existing Lante treatment equipment, the District was required to install liquid phase granular activated carbon in addition to the existing equipment to remove the 1,2,3-TCP before water treated at the Lante Plant can be used as potable water.

1.3 Brief Description of System

The November 2005 Engineering Report includes descriptions of District's sources, treatment and distribution systems. This report focuses on the additional LGAC treatment for 1,2,3-TCP. The District has installed 10 ten-foot diameter GAC pressure vessels which will receive up to 7800 gpm of water which has passed through the air strippers. Testing has demonstrated that the air strippers, when operated with a volumetric air to water ratio of approximately 55 to 1, removed 40 – 50% of the incoming 1,2,3-TCP. LGAC effluent will then go to the existing ion exchange equipment for nitrate and perchlorate removal, followed by an advanced oxidation process (UV – hydrogen peroxide) for NDMA and 1-4 dioxane destruction. The LGAC is expected to remove 1,2,3-TCP to below the Notification Level of 5 ng/L, and the advanced oxidation process also significantly reduces 1,2,3-TCP and can be considered an extra safety barrier to prevent this contaminant from entering the distribution system.

It has been proposed that the 10 LGAC vessels operate in a single-pass parallel configuration, as opposed to operating paired vessels in the lead-lag mode. The District has allotted additional space to add additional vessels or convert to the lead-lag mode if it becomes necessary.

1.4 Sources of Information

Information used to prepare this report was obtained from California Department of Public Health (CDPH or the Department) files, Valley County Water District personnel, and visits to the Lante Plant site. On behalf of the District, Stetson Engineers has prepared and submitted a Preliminary Design Report (PDR) dated June 5, 2007, and a Compliance Test Report, dated June, 2007. These documents are included in Appendix B. Appendix C includes maps and summaries of water quality data within the BPOU.

The investigation, analysis and preparation of this report were conducted by Alan Sorsher, P.E., Associate Sanitary Engineer with the Department's Drinking Water Field Operations Branch under the supervision of Jeff O'Keefe, P.E., District Engineer, both with the Department's Metropolitan District.

2. INVESTIGATIVE FINDINGS

2.1 Groundwater concentrations of 1,2,3-Trichloropropane

2.1.1 Upgradient concentrations

CDPH's drinking water notification level for 1,2,3-TCP, first established in 1999, is 0.005 micrograms per liter (µg/L) or 5 nanograms/liter (ng/L). Analytical methods capable of reliably detecting these low concentrations were not refined and approved until the summer of 2002. At that time, drinking water systems that were required to monitor for this compound had to achieve this low reporting level.

2.1.1.1 Cooperating Respondents (CRs) Monitoring Wells

Plate 1 (titled 123 TCP in BPOU) in Appendix C is a map indicating the range of historically highest detected concentrations of 1,2,3-TCP in the BPOU. Appendix C includes a printout of the data base of analytical results for 1,2,3-TCP. The results infer a 1,2,3-TCP hotspot in the area around Wynn Oil monitoring well MW-1. The reported concentration was 2.8 micrograms/liter (2800 ng/L) in a sample taken on April 26, 2004. A number of upgradient monitoring wells to the north of MW-1 were non-detect at the 5 ng/L level. Four monitoring wells owned by Aerojet located downgradient and south of Wynn Oil monitoring well MW-1 have been sampled between 2001 and 2005, but because the reporting limits for these samples were too high, it is unknown but likely that some levels between 5 and 1000 ng/L are present in the water intercepted by these wells.

2.1.1.2 EPA Monitoring Wells

As part of its Superfund investigation of the San Gabriel basin, the USEPA has installed a series of multi-port monitoring wells to assist the characterization of the contaminant plumes. In September 2006 the reporting limit was lowered to 5 ng/L versus the previously used level of 500 ng/L.

Table 1 lists the EPA monitoring wells in a generally southwest direction between the Wynn Oil monitoring well MW-1 and the District's three extraction/productions wells.

Table 1

MONITORING WELL	Range of Detected 1,2,3-TCP concentration (various sample zones), ng/L
MW5-3	8 - 49
MW5-11	26 - 130
MW5-18	3 - 37
MW5-13	12 – 93
MW5-17	5<

According to the Operation, Maintenance and Monitoring Plan (OM&MP) prepared by Stetson Engineers on behalf of the District, EPA monitoring wells MW5-3, MW5-11 and MW5-18 are within the 5 year capture zone modeled for SA1-1. EPA monitoring wells MW5-13, and MW5-17 are within the 20 year capture zone modeled for the Lante Well and SA1-2.

2.1.1.3 Extraction Production Wells

The concentrations of 1,2,3-TCP detected in the extraction/production wells are provided below:

Table 2

WELL	Range of Detected 1,2,3-TCP concentration (ng/L)
Lante Well (SA1-3)	39 – 89
SA1-1	7 - 11
SA1-2	6 - 9

2.1.2 Concentration levels in Lante Influent and at GAC Influent

The Compliance Test Report (Appendix B) summarizes data obtained from May 9 to May 18, 2007. As the CR's consultant, Geomatrix predicted in the PDR, when all three wells operated, the plant influent concentration of 1,2,3-TCP was 28 – 31 ng/L. The air strippers operate at an air to water ratio of about 55:1 and during the test removed about 50% of the 1,2,3-TCP so that the levels going into the LGAC were about 16 –

17ng/L.

With just SA1-1 and the Lante Well operating the concentrations into the air strippers were about 47 to 54ng/L and about 26 – 30 ng/L after the air strippers.

As mentioned in the PDR, it is expected that these concentrations will fluctuate in the future. Stetson Engineers used a design concentration of 30 ng/L for the LGAC influent and included flexibility to add LGAC vessels or change to a lead lag configuration if necessary.

2.2 Description of Lante Plant's Activated Carbon (GAC) Treatment Equipment

The LGAC Treatment Facility consists of 10 Calgon model 10 contactor vessels. Each pressure vessel is ten feet diameter and epoxy lined. Each vessel is anticipated to handle a maximum flow of 780 gpm, for a total combined capacity of 7,800 gpm. Equipment drawings and specifications for the activated carbon are included in Appendix D, along with a data sheet for the LGAC equipment. A 39,000 gallon backwash holding tank has been installed which empties to the local sewer system.

Each vessel is 10 feet in diameter and 12 feet high. The vessels have NSF-approved epoxy linings installed to prevent internal corrosion. Each vessel is equipped with a separate inlet and outlet for carbon addition and removal, respectively. Each vessel is also equipped with vent valves, flow rate indicator, pressure gauges, and sample ports. Each vessel has five sample ports, designed specifically for water quality monitoring. The ports are located at the vessel's influent, effluent, 25 percent bed depth, 50 percent bed depth, and 75 percent bed depth. Provisions for the addition and removal of utility water as well as wastewater removal are also provided. The flowmeters are tied into the District's SCADA system for monitoring and recording as are the differential pressure indictors. The flow in each vessel is manually set and controlled with individual gear driven butterfly valves.

Other water systems have successfully treated 1,2,3-TCP to below the 5 ng/L using bituminous activated carbons. The District has proposed to use virgin coconut shell activated carbon for this application which is expected to have an even greater ability to remove this compound. Each vessel holds 20,000 lbs of 12 x 30 mesh granular activated carbon. The carbon must meet the NSF standard 61 – use for drinking water system components. Since the LGAC has a specific gravity of about 0.5, each 20,000 lb bed of carbon will occupy approximately 4800 gallons. At the maximum flow rate of 780 gpm per vessel, the minimum empty bed contact time (EBCT) will be 6.1 minutes. At 700 gpm the EBCT would be 6.9 minutes and 7.9 minutes at 610 gpm. Limitations on the discharge of ion exchange brine to the sewer system has recently limited the plant flow to about 5500 gpm, in which case the EBCT would be 8.7 minutes.

The effluent of Lante Plant is disinfected with liquid sodium hypochlorite solution (12.5 percent strength) prior to distribution the Valley County Water District and Suburban Water Systems.

2.3 GAC Treatment Process

The LGAC vessels are equipped with manual flow control valves and meters to equally distribute the flow from the air strippers to the LGAC units. In this parallel configuration, flow is downward through all ten carbon beds. When 1,2,3-TCP is detected at the port representing 75% of the bed depth, the vessel is removed from service for carbon changeout.

After fresh carbon has been loaded, the vessel is backwashed prior to being placed into service. Backwashing an adsorber consists of directing flow upward under the carbon bed, expanding the carbon bed to remove entrained air, suspended solids and carbon fines. The backwash water will be supplied from the District's distribution system. The backwash waste stream will be discharged to the 39,000 gallon backwash tank for disposal to the sewer system once the suspended solids have settled. The LGAC wastewater must be discharged at about 27 gpm in order to empty the tank in 24 hours. The District's sewer capacity is limited to 254,000 gpd and a peak of 350 gpm which must accommodate the Lante Plant's other waste streams.

Differential pressure switches with indicating gauges are installed on each vessel to monitor the pressure drop across the vessel. The system should be operated not to exceed a differential pressure of 20 psi. If the differential pressure exceeds this value, the vessel should be backflushed. The backflush flow rate should also be controlled to maintain the differential pressure at less than 20 psi. District operators will be visiting the facilities daily to ensure that the equipment is functioning properly. Backflushing of the vessels will be implemented manually as necessary. Operating procedures for backflushing LGAC beds are provided in the OM&MP developed for the Lante Plant.

2.4 Compliance Testing Report

A copy of the Compliance Test Report prepared by Stetson Engineers is included in Appendix B. The report discusses the testing and results of the plant operation, including the LGAC vessels between May 9, 2007 and May 18, 2007. During the test period, two pumping scenarios were used, one with Wells SA1-1 and SA1-3 (Lante Well) at 5639 gpm, and the second using all three wells at 5525 gpm. Plant flow was limited since one of the four air strippers was out of service. The testing demonstrated the hydraulic integrity of the equipment, and that the 1,2,3-TCP was not detected in the treated water, at least over the short term. No 1,2,3-TCP was detected at the sample ports representing the top 25 percent of the LGAC beds. The vessel flows were adjusted so that one of them operated at the full 780 gpm over the test period.

As is common with LGAC applications, some initial rise in pH was observed and the potential for nitrate to accumulate on the LGAC and then slough off was also seen.

Stetson's conclusions are given in Section 4.0 of the report:

4.0 CONCLUSIONS

- *The addition of the LGAC treatment process did not adversely affect the performance of the ISEP or UV treatment processes. However, during LGAC changeout, the pH of the combined inflow to the ISEP should be monitored.*

- *1,2,3-TCP was completely removed by a combination of air stripping and LGAC. Air stripping removed nearly 50 percent of the combined influent 1,2,3-TCP.*

- *Breakthrough of PCE and TCE was observed in the combined air stripper outflow. TCE and PCE were not detected in the fully-treated water, so it is most likely that these VOCs were adsorbed to the LGAC. The LGAC process can act as a redundant process for VOC removal.*

- *Hexachlorobutadiene was detected at 1.1 µg/l in a sample from Well SA1-1, but confirmation samples indicated the compound was non-detect. Hexachlorobutadiene was not detected in any of the air stripper combined inflow, air-stripper combined outflow or fully treated water samples.*

- *Although apparent nitrate peaking appears to have been observed in the LGAC Vessel 1 outflow, the ISEP units continued to function normally without any problem removing nitrate and perchlorate to treatment design concentrations.*

The testing confirmed the tendency for the carbon to accumulate nitrate and then release it when shut down and re-started. The laboratory results showed a peak on restart of 63 mg/L versus the influent of about 54 mg/L. Under this small nitrate peaking, the ISEP units appear to have been unaffected.

However, since test runs were only ten days (and the vessel was on low flow standby for about the prior week as other vessels were loaded and prepared), the full potential for nitrate peaking could not be evaluated. If the plant was shut down after running for several months and then restarted, the amplitude of the nitrate peak could be much greater. It is unknown how well the ISEP units would remove nitrate and perchlorate under such circumstances. The permit amendment should have a provision to monitor nitrate levels and discharge plant effluent to waste during periods of very high nitrate peaking, until it can be proven that perchlorate and nitrates will be sufficiently removed even under extreme conditions.

2.5 Monitoring and Reliability

The use of granular activated carbon to remove low levels of organic contaminants is a well established treatment technique. However, 1,2,3-TCP is more difficult to adsorb on LGAC than more common contaminants such as trichloroethylene (TCE) and perchloroethylene (PCE). As discussed in Section 3 of the PDR, only a small number of water systems have used of this technique specifically for very low levels of 1,2,3-TCP. Both the Glendale and the Burbank water systems have been successfully using bituminous based LGAC for several years for 1,2,3-TCP removal. Valley County has proposed using virgin coconut shell carbon, which is expected to result in even longer bed life.

Operation of the air strippers in series with the LGAC vessels provides an additional, necessary treatment barrier. In addition to the approximately 50% removal of 1,2,3-TCP in the air strippers mentioned above, the very high efficiency of the air strippers remove other VOCs to extremely low concentrations, typically below detection limits. This is expected to enhance the 1,2,3-TCP adsorption on the LGAC since there should be less competition for active adsorption sites on the LGAC, and less displacement of 1,2,3-TCP by other VOCs in the carbon beds.

The exhaust air from the four air strippers was originally treated by an absorption and catalytic oxidation system utilizing recirculating resin beads (MC^2 System). Recirculation of the resin beads required an air flow of 14,000 cubic feet per minute (CFM) and thus determined the air to water ratio for the 1950 gpm strippers. The decision has been made to replace the MC^2 System with a conventional vapor phase activated carbon system to remove the VOC emissions from the air leaving the air strippers. While this will give the District the opportunity to operate the air strippers at a lower air to water ratio, it will be important that the air strippers continue to operate at high efficiency, remove a significant portion of the 1,2,3-TCP, and the efficiency should be measured and recorded over time.

The concentration of 1,2,3-TCP in water leaving the LGAC equipment is expected to be below the NL of 5 ng/L at all times. Nevertheless, according to the PDR report in Appendix B, the UV-hydrogen peroxide treatment will provide an additional safety barrier to 1,2,3-TCP at this facility

The short-term test of the LGAC equipment during May 2007 confirmed the ability the virgin coconut shell carbon to remove the 1,2,3-TCP from the incoming water. The proposed treatment arrangement of air stripping followed by coconut shell LGAC is expected to successfully remove the traces of 1,2,3-TCP with a reasonably long bed life. Since long term testing at the District has not been performed, the actual bed life for this application has yet to be confirmed. Therefore, the operation and monitoring of the treatment technique should be conservative, at least to start, with the understanding that operational parameters and the monitoring scheme may be adjusted after the District has some long-term experience with how the specific carbon and equipment performs on their specific water.

Specific permit provisions for monitoring are listed in Section 4 of this report. Compliance with the permit for 1,2,3-TCP will be based on a weekly sample at the combined LGAC effluent header (SP 13) or ISEP influent. Permit amendment provisions will include careful operational monitoring of influent 1,2,3-TCP levels in and out of the air strippers, monitoring and charting of the 1,2,3-TCP removal efficiency in the air strippers, and careful monitoring of the movement of 1,2,3-TCP as it travels down the LGAC beds. Experience at other water systems treating 1,2,3-TCP has been that the time of movement through the LGAC beds are not linear – the first 25% of the bed lasts longer and each successive 25% of the bed lasts a shorter time. At least for the first two or three LGAC charges, monitoring should be performed monthly at the sample port associated with the first 25% of the carbon bed depth. Detection at the 25% port will trigger immediate sampling at the 50% port and will continue monthly at the 50% port until such time as there is a detection. Then the 75% port will be immediately sampled, and weekly sampling begun at the 75% port. Detection at the 75% port will trigger an immediate confirmation sampling and also sampling of that vessel's effluent port with expedited turnaround from the laboratory. If the particular vessel's 75% port effluent is non detectable for 1,2,3-TCP below the laboratory's reporting limit, the District may continue to operate that bed, but continue weekly testing. Confirmed detection at the 75% port shall trigger removal from service and change out of the LGAC bed. The combined effluent of all LGAC vessels shall always be non-detect for all VOCs, including 1,2,3-TCP.

Although the water is disinfected during its downstream exposure to UV light in the Trojan UV Terra system, and is hypochlorinated prior to distribution, excessive biological growth within the LGAC vessels could interfere with the adsorption of 1,2,3-TCP or foul the ISEP resin. Since LGAC beds are prone to support bacteriological activity, the District will test for HPC at the combined LGAC effluent sample point, SP 13. If SP 13 has more than 250 CFU/ml, the District must investigate and remedy the source of the HPC and must disinfect any LGAC bed and vessel that cannot be remedied by other means.

In addition to monitoring the operation of the LGAC for 1,2,3-TCP removal, the source wells and up-gradient monitoring wells will be tested for 1,2,3-TCP levels to provide information and early warning of any increase in 1,2,3-TCP concentration.

The results of all operational monitoring performed in accordance with the requirements outlined in the permit amendment provisions shall be summarized and provided to the Department monthly. In addition, all analytical results for compliance purposes shall be submitted electronically to the Department using the appropriate primary station (P.S.) codes assigned for each sampling location. The LGAC equipment shall be operated such that the combined effluent is non-detect for all VOCs. Compliance with MCLs and Notification Levels (NLs) is based on the results of the weekly sampling conducted at the plant effluents.

2.6 Operation and Maintenance

The Lante Plant shall be operated in accordance with operational procedures established in an approved OM&MP. After one (1) year of operation, the OM&MP for the Lante Plant shall be updated based on the first year's operational experience. The OM&MP shall include a daily checklist of inspected items for each treatment process. The updated plan shall be submitted within 15 months after receipt of this water system permit amendment.

If there is any conflict between the OM&MP and the Districts water system permit, the permit and its amendments shall take precedent.

The Draft OM&MP provided shall be revised and updated to more accurately describe the operational experiences and emergency procedures, monitoring program and reporting requirements. The District shall provide the Department with a revised OM&MP for approval. The District may modify the OM&MP at any time to accommodate changing conditions; however, any modifications made must be submitted to and be approved by the Department prior to implementation. At any time, the Department can require the District to modify the OM&MP due to changing conditions, change of laws or regulations, or concerns of the public.

As preventive maintenance, periodic inspection of the LGAC vessel internal parts should be made to ensure that the underdrain, vessel lining, and nozzles are in good condition. As a minimum, each vessel should be inspected once per year, or during carbon transfers if the on-line period exceeds one year. The District should maintain records of all service or inspection of equipment performed. All malfunctions and corrective actions taken should be documented. Maintenance performed on equipment should also be adequately documented. Procedures for operations and maintenance of the facilities are provided in the OM&MP.

2.7 California Environmental Quality Act (CEQA) Clearance

As lead agency under the California Environmental Quality Act (CEQA), the Valley County Water District filed an Initial Study and Negative Declaration for the Valley County Water District Water Treatment Plant Project (previously referred to as the Valley County Water District Subarea 1 Arrow/Lante Project) in February 2001, revised November 2001. The Initial Study included the option of utilizing LGAC for VOC removal. A Negative Declaration was filed in November 2001 based on the findings of Initial Environmental Study. The District filed a notice of intent to adopt a Negative Declaration for the Lante Plant in January 2002 and a Notice of Determination was filed in March 2002. The District has complied with the requirements set forth in CEQA and the project will not have a significant effect on the environment.

3. ENGINEERING APPRAISAL OF SANITARY HAZARDS AND SAFEGUARDS

In conjunction with the experiences at other water systems treating for 1,2,3-TCP, the design and proposed operation of the LGAC treatment equipment is expected to be successful. In addition to operational flexibility such as operating the vessels at reduced flow rate, the District, if necessary, could add additional vessels or switch to a lead-lag configuration.

On July 3, 2007 the air strippers and new LGAC equipment were inspected to verify that the LGAC treatment facilities were complete and ready for operation. No deficiencies or sanitary hazards were noted during the site visit.

4. CONCLUSIONS AND RECOMMENDATIONS

Issuance of an amended domestic water supply permit by the Department of Public Health to the Valley County Water District for the operation of the LGAC treatment at the Lante Plant is recommended subject to the following provisions:

GENERAL

1. The previously issued water system permit and subsequent amendments remain in effect except where specifically modified by this amendment.

2. The District shall comply with all State laws applicable to public water systems and any regulation, standard or orders adopted thereunder.

3. All water treated by the District and distributed for domestic use shall meet the Maximum Contaminant Levels (MCLs) established by the California Department of Public Health.

4. The only approved sources of domestic water supply are listed in Tables 1 and 2.

Table 1. Approved Groundwater Sources

Source	P.S. Code	Status	Capacity (gpm)
Clinton O. Nixon East Well	1910009-005	Active	2,300
Clinton O. Nixon West Well	1910009-006	Active	3,200
Maine Street East Well	1910009-001	Active	2,200
Maine Street West Well	1910009-002	Active	1,400
Lante Well	1910009-007	Active	3,400
SA1-1 Well	1910009-033	Active	3,400
SA1-2 Well	1910009-034	Active	2,400

Table 2. Other Sources

Source	P.S. Code	Status	Maximum Capacity (gpm)	Location
Covina Irrigating Company	1910009-015	Active	1,000	[redacted]
Metropolitan Water District (MWD) Connection USG-9	1910009-016	Standby	13,500	[redacted]

5. The only approved treatment facilities are listed in Table 3.

Table 3. Approved Treatment Facilities

Facility	Plant Capacity (gpm)	Treatment Processes
Lante Plant	7,800	Air stripping, adsorbtion using granular activated carbon, ion exchange, advanced oxidation treatment with UV/ peroxide addition and disinfection with liquid sodium hypochlorite
Clinton O. Nixon West GAC Treatment Facility	2,400	Liquid phase granular activated carbon (temporarily suspended) and disinfection with liquid sodium hypochlorite
Clinton O. Nixon East GAC Treatment Facility	3,200	Liquid phase granular activated carbon (temporarily suspended) and disinfection with liquid sodium hypochlorite
Maine Street GAC Treatment Facility	3,600	Liquid phase granular activated carbon and disinfection with liquid sodium hypochlorite

6. No additions, changes or modifications to the sources of water supply or water treatment facilities outlined in Provisions 4 and 5 shall be made without prior receipt of an amended domestic water supply permit from this Department.

7. All treatment facilities shall be operated by personnel who have been certified in accordance with the Regulations relating to Certification of Water Treatment Facility Operation, CCR, Title 22. The classifications for all applicable treatment facilities are listed in Table 4. The designated chief treatment operator for the Lante Plant shall obtain a Grade T5 certificate by January 1, 2009. In addition, the District's distribution system has been

classified as a D4 system. Designated chief and shift distribution system operator(s) shall possess minimum grade D4 and D3 certificates, respectively.

Table 4. Treatment Facility Classifications

Treatment Facility	Treatment Facility Classification	Min. Treatment Grade Required	
		Chief Operator	Shift Operator
Lante Plant	T5	T5	T3
Clinton O. Nixon West GAC Treatment Facility	T2	T2	T1
Clinton O. Nixon East GAC Treatment Facility	T2	T2	T1
Maine Street GAC Treatment Facility	T3	T3	T2

8. The District shall maintain an active cross-connection control program in accordance with the California Code of Regulations (CCR) to prevent the water system and treatment facilities from contamination as a result of cross-connections. All cross-connections shall be abated within 30 days of their identification. Annual cross-connection surveys shall be conducted. Backflow prevention devices shall be tested at least annually.

9. The District shall monitor all active groundwater and surface water sources in accordance with the Vulnerability Assessment and Monitoring Guidelines issued by the Department.

10. The District shall only use additives that have been tested and certified as meeting the specification of American National Standard Institute/National Sanitation Foundation (ANSI/NSF) Standard 60. This requirement shall be met under testing conducted by a product certification organization accredited by the ANSI for this purpose.

LANTE TREATMENT PLANT

General

11. All water treated by the District at the Lante Plant and distributed for domestic use shall meet the MCLs and Notification Levels (NLs) established by the California Department of Public Health.

Air Stripping Treatment

12. Each air stripper shall not be operated at a flowrate exceeding its capacity of 1,950 gallons per minute (gpm) at any time.

13. In order to ensure reasonably long LGAC bed life for 1,2,3-TCP removal, the District shall operate the air strippers at a high enough air to water ratio such that the typical concentration of total VOCs other than 1,2,3-TCP in the water leaving the air strippers will be no more than 1.5 micrograms/liter.

14. The District shall inspect and maintain the air strippers as needed to prevent or minimize fouling of the packing media and maintain efficient operation of the air strippers.

15. Each air stripper and its appurtenances shall be operated in compliance with the requirements of the United States Environmental Protection Agency (USEPA). If the Lante Plant cannot meet the requirements of the USEPA, the District shall cease operation of the Lante Plant until it can again comply with USEPA requirements.

Liquid Phase Granular Activated Carbon Treatment

16. Except as provided for below, each LGAC vessel shall be operated at a flowrate of no more than 780 GPM. When a vessel is removed from service for carbon changeout or any other reason, the total plant influent rate shall be adjusted so that each of the remaining LGAC vessels receives no more than 780 gpm. Each LGAC vessel shall be operated with an Empty Bed Contact Time (EBCT) of at least 6 minutes at all times.

17. All initial and replacement carbon for the LGAC adsorbers shall be virgin coconut shell carbon and meet the requirements in the specifications of the Preliminary Design Report, June 2007 as a minimum. Any change of the carbon specification shall be approved in writing by the Department.

18. Each time the activated carbon is replaced, it shall be backwashed to remove carbon fines and the adsorber shall not discharge to the plant effluent until it is verified that no visible carbon fines are present in the adsorber's effluent.

19. Each time a carbon vessel is emptied, the vessel internals shall be inspected for evidence of damage, looseness, clogging or other problems. The condition of the lining shall be noted. Records of maintenance inspections shall be kept on file at the Lante Plant as specified in Provision 41.

20. If entry into the vessel is necessary, the vessel shall be disinfected with a free chlorine solution of 50 mg/L and held for two (2) hours. The vessel shall be flushed to a residual of less than 0.1 mg/L prior to installing the fresh carbon.

MONITORING

General

21. Where specified, low level analysis for 1,2,3-trichloropropane (1,2,3-TCP) shall be performed by an ELAP certified laboratory with the lowest achievable reporting limit, not greater than 5 nanograms/Liter.

22. Sampling shall be performed in a manner which minimizes the chances for contamination of the sample. Sampling events shall be planned so that the cleaner samples (plant effluent, individual carbon adsorber effluent, and intermediate water) are sampled prior to taking plant influent samples. Alternatively, a different individual may be designated to take plant influent samples.

23. The District shall instruct the laboratory to attempt to avoid carry over of contaminants within the GC/MS equipment. The District shall instruct the laboratory not to batch water samples from the Lante Plant with soil samples, wastewater samples or with water samples having high concentrations of semi-volatile contaminants. When using an automatic sampler, the samples from the Lante Plant should be loaded to run first.

24. The District shall instruct the laboratory performing GC/MS analyses for volatile or semi-volatile organic compounds to include a listing of all Tentatively Identified Compounds (TICs) and unknown compounds related to significant chromatographic peaks found by the analyst.

    a. The laboratory performing the analyses shall be instructed to report all calibrated peaks on chromatographic analyses. Uncalibrated peaks on chromatographic analyses shall be reported if they are greater than 10 percent of the nearest internal standard and are not known artifacts produced by the instrument. All uncalibrated peaks that can be identified by the mass spectra shall be identified as TICs. All TICs must be reported to the Department along with the other compounds.

    b. If unknown peaks on GC/MS chromatograms are not identified by the laboratory's existing library of mass spectra, the sample extracts shall be retained and the District or the laboratory shall consult with the Department within seven (7) days of this finding. For volatile organic analyses, additional sampling may be required. Following the consultation, and unless instructed otherwise by the Department, the laboratory analyst shall attempt to identify functional groups and/or

tentatively identify the compound(s). This attempt shall be made and the Department notified of the results by telephone and fax within 14 days of the discovery of unknown peaks.

c. If the TIC or unknown compound is repeatedly detected and not a one-time event, the Department may require and allow time for additional work to positively identify the compound(s) and/or additional testing of the Lante plant effluent to verify removal of the compound(s).

d. Records of the mass spectra, sample date and sample location for all TICs and unknown chemical species described above shall be maintained by the District in a central location in either paper form or digital form.

23. If an organic compound is detected in a sample from the wells or plant, and also found in the associated method or travel blank, the sample and blank results should be indicated as such and the sample result should not trigger subsequent monitoring unless it was present at more than five times the concentration (or ten times the concentration in the case of a common lab contaminant) that of the blank. However if the sample result is above an MCL or Action Level, the water shall be re-tested, and if lab contamination is still a problem, another lab should be used.

24. The District shall comply with any additional conditions which the Department deems necessary based on any newly identified constituents.

25. If necessary, the Department may modify the monitoring provisions specified herein based on additional information. The District may request a modification of any monitoring provision based upon substantiating data at any time.

Upgradient Surveillance Wells

26. The following monitoring wells owned by the USEPA shall be sampled and analyzed in order to provide early detection of any new constituents or significant changes of previously identified constituents that may be drawn into the extraction wells:

Table 5. Surveillance Wells

MONITORING WELL	Sampling Frequency
MW5-3	Annual
MW5-11	Annual

MONITORING WELL	Sampling Frequency
MW5-18	Annual
MW5-13	Every two years
MW5-17	Every two years

Sampling shall be performed or coordinated at the time that the USEPA or its contractor collects samples from these wells.

If these wells become unavailable, then the District shall drill replacement monitoring wells and continue the same monitoring program.

Samples from these wells shall be analyzed by the USEPA or the District for:

- All organic constituents (Title 22 VOCs and SOCs) in the District's Vulnerability Assessment Guideline. Report all detections and peaks as required in Provision 24.
- Semi-volatile organic chemicals (SVOCs), including 1-4 dioxane using method 8270 and 8270 modified respectively. Report all detections and peaks as required in Provision 24.
- For method 8270, the laboratory shall report results at the laboratory's drinking water reporting limits if applicable, or the lowest reproducible, achievable reporting limits whichever are lower. Reporting limits shall be subject to the Department's review and approval.
- Low level 1,2,3-TCP
- Perchlorate and chlorate
- Nitrosamines including NDMA

27. The evaluation and interpretation of the results of the monitoring well sample analysis shall be included in the Annual Report for the Lante Plant.

Production Wells

28. Monitor as per previous permit amendment, but include sampling and analysis for low concentrations of 1,2,3-TCP on a monthly basis.

29. Detection of any SVOC other than 1-4 dioxane in the monitoring wells shall trigger corresponding sampling and analysis in the extraction/production wells.

Air Stripping Monitoring

30. The monitoring points, frequencies and primary station codes (P.S. Codes) associated with the Lante facility is provided in Table 6.

Table 6. Air Stripping Equipment Sampling Points

Treatment Process	Sampling Point	P.S. Code	Monitoring Requirements
Air Stripping	Combined Air Stripper Influent (SP-2)	1910009-104	Monthly for VOCs. Every 2 weeks for 1,2,3-TCP for the first year, then monthly.
	Air Stripper 1 Effluent (SP-3A)	1910009-108	Every 2 weeks for 1,2,3-TCP for the first year, then monthly. Every 2 weeks for VOCs if detected at combined air stripper effluent (SP-3). Ambient air temperature at the time of sampling shall be recorded.
	Air Stripper 2 Effluent (SP-3B)	1910009-109	
	Air Stripper 3 Effluent (SP-3C)	1910009-110	
	Air Stripper 4 Effluent (SP-3D)	1910009-111	
	Combined air stripper Effluent (SP-3)	1910009-112	Monthly for VOCs. Monthly for 1,2,3-TCP, coliform bacteria and HPC.

31. For each air stripper, the District shall calculate the 1,2,3-TCP removal efficiencies based on the results of the analyses required in Provision 30. The District shall develop a control chart of each air stripper's 1,2,3-TCP removal efficiency and update the chart monthly.

32. Detection of any SVOC other than 1-4 dioxane in any of the extraction/production wells shall trigger corresponding sampling and analysis of the combined air stripper effluent and the plant effluent.

Liquid Phase Granular Activated Carbon Monitoring

33. Each LGAC vessel shall be monitored as follows:

- If 1,2,3-TCP is detected in the monitoring wells, extraction wells, or air stripper effluent, testing of low level 1,2,3-TCP shall be performed in lieu of EPA Method 524.2 for VOCs. Testing for Method 524.2 VOCs shall resume in addition to 1,2,3-TCP if any of these chemicals are detected in the plant effluent.

- When the carbon bed is fresh, sampling for VOCs shall be performed monthly at the 25% port. Upon detection of any treatable VOC, a sample at the 50% port shall be taken and analyzed within seven (7) calendar days.

- Sampling shall continue monthly at the 50% port until such time that any treatable VOC is detected. Upon detection of any VOC, a sample at the 75% port shall be taken and analyzed within seven (7) calendar days.

- Sampling shall then continue weekly at the 75% port, until any treatable VOC is detected. When any treatable VOC is detected at the 75% port, the laboratory shall be instructed to immediately notify the District, the 75% port shall be re-sampled along with the vessel effluent within 24 hours of the detection and analyzed within 48 hours of sampling. If any treatable VOC is above the DLR or reporting limit in the re-sample or the vessel effluent sample, the vessel shall be immediately removed from service.

- If the total of adsorbable semi-volatile constituents detected in the combined air stripper effluent exceeds 10 micrograms/L, then in addition to the VOC analyses required in this provision, the LGAC port monitoring shall include analyses by method 525.2. Method may 8270 be used if all the detected semi-volatile constituents are detectable by that method at similar reporting limits.

- When sampling any LGAC vessel port, the District may also collect a sample at the next lower port, archive the sample at the laboratory, and have the archived sample analyzed if required by this Provision. However all sample holding times specified in the approved method must be observed.

34. The Department may adjust the LGAC sampling protocols based on changes in the groundwater concentration, actual plant performance data, and analytical capabilities.

35. If any LGAC bed is backflushed and returned to normal downflow, the effluent from that vessel shall be run to waste or to the backwash tank. An effluent sample from that vessel shall be obtained after one (1) hour, checked for carbon fines and analyzed for 1,2,3-TCP and if present in the air stripper effluents, adsorbable organics using methods 524.2 and 8270 or 525.2. If all adsorbable organics are non-detectable, the vessel may return to normal service.

36. Each time an LGAC bed is replaced and placed into service, the effluent from that vessel shall be visually checked daily for total suspended solids for the initial (5) five days of service to ensure that no carbon fines are present.

The District shall also field check the pH of the combined LGAC effluent, (SP-13) following bed replacement and ensure that pH is in range for the subsequent ion exchange equipment.

37. The combined LGAC effluent sample point (SP-13) shall be sampled and analyzed weekly for total coliform and heterotrophic plate count (HPC) bacteria. If the results are positive for coliforms or greater than 250 cfu/ml (colony forming units per milliliter) for HPC, within 24 hours of notification, the District shall sample each LGAC vessel's effluent, the combined LGAC effluent and the Lante Plant effluent. The District shall investigate the source of the high bacteriological result. The District shall remove from service any individual LGAC vessel with positive coliforms. The District shall consult with the Department when the HPC is confirmed above 250 cfu/ml for any individual LGAC vessel, or if there is an indication of a sudden or significant increase in HPC.

38. For the purpose of operational control, the District shall arrange for the installation of a benchtop or portable nitrate analyzer based on ultraviolet light absorption for its principle of detection.

- To ensure that temporary surges of nitrate leaving the LGAC beds do not impair the plant effluent quality, any time the plant flow is shut down, upon restarting the plant, the plant effluent shall be temporarily diverted from potable use, and the combined effluent of the LGAC vessels shall be tested for nitrate at least three times during the first 90 minutes after restarting plant flow. If the nitrate concentration at the combined LGAC effluent is above 75 mg/L or 125% of the LGAC influent or indicates a rising trend, the Lante Plant effluent shall continue to be diverted from potable use. The diversion from potable use shall continue until the nitrate concentration in the LGAC combined effluent has stabilized at a level at or below the influent to the LGAC.
- During such periods of effluent diversion, the ISEP effluents shall also be tested for nitrate and sampled and analyzed for perchlorate.
- This provision shall remain in effect until the District has demonstrated the upper limit of nitrate concentration that the ion exchange equipment can tolerate and continue to adequately remove nitrate and perchlorate.
- The benchtop/portable analyzer shall be replaced with a continuous nitrate analyzer with an alarm function. The instrumentation shall include a variable alarm set point, and capable of monitoring plant and ISEP effluents as well.

RECORDS AND REPORTING

39. In addition to any other analysis results required to be electronically transmitted to the Department by the 10th of each month, a monthly report of the operation of the Lante Plant and source wells shall be submitted to the

local office of the Department. This operational report shall be submitted by the 20th day of the following month unless otherwise specified. This report is required regardless if the treatment plant is furnishing water to the distribution system or not. As a minimum, the report shall include:

a. A summary table of analytical results of all samples related to the wells and plant received by the District in a calendar month. The summary shall include the analytical results of the wells, air stripping tower influent and effluent, and LGAC ports and effluents.

b. The monthly operation, length of time in use and production of each extraction well.

c. The daily flowrate of water processed by the Lante Plant.

d. Daily air/water ratio and water flowrate through the air strippers,

e. Determinations of air stripper removal efficiencies for 1,2,3-TCP, ambient air temperature and any other compound requested by the Department,

f. The most recent control chart of the removal efficiencies of the air strippers and,

g. A table or tables indicating the status of each LGAC bed in terms number of days in service, number of days before each monitoring port detection, what VOCs were detected and bacterial status of the combined LGAC and individual LGAC beds and,

h. Operational schedule and problems, both scheduled interruptions and any unscheduled interruption,

40. Any change in the monitoring and reporting requirements shall be approved by the Department in writing.

41. Copies of reports, inspections and all records shall be kept for at least five (5) years. Water quality records shall be kept for 10 years.

42. The District shall prepare annual report to the Department, which shall include compliance with the permit provisions, the treatment plant's status, condition, and performance and any problems or difficulties. This report shall be due by March 30th of the following year.

43. The District shall immediately inform the Department by telephone and fax, of any exceedence of any organic constituent's MCL or Notification Level in the effluent of the Lante Plant. If the Department is closed at the time, it shall be notified by telephone by 8:15 a.m. of the next day. The water shall not be supplied to the distribution system until such exceedence has been corrected.

COMPLIANCE SCHEDULE

44. Within forty-five (45) days after issuance of this permit amendment, the District shall obtain and make functional a benchtop analyzer for operational

nitrate testing in the plant.

45. Within one hundred eighty (180) days after issuance of this permit amendment, the District shall install and have operational a continuous nitrate analyzer as required in Provision 38.