

Department of Health Services
Division of Drinking Water and Environmental Management

WATER PERMIT AMENDMENT
No. 04-07-00PA-000

CITY OF BURBANK

Los Angeles County
System No. 1910179

October 2000

Engineering Report

*For Consideration of the Amended Permit Application From
The City of Burbank
Serving City of Burbank, Los Angeles County*

October 2000

*Drinking Water Field Operations Branch
State Department of Health Services*

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I. INTRODUCTION

A. PURPOSE OF REPORT

The City of Burbank (hereinafter, City) submitted an application, dated December 9, 1997 for an amended permit. The application is to use the City Well No. 10 (Well VO-8) as an additional source, to construct a collection pipeline from Well VO-8 to the Burbank Operable Unit (BOU) plant influent, to change the flow of the Liquid Phase Granular Activated Carbon (LPGAC) beds of the BOU treatment plant from upflow to downflow, to add LPGAC backflush filters to the BOU treatment plant, and to use Calgon CL-50 as a scale inhibitor in the BOU treatment plant. The application also requested to add an interconnection with the City of Glendale at two locations. The purpose of this report is to document the sanitary engineering review, to evaluate the proposed operation of the BOU, and to make recommendations regarding the issuance of a domestic water supply permit amendment to the City.

B. BRIEF DESCRIPTION OF SYSTEM

1. The City System

The City currently operates its existing water system under Water Permit No. 65-108 issued on June 18, 1965, and Amendment Nos. 03-92-000, issued on June 1, 1992, and 04-07-95PA-000, issued on December 15, 1995. The permit and amendments are summarized in the following table:

| Permit | Permit No | Issued Date | Permit Type |
|-----------|----------------|-------------------|------------------------------|
| Full | 65-108 | June 18, 1965 | Revised Full Permit |
| Amendment | 03-92-000 | June 1, 1992 | GAC treatment-Wells 7 and 15 |
| Amendment | 04-07-95PA-000 | December 15, 1995 | BOU Treatment Facilities |

Due to the regional groundwater contamination with Volatile Organic Compounds (VOCs), all of the City's groundwater sources exceed State standards and require treatment. Since 1991, the City has installed and operated a Granular Activated Carbon (GAC) unit at the Lake Street facility to remove VOCs from Well Nos. 7 and 15, which provide about 10 percent of the total water supply. Well Nos. 7 and 15 have a total capacity of approximately 1,800 gpm. About 50 percent of the total water supply is provided by the BOU treatment plant. The maximum capacity of the BOU treatment plant is 9,000 gpm. The remaining 40 percent of the total supply is purchased from the Metropolitan Water District of Southern California (MWD) through the Jensen Plant and the Weymouth Plant. A portion of the water purchased from MWD is used for blending to reduce the nitrate level in the BOU treated water. The City has five (5) active

connections to the MWD distribution system. All MWD connections provide a total capacity of 52,000 gpm.

The City serves a permanent population of about 105,332 through 26,411 service connections. The maximum daily usage in 1999 was around 20 MG in August 1999, while the maximum monthly usage was 773 MG in August. The annual usage in 1999 was about 7133 MG or 740 gallons per connection per day.

The total source capacity of the whole system is about 63,000 gpm or 90 MGD. The City has 30 storage facilities with a total capacity of 58 MG and 19 booster stations. To evaluate the adequacy of the existing sources to meet maximum daily demand, Chart 1 of the Waterworks Standard was used for the evaluation. Given a maximum average monthly air temperature of 80 °F and approximately 26,000 service connections, a maximum daily usage rate of 32,000 gpm was found. If the peak hour requirement is at 2 times of the maximum daily usage, the City's water supply and storage are still adequate to meet the system demand in the foreseeable future.

There are 12 pressure zones in the distribution system with pressures ranging from 20 to 160 psi. The operation is divided into three (3) subsystems based upon the three (3) main pressure zones: Zone Nos. 1, 2 and 3. A system schematic diagram showing the elevations of wells, pumps, and reservoirs, is shown in Figure 1. Zone No. 1 serves more than 85 percent of the total connections. The effluent from the Blending facility, which is a blend of water from the MWD B-5 connection and the BOU treated water, along with all other MWD connections and the Lake Street GAC treated water feed into Zone No. 1. Zone Nos. 2 and 3 serve about 10 percent of the total connections. The nine (9) hillside zones serve the rest of the connections.

The treated groundwater from the BOU Treatment Plant is disinfected with free chlorine directly into the pipeline located in the chlorine diffuser vault coming from the Lockheed Martin's BOU Treatment Plant. After the chlorine is diffused through the static mixer, the treated water is transferred to the Valley Forebay. Ammonia is then added to the effluent of the Valley Forebay to chloramine the water before blending it with the MWD water from the City's B-5 connection. The City has four (4) chlorination sites: the Valley Forebay, the Lake Street Forebay, the Palm Avenue station, and the Reservoir No. 5 stations. The Valley Forebay and the Lake Street Forebay also have ammonia injection facilities. The following section describes the BOU in detail.

2. The Burbank Operable Unit Facilities

a. Extraction Wells

The location of the BOU is shown in Figure 2 in the Appendix. Seven (7) wells have been constructed in the BOU Phase I Well Field. [REDACTED]

[REDACTED]. The seven

(7) extraction wells are spaced between 800 and 1300 feet apart, for a total distance of about 6000 feet between Wells VO-1 and VO-7.

The drilling logs, well design and development are summarized in the attached Well Construction Summary and Well Data form for each individual well. The wells are constructed with 18-inch diameter, 0.312-inch wall, type 304 stainless steel casing and wire wrap screens. Mild steel casing was used from about 70 feet above the water table to ground surface. Screen slot size varies among the wells and between the upper and lower sections of each well, ranging from 60-slot to 90-slot. The wells are between 332 and 365 feet deep. Each well contains two (2) isolated screen sections, an upper and a lower section. The gravel pack consists of clean, washed, rounded gravel. A sanitary seal consisting of cement grout extends approximately 60 feet below ground surface in the annulus of each well.

During the BOU Phase 2 expansion, the City Well No. 10 has been refurbished and converted to Extraction Well VO-8. [REDACTED]

[REDACTED] The well was drilled in 1942 using the cable tool method to a depth of 588 feet. The well is cased with 20-inch No. 8 gauge steel double wall casing. In 1994, the well was rehabilitated and reconfigured to allow conversion to an extraction well. This consisted of removing the pump and column pipe, physical and chemical development, and placement of pea gravel to a depth of 360 feet and sealed with bentonite and cement at a depth of 354 feet. A sanitary seal was placed approximately 50 feet below ground surface in the annulus of Well VO-8.

A secured, below-grade well vault is provided to house Wells VO-1 through VO-7 appurtenances. The well vault provides access to the wellhead, flow meter, flow control valves, pressure relief controls, water level and line pressure monitors, and pump electric box. A secured, above-ground sampling cabinet has been installed near each well vault and contains a groundwater sampling port, a packer inflation pressure gauge and inflation/deflation valve, remote meters (voltage and current) for monitoring the cathodic protection system rectifiers, and a wellhead vent line.

The well pumps were sized and selected based upon the development of each well. The pumps installed in Wells VO-1, VO-2, VO-3, and VO-4 are 200-horsepower (hp), electric submersible units with an optimum design capacity of 1,500 gpm at a total dynamic head (TDH) of 410 feet. The pumps installed in wells VO-5, VO-6, and VO-7 are 250-hp, electric submersible units with an optimum design capacity of 1,900 gpm at a TDH of 420 feet. Well VO-8 is equipped with a 200 hp, line shaft turbine motor and is designed to deliver a flow of at least 1,500 gpm at 410 feet total differential head. All pumps are water lubricated except Well VO-8 that has a self oil-lubricating system connected to the motor shaft. The well pump information is summarized in the attached Well Data Forms.

Flow rates and water levels at each well are remotely monitored from inside the control room at the BOU Treatment Plant. The water level in each well is monitored by a pressure transducer. The flow rate from each well is monitored at the wellhead by a magnetic flow meter, and can be adjusted from the control room by the operator.

Groundwater is conveyed by underground high-density polyethylene (HDPE) pipelines. Groundwater from Wells VO-1 through VO-5 is conveyed to the west along Vanowen Street while groundwater from Wells VO-6 and VO-7 is conveyed to the east [REDACTED]

[REDACTED]. The underground sections of the pipeline are up to 30-inch outside diameter HDPE Drisco pipe, rated at 160 psig at 73° F. A separate 12-inch HDPE pipeline connects Well VO-8 to the Treatment Plant, as shown in Figure 2. The above ground sections of the pipelines, and the piping inside each well vault are of carbon steel construction, rated at 150 psig at 350° F.

b. Burbank Operable Unit - Treatment Facilities

The BOU Treatment Facilities include the Treatment Plant, the Valley Pumping Plant and the Blending Facilities (Figure 3). Water from the extraction wells is combined to enter the air stripping towers. The effluent from the stripping towers is then treated through the LPGAC before being discharged to the Valley Forebay. Chlorine is injected at the Valley Forebay's influent at a dosage of 1.5 mg/L. Ammonia is then injected at a 1 to 5 ratio of ammonia to chlorine to chloramine the Valley Forebay's effluent before it is boosted to the Blending Station. This station is a large pipe with an in-line static mixer where MWD water is blended with water produced by the BOU to reduce the nitrate level to approximately 39 mg/L. The water is then introduced into the distribution system at a flow rate of about 12,000 gpm for normal operation.

1. The BOU Treatment Plant

The purpose of the Treatment Plant is to remove organic chemicals to levels that are safe for domestic consumption. The Treatment Plant is a semi-automated facility designed to extract, transfer and process groundwater collected from the extraction well field. The main section of the plant consists of a stripping tower feed system, stripping tower system, stripping tower overhead treatment system and a stripping tower bottom treatment system. Figure 4 is a plot plan of the plant layout. Stripping tower system includes two (2) air stripping towers, each with the capacity to process a maximum of 4,500 gpm. The operator may select a one-tower operation, or a two-tower operation in either parallel or series mode. The influent enters the top of the tower above the packed section while air is fed to the bottom of the column below the packed media section. The tower utilizes a trough distributor to ensure even distribution of the influent over the packed media

section. Each tower is about 58 feet high with 11 feet from bottom to seam and a diameter of 14 feet. The towers contain a 40-foot packed section starting 10 feet from the bottom of the towers. The first 10 feet of packing, from the bottom, consists of 2-inch Pall rings, the remainder consists of 3-inch LANPAC.

There are three (3) air blowers, one (1) for each tower and one (1) as a standby. Each blower provides 13,000 acfm at 1.08 inches of TDH. Each blower is equipped with a 75-hp motor. The volumetric air-to-water ratio is designed for 20 to 1. This ratio can be adjusted. The airflow is adjusted to provide an air-to-water ratio to achieve the desired removal of VOCs from the influent. The tower has been operating at a 19 to 1 ratio for the last three (3) years. There is no filtration provided for the blower inlet air except some screens. VOCs and air exit the top of each tower and are directed to separate vapor phase granular activated carbon (VPGAC) beds. The bottom streams from the two (2) towers are combined and directed to a common LPGAC influent header.

Figure 5 and 6 are the process flow diagrams of the VOC Treatment Plant and the Steam Regeneration and Condensate Recovery, respectively. Figure 7 shows the process flow diagram of the LPGAC System and Figure 8 shows the flow distribution in the LPGAC beds. Air stripping tower data are summarized in the attached Air Stripping Plant form along with the extraction well level header pressure control system. The LPGAC data is summarized in the GAC Filtration Data Form.

The stripping tower bottom treatment system includes six (6) 14-foot diameter, 46-foot 9-inch vertical vessels. Each vessel contains two (2) 14-foot diameter by 10-foot high flat beds designed carbon baskets with a support and retainer screen. The vessels are designed for an operating pressure of 90 psig. The air stripping towers are intended to be the primary treatment and the carbon beds provide an additional level of protection. Water is fed in a downflow manner through the beds and the maximum capacity of each bed is 750 gpm. The flow to each LPGAC bed is primarily manual control. The LPGAC beds are placite-lined carbon steel vessels with stainless steel internals. The effluent exiting the LPGAC beds is directed to the Valley Pumping Plant.

The spent carbon is normally reactivated on site. The regeneration process involves the hydraulic transfer of the spent carbon from one (1) of the 12 LPGAC beds to an insulated pressure vessel designed to desorb/regenerate the liquid phase carbon. The spent carbon is contacted with low pressure steam for 30 hours. The organic compounds adsorbed onto the carbon are heated, vaporized and removed with the exiting steam. This steam is condensed and separation of the liquid phase and the heavy organics is accomplished. The heavy organics are collected and removed for special disposal and the liquid phase with high organic content is pumped to Tank 600. Waste streams into Tank 600 are highly contaminated and show a wide range of contamination including trichloroethylene (TCE), tetrachloroethylene (PCE), 1,2,3-Trichloropropane (1,2,3-TCP) and so on.

The Tank 600 modifications using two (2) separate 5000-pound LPGAC columns to treat Tank 600 water and sump water were completed on August 20, 1999 and began operation on August 23, 1999. The treated water is subsequently discharged to the storm drain. The contents of Tank 600, the boiler blowdown and drain water and any other waste generated by the plant shall not be allowed to re-enter the drinking water treatment processes. The two (2) GAC columns used to treat the contents of Tank 600 must always be regenerated off-site or replaced by virgin carbon and the spent carbon disposed of properly off-site.

Well VO-1 exceeds the Total Chromium MCL level and has to be treated. Lockheed Martin submitted a plan to this Department and to the City of Burbank for blending the water from Well VO-1 with water from the other wells when operating Well VO-1 to comply with the Total Chromium MCL. All wells shall be sampled monthly for chromium and the plant effluent shall be sampled weekly. The operators of the system shall maintain records of the blending process and show by calculation that their plan is meeting the Total Chromium MCL at any time.

2. The Valley Pumping Plant

The Valley Pumping Plant includes three (3) main components: the disinfection facility, the forebay facility, and the City's booster station. The system components are shown on the process flow diagram, as shown in Figure 9. The treated groundwater from the Treatment Plant is disinfected with free chlorine directly into the pipeline located in the chlorine diffuser vault. After the chlorine is diffused through the static mixer, the treated groundwater is transferred to the Valley Forebay. The Forebay has a total capacity of 5 million gallons and is divided into two (2) sections. Water is released from the Forebay into an existing concrete conduit, which connects to the Booster Station. Ammonia is then injected into the concrete conduit. Ammonia reacts with the chlorine to form monochloramines. Chlorine and ammonia are injected to provide a total residual throughout the City's distribution system. The disinfected water is pumped through the existing pipelines from the Booster Station. Disinfection facilities are summarized in the attached Disinfection Data Form.

Four (4) pipelines from the Valley Forebay lead to four (4) pumps, two (2) with 350 hp and two (2) with 600 hp motors. The four (4) pumps have individual capacities of 4,000, 4,000, 6,000, and 6,000 gpm, respectively. Three (3) existing pumps were rehabilitated and a new pump with a variable frequency drive was added. Each line consists of a suction butterfly valve, meter, pump, check valve, butterfly valve for discharge control, surge anticipator valve, and a discharge gate valve. Each line connects to a discharge line located west of the Booster Station and will be delivered to the Blending Facilities. The Valley Pumping Plant has a capacity of 12,000 gpm. A Pumping Station Data Form is attached.

3. The Blending Facilities

At the Point of Interconnection, disinfected groundwater is blended with water supplied from the MWD to reduce nitrate levels in the treated groundwater. The Blending Facilities include a connection to the MWD supply and the potable water conveyance system. The size of the MWD B-5 connection was increased to provide a capacity of 12,000 gpm of potable water to the blending station. The potable water conveyance system consists of approximately 8,400 feet of 30-inch diameter ductile iron pipe, from the B-5 vault to the Valley Pumping Plant.

The Blending Station consists of manifolded piping, pressure reducing valves, and a static mixer to blend the potable water from MWD with treated and disinfected groundwater from the Valley Pumping Plant. Figure 10 in the Appendix shows the Blending Station layout.

c. Operations and Water Quality Monitoring

Currently, the City is responsible for operating the Valley Pumping Plant, the Blending facilities, and the City's system while Lockheed Martin operates the BOU Treatment Plant and the Extraction Well Field. Once approved, the City of Burbank is scheduled to assume the operation and maintenance of the BOU Treatment Plant within the year 2000.

The minimum flow rate set-point is set at 650 gpm for Wells VO-1, VO-2, VO-3, VO-4, and VO-8, and at 850 gpm for the other wells. The maximum flow rate set point is set at 2,150 gpm for Wells VO-1, VO-2, VO-3, and VO-4, at 2,000 gpm for Well VO-8, and at 2,300 gpm for the other wells. Maintaining the correct flow of the effluent water to the City Point of Delivery (PS Code: G19/179VOACEFT) and priority pumping of water well pumps are required (see Table Nos. 1, 2 and 3).

The primary quality control parameter in the operation of the groundwater treatment plant is the ratio of stripper airflow to stripper feed water. The minimum ratio of air flow/feed water is 2.14 acfm/gpm. This corresponds to a minimum air/water ratio of 16 to 1 by volume. Lower values would result in inefficient liquid/vapor contact and a drop-off in column performance. The minimum flow to each tower is designed at 2,250 gpm. If the plant influent drops below that level, a portion of the tower effluent will be recycled to meet this requirement.

The A or B train of the BOU treatment plant tower effluent must be on-line with a minimum flow rate of 2,250 gpm before initiating the LPGAC bed backflush procedure. LPGAC beds that are on standby will have a minimum flow of 100 gpm to prevent bio-growth in the beds. Control valve PV-800 located in the effluent header leading to the Point of Delivery is closed during start-up until proper operating parameters have been established throughout the plant.

A tank truck station is designated for the tower cleaning procedure. A common line is used to transfer the cleaning chemicals to the acidization loop at each stripper tower. The line is drained and flushed with water being drawn from the tower effluent prior to initiating chemical addition. The flushed water is then directed to a tank truck brought in by the cleaning service company to be disposed off-site.

Water samples at various stages of the treatment processes are collected to monitor the treatment efficiency and water quality. In addition to the sampling schedule specified in the Operational Sampling Plans of the Lockheed Martin and the City, previous permit provisions, and correspondences, additional samples shall be collected according to the provisions of this document. The sampling locations for the BOU-LPGAC beds with the assigned Primary Station Codes are summarized in Table 4. The City shall submit monitoring data via electronic data transfer (EDT) for each sampling location using this Department Primary Station Code.

II. INVESTIGATION FINDINGS

A. *LPGAC Downflow Modification*

The LPGAC system at the BOU Treatment Plant consists of 12 carbon beds each with a capacity of 42,000 pounds of carbon. These beds are piped to operate in a parallel mode. The previous flow distribution piping to the beds consisted of a main LPGAC influent header from the Stripper Tower discharge with 12 taps from the main header through manual flow control valves to the bottom of the individual beds. Discharge piping from the LPGAC beds consisted of 12 pipes from the tops of the beds connecting into a main bed effluent header. Flow through each bed was balanced utilizing the manual flow control valves, and was limited to 750 gpm.

The Phase 2 modification simply changed the direction of flow through the beds from upflow to downflow by repiping the main LPGAC influent header and the main LPGAC effluent header. This repiping involved capping one (1) header and piping a jumper from the other header. Repiping was also required at the plant discharge so that the capacity to discharge water from the Stripping Towers, bypassing the LPGAC beds, could be retained. The design also included repiping the fill lines for two (2) tanks in the plant. Tanks 770 and 920 fill from the main effluent header from the LPGAC system. These fill lines were modified to tie into the new plant effluent header.

The operational procedure for balancing the flow will be manual, with the operator adjusting the valves to balance the flow between the beds. The frequency of the adjustment could be increased due to mal-distribution of flow balance caused by one (1) bed plugging earlier than others. The frequency of the operator inspection will be dictated by operational experience. Manual flow balancing procedures are contained in

the Operation and Maintenance Manual. Sampling locations for the BOU LPGAC beds after the modifications are redesignated Primary Station Codes as listed in Table 4.

B. LPGAC Backflush Filter Additions

The plant effluent is now used to fill Tank 770 for LPGAC backflush. Two (2) pumps (P-760A/B) are equipped at Tank 770 to provide water for LPGAC backflush as well as for carbon transfer. These pumps are Peerless horizontal centrifugal model 8196XT with a 14.125-in impeller and a 200 hp motor. The pumps are designed to deliver 3,000 gpm at 175 feet total differential head.

The LPGAC Backflush Filter addition consisted of the installation of three (3) bag filter housings (FL-710A/B/C) in a parallel arrangement, each rated at 1,800 gpm. The LPGAC backflush return header was re-piped to route the backflush return water through the filters and to the storm sewer. A valve was added to the LPGAC backflush return header, so that carbon laden water can either be routed to the new filters (FL-710A/B/C) or routed to Tank 770, Tank 780, or Tank 790. The connection between the plant effluent and Tank 770 is air-gapped in order to prevent any potential for cross connection. Each filter housing is fitted with valves at the inlet and outlet to allow changing of filter bags without shutting down the backflush operation. A differential pressure gauge is installed to measure the differential pressure through the bag filters to indicate a plugging filter. The specified filter housings are Ronningen-Petters Multi-bag filter housings. Each housing is designed to hold 22 bags. A specification sheet and a cut sheet on the filter housings are included in the appendix (data forms).

The nominal size for the filter bags chosen for this operation is 1 micron. Solids holding capacity of these bags depends on the carbon fines size distribution in the backflush return water, and the pressure drop allowable through the filters. The solids holding capacity can vary from one (1) to two (2) pounds up to 15 pounds at the beginning and at the end of a backflush, respectively. The worst scenario for carbon fines loading in the BOU treatment plant would be for a virgin carbon load that could amount up to 420 lbs of fines as specified in the *BOU Expansion Final Operations and Maintenance Plan, December 1997*.

The control of the backflush operation is a manual task performed by the operator. The operator will monitor the LPGAC bed flow rates and pressure drop through the bed daily. The backflush procedure will be initiated following the Operation and Maintenance Plan.

C. Addition of Well VO-8 and Its Collection Pipeline

Well VO-8 was originally the City's Well No. 10 that was drilled and constructed between January 22 and March 6, 1942 using the cable tool method. It was completed with 20-inch diameter, No. 8 double casing to a depth of 588 feet below ground surface. Well VO-8 was originally used as a water supply well for the City and has been offline since 1980.

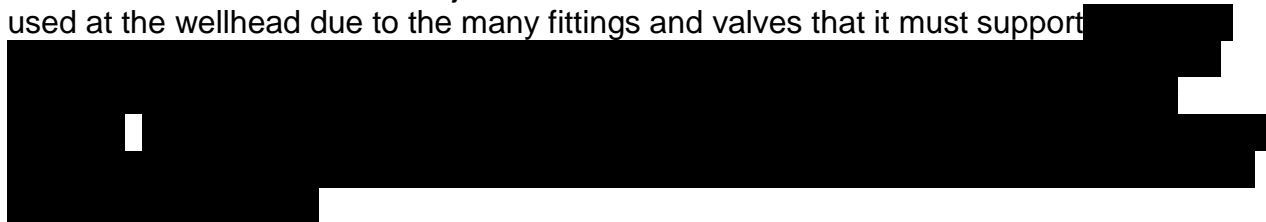
The rehabilitation and reconfiguration of Well VO-8 was performed in 1994. The work consisted of removing the existing pump and pump column, conducting a video survey to establish the initial condition of the well, placing 18 cubic yards of pea gravel up to a depth of 360 feet, placing a bentonite seal to a depth of 356 feet, and placing a cement seal to a depth of 354 feet. The well was acidified with a combination of granular acid, acid enhancer and bacteria controller and then disinfected with chlorine bleach.

The anticipated well drawdown at 1,500 gpm is approximately 20 feet. Static water level was measured at 150 feet below ground surface during this period. An additional 50 feet of anticipated drawdown was included to account for long term water level variation. The point of final discharge is at the top of the air stripper at a height of approximately 55 feet above grade. The total dynamic head was calculated at 290 feet.

Modifications to the wellhead were made in 1997 and included the removal of the concrete pedestals for the motor and transformer, the installation of a line shaft turbine pump and motor, and the installation of sounding tubes to house low water transmitters and pressure transducer. The cathodic protection of pumps and pipes is furnished by the installation of sacrificial anodes. An electrical transformer and motor control center are installed near the wellhead. A sanitary seal was placed approximately 50 feet below ground surface in the annulus of Well VO-8. Well VO-8's Civil Site Plan is attached (Figure 11). Figure 12 shows all features of the Extraction Well VO-8 in detail.

Samples have been collected for Well VO-8 to assess the vulnerability to contamination. Initial results show levels of TCE and PCE (26 and 87 ppb, respectively) exceed State standards. A complete Title 22 analysis was submitted to this office, and use of Well VO-8 was granted on December 9, 1998.

A new HDPE pipeline was constructed to connect Well VO-8 to the plant influent. The pipeline is designed to handle a maximum flow of 1,500 gpm at velocity of 5.63 ft/s. The maximum pressure that the pipeline can withstand is 160 psi at 73° F. The pipeline is continuous with no mechanical joints and has a minimum cover of 5 ft. Carbon steel is used at the wellhead due to the many fittings and valves that it must support



The well was modified to minimize sand production and to minimize the risk of collapse of the original well casing. Blank casing and screen installation was completed in October 1999. Blank casing was installed to a depth of approximately 215 feet. The blank casing installed is 16 inch ID, 3/8', ASTM-A139 grade. Well screen was installed from approximately 215 feet to bottom (355 feet). The well screen installed is 0.05 inch slotted, wire-wrap type 304 stainless steel.

D. Use of Scale Inhibitor, Calgon CL-50

During the initial operating year of 1996, the BOU treatment plant experienced several problems related to calcium carbonate scale deposition. Two (2) pilot studies have been conducted on the injection of a polyphosphate scale inhibitor and the injection of carbon dioxide. The results showed that the polyphosphate optimally mitigated the scale deposition problem.

A study was conducted to determine the long-term impacts of the polyphosphate scale inhibitor on the downstream facilities and on the LPGAC. The study concluded that calcium carbonate scale deposition within the BOU Treatment Plant could be arrested by the application of a 1 mg/L dose of a polyphosphate scale inhibitor. The injection of the polyphosphate scale inhibitor does not negatively impact the Total Dissolved Solids (TDS) of the water and the disinfection process. The injection of the polyphosphate scale inhibitor increases the LPGAC life cycle and preserves the carbon for organics removal. The polyphosphate is stable and does not break down into *ortho*-phosphate throughout the Treatment Plant and into the distribution system.

A Calgon product, CL-50, was chosen as a scale inhibitor. It has been tested and certified as drinking water additive at concentration up to 28.5 mg/L by National Sanitation Foundation (NSF). Other water systems are using CL-50 successfully as a scale inhibitor. CL-50 is an inorganic polyphosphate solution comprising primarily of sodium hexametaphosphate and sodium tripolyphosphate. Solution of this compound can effectively prevent scale formation by complexing with calcium ions and forming protective films. A chemical metering pump (LMI model C721-168S) rated for up to 4 gallons per hour (GPH) is used to continually inject the CL-50 from a 400-gallon drum into the plant influent. The chemical feed rate must be checked regularly to provide optimum dosage in the range of 1 to 7 mg/L obtained from the field study.

E. Addition of Two Interconnections with City of Glendale

The City constructed two (2) interconnections with the City of Glendale for emergency usage

[REDACTED]

[REDACTED]. There is 42 inches of cover for both pipelines and there is no known sanitary hazard within the interconnection area. Figure 14 shows the map of the two (2) interconnections. The two (2) interconnections with the City of Glendale shall be exercised at least annually. Everytime these connections are used, the City shall document the reasons for use, the date and time, the running time period and the flow rate, and submit a reporting form to this Department within 10 days.

| Connection | Location | Capacity |
|------------|------------|------------|
| [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] |

III. ENGINEERING APPRAISAL OF SANITARY HAZARDS AND SAFEGUARDS

The location of the extraction Well VO-8 has been evaluated. The closest sewer line is about 60 ft away and the well is not subject to flooding. A sanitary survey within 200 feet of Well VO-8 showed no known sanitary hazard, as shown in Figure 15. The extraction well was rehabilitated and conformed to the requirements of the California Water Well Standards (DWR Bulletins 74-81 and 74-90). Groundwater samples have been collected from the new Extraction Well VO-8 by Lockheed Martin according to the Vulnerability Assessment and Monitoring Frequency Guidelines.

All groundwater from the BOU well field will be treated to meet State MCLs and the Hazard Index for VOCs except for nitrate. The Treatment Plant effluent will be blended with low-nitrate water from MWD to meet the nitrate MCL prior to delivery to the customers. Monitoring for the VOCs, other chemicals, as well as the nitrate level in the blended water is performed. The analytical results for all the extraction wells indicated levels of TCE and PCE that highly exceed State Standards. In addition to PCE and TCE, other chemicals also have been detected particularly 1,2,3-TCP, 1,2-DCA, chromium, and nitrate. 1,2,3-TCP is difficult to be stripped out by the air stripping towers and has an action level of 5 ppt. Based on the Freundlich constants for the PCE, TCE, and 1,2,3-TCP performed by US Filter-Westates Carbon, the breakthrough time for GAC bed and GAC usage rate both are in the order of PCE > 1,2,3-TCP > TCE.

In order to meet the VOC MCLs, removals of at least 99.98 percent is needed. In addition, the operations of the Extraction Well Field must ensure adequate dilution for inorganic chemicals (i.e. chromium) that the BOU Treatment Plant was not designed to treat. Due to the high concentrations involved, the facilities must be operated and monitored in a reliable manner.

IV. CONCLUSIONS AND RECOMMENDATIONS

The Department of Health Services (Department) finds that the sources of supply, treatment, works, and operation as described in this report are capable of producing a safe, wholesome, and potable water supply. The quality of the water served and the City's facilities and operations adequately meet this Department Standards. Issuance of a domestic water supply permit amendment by this Department to the City is recommended subject to the following provisions:

DEFINITIONS

The following definitions are provided to be consistent with EPA reports and treatment plant design and specifications.

- (a) Treatment Plant: The plant includes nitrate and chromium blending, air stripping and liquid phase granular activated carbon (LPGAC) for treating groundwater.
- (b) Valley Pumping Plant: The plant includes Valley Forebay Facility and Booster Station for storage, disinfection and pumping of the treated groundwater.
- (c) Blending Facilities: The plant includes facilities that provide blending of purchased water from the Metropolitan Water District of Southern California (MWD) with the treated groundwater for nitrate reduction.
- (d) BOU Facilities: The Burbank Operable Unit includes eight (8) Extraction Wells, Treatment Plant, the Valley Pumping Plant, the Blending Facilities, and the pipelines and appurtenances associated with the above treatment processes.
- (e) Point of Delivery: The physical point of transfer of the treated groundwater from the Treatment Plant to the Valley Pumping Plant.
- (f) Point of Interconnection: The physical point of transfer of the treated groundwater following the booster station but prior to entry into the Blending Facilities.
- (g) Point of MWD Connection: The physical point of transfer of the purchased treated surface water from the MWD for blending from the MWD pipeline to the Blending Facilities.
- (h) Point of Water System Introduction: The physical point of transfer of the blended water between the Blending Facilities and the City's potable water distribution system.

GENERAL

1. Only the following sources are approved for use as a domestic water supply by the City:
 - (a) Eight (8) extraction wells drilled in the BOU extraction well field and treated in BOU Facilities as follows:

Table 1. BOU wells

| Well | Primary Station Code | Status | Depth (ft) | Capacity (gpm) |
|-------|----------------------|--------|------------|----------------|
| VO-01 | 01N/14W-10H01 S | Active | 345 | 1,500 |
| VO-02 | 01N/14W-10B03 S | Active | 340 | 1,600 |
| VO-03 | 01N/14W-10B04 S | Active | 349 | 1,500 |
| VO-04 | 01N/14W-10C03 S | Active | 357 | 1,700 |
| VO-05 | 01N/14W-10D03 S | Active | 360 | 1,900 |
| VO-06 | 01N/14W-09A05 S | Active | 369 | 2,300 |
| VO-07 | 01N/14W-09A06 S | Active | 370 | 1,900 |
| VO-08 | 01N/14W-09H01 S | Active | 360 | 1,500 |
| Total | | | | 13,900 |

(b) Two (2) active wells with LPGAC for organics removal and chloramination treatment at the City's Lake Street site as follows:

Table 2. Non-BOU wells

| Well | Primary Station Code | Status | Depth (ft) | Capacity (gpm) |
|-------|----------------------|--------|------------|----------------|
| 7 | 01N/14W-11Q01 S | Active | 631 | 930 |
| 15 | 01N/14W-14B08 S | Active | 495 | 860 |
| Total | | | | 1,790 |

(c) Five active connections with the MWD as follows:

Table 3. Connections with MWD

| Connection | Primary Station Code | Capacity (gpm) | Location |
|------------|----------------------|----------------|------------|
| B-1 | 1910179-066 | 13,500 | [REDACTED] |
| B-2 | 1910179-067 | 6,700 | [REDACTED] |
| B-3 | 1910179-068 | 4,500 | [REDACTED] |
| B-4 | 1910179-069 | 9,000 | [REDACTED] |
| B-5 | 1910179-070 | 18,000 | [REDACTED] |
| Total | | 51,700 | |

2. The following treatment facilities are approved for use by the City:

Table 4. Treatment sites

| Treatment Facility | Treatment Process |
|-----------------------------|--|
| The BOU Treatment Plant | <ul style="list-style-type: none"> • Chromium Blending • Calgon CL-50 addition for scale control as necessary • Air stripping of VOCs using 2 air stripping towers • Adsorption of organic chemicals using 12 LPGAC Beds |
| The Valley Pumping Plant | <ul style="list-style-type: none"> • Chloramination for disinfection |
| The BOU Blending Facilities | <ul style="list-style-type: none"> • Blending of nitrate |
| The Lake St. GAC Plant | <ul style="list-style-type: none"> • Adsorption of organic chemical using LPGAC • Chloramination for disinfection |

3. No other sources shall be added and no changes, modifications, or additions in treatment shall be made without first receiving an amended domestic water permit from this Department.
4. The City shall comply with Title 17 of the California Code of Regulations (CCR) to prevent the water system and treatment facilities from being contaminated from possible cross-connections. The City shall maintain a program for the protection of the domestic water system against backflow from premises having dual or unsafe water systems in accordance with Title 17. All backflow prevention devices shall be tested annually.
5. Water leaving the BOU at the Point of Water System Introduction (PS Code:G19/179-NIBLEFT) shall comply with all Maximum Contaminant Levels (MCLs) and Action Levels (ALs) established by this Department, at all times. If the water quality does not comply with the California Drinking Water Standards, the City shall not use the BOU effluent until the cause of the exceedance is remedied or additional treatment is provided to meet standards.
6. There shall be no bypassing of any treatment processes in the BOU Facilities at any time without prior approval from this Department. This requirement applies only to the normal operation of the BOU Facilities normal operation and does not apply to those special time periods such as system maintenance (in which water will not be introduced to the water system) and when only purchased water from MWD is used.
7. There shall be no recycling to the head of the BOU Treatment Plant of any water from Tank 600, boiler blowdown, drain water or any other waste streams generated at the plant.

8. The BOU Facilities shall be inspected daily when in use and operational records of its operations shall be maintained. The records shall also document any emergency and scheduled interruptions from BOU, including:
 - (a) Location of the interruption,
 - (b) Cause of the interruption,
 - (c) Date, approximate time, and duration of the interruption,
 - (d) Precautions taken to minimize contamination of the supply and notification of affected users, and
 - (e) Solution/Resolution of the interruption.

9. A monthly report of the operation of the BOU Facilities shall be submitted to this Department, by the 20th day of the following month. As a minimum, the report shall include:
 - (a) The daily operation, length of time in use and production of each extraction well,
 - (b) The amount of chlorine and ammonia used daily, daily total chlorine residuals, the daily Calgon CL-50 injection rate (lbs/day or gal/day), and the daily CL-50 dosage rate (mg/L),
 - (c) Operational schedule and problems, daily air/water ratios, and amount of flow through each treatment chain (i.e. two air strippers, 12 LPGAC beds),
 - (d) A summary of all required analytical results of the wells, air stripping tower influent and effluent, LPGAC effluent, and blended water,
 - (e) A summary describing the status of each LPGAC bed in terms of the daily flowrate through each LPGAC bed, number of days in service, monitoring port status, the weekly calculation of the Hazard Index, and bacterial analysis of the plant effluent prior to chlorination,
 - (f) A spreadsheet showing the nitrate concentration at point of delivery (PS Code: G19/179VOACEFT), daily calculation of the projected concentration of the nitrate in the blended BOU VOC Plant effluent at the Point of Water System Introduction, the amount of blending water to be utilized, and the actual nitrate concentration of the water leaving the blending point.

10. Water samples for operational control purposes may be analyzed by field test kits, continuous monitors or portable units within the BOU. All water samples for compliance purposes shall be performed by a laboratory certified by the Environmental Laboratory Accreditation Program (ELAP) of the State Department of Health Services for the specific

analytical procedure, and analytical results shall be submitted through electronic data transfer (EDT) using the Primary Station Codes (PS Code) as follows.

Table 5. Primary station codes for BOU

| SOURCE NAME | PRIMARY STATION CODE |
|--|----------------------|
| BOU ½ PORT AD-730B UPPER GAC (S-E) | G19/179-VOACES1 |
| BOU ½ PORT AD-730B LOWER GAC (S-E) | G19/179-VOACES2 |
| BOU ½ PORT AD-740B UPPER GAC (S-M) | G19/179-VOACES3 |
| BOU ½ PORT AD-740B LOWER GAC (S-M) | G19/179-VOACES4 |
| BOU ½ PORT AD-750B UPPER GAC (S-W) | G19/179-VOACES5 |
| BOU ½ PORT AD-750B LOWER GAC (S-W) | G19/179-VOACES6 |
| BOU ½ PORT AD-730A LOWER GAC (N-E) | G19/179-VOACEN1 |
| BOU ½ PORT AD-730A LOWER GAC (N-E) | G19/179-VOACEN2 |
| BOU ½ PORT AD-740A LOWER GAC (N-M) | G19/179-VOACEN3 |
| BOU ½ PORT AD-740A LOWER GAC (N-M) | G19/179-VOACEN4 |
| BOU ½ PORT AD-750A LOWER GAC (N-W) | G19/179-VOACEN5 |
| BOU ½ PORT AD-750A LOWER GAC (N-W) | G19/179-VOACEN6 |
| BOU ¾ PORT AD-730B UPPER GAC (S-E) | G19/179-VOALOS1 |
| BOU ¾ PORT AD-730B LOWER GAC (S-E) | G19/179-VOALOS2 |
| BOU ¾ PORT AD-740B UPPER GAC (S-M) | G19/179-VOALOS3 |
| BOU ¾ PORT AD-740B LOWER GAC (S-M) | G19/179-VOALOS4 |
| BOU ¾ PORT AD-750B UPPER GAC (S-W) | G19/179-VOALOS5 |
| BOU ¾ PORT AD-750B LOWER GAC (S-W) | G19/179-VOALOS6 |
| BOU ¾ PORT AD-730A LOWER GAC (N-E) | G19/179-VOALON1 |
| BOU ¾ PORT AD-730A LOWER GAC (N-E) | G19/179-VOALON2 |
| BOU ¾ PORT AD-740A LOWER GAC (N-M) | G19/179-VOALON3 |
| BOU ¾ PORT AD-740A LOWER GAC (N-M) | G19/179-VOALON4 |
| BOU ¾ PORT AD-750A LOWER GAC (N-W) | G19/179-VOALON5 |
| BOU ¾ PORT AD-750A LOWER GAC (N-W) | G19/179-VOALON6 |
| BOU VOC PLANT EFF AT PT OF DELIVERY (A) | G19/179VOACEFT |
| FOREBAY INFLUENT – EAST (B) | G19/179-FORBYIE |
| FOREBAY INFLUENT – WEST (C) | G19/179-FORBYIW |
| FOREBAY EFFLUENT (AFTER CHLORINATION) (D) | G19/179-FORBYEF |
| BOOST STAN EFF (AFTER NH ₃ ; BLEND INF) (E) | G19/179-NIBLINF |
| NO ₃ BLENDED EFFLUENT (F) | G19/179-NIBLEFT |
| MWD B-5 SUPPLY FOR NO ₃ BLENDING (G) | G19/179-MWD-INF |
| REGENERATION FROM LIQUID PHASE | G19/179-GACLGEN |
| REGENERATION OF GAC FROM VAPOR PHASE | G19/179-GACVGEN |
| TANK 600 EFFLUENT | G19/179-T600EFF |
| AIR STRIPPING TOWER COMBINED EFFLUENT | G19/179-VOASEFC |
| AIR STRIPPING TOWER T-200B (S) EFFLUENT | G19/179-VOASEFS |

Table 5. Primary station codes for BOU (continued)

| SOURCE NAME | PRIMARY STATION CODE |
|---|----------------------|
| AIR STRIPPING TOWER T-200A (N) EFFLUENT | G19/179-VOASEFN |
| AIR STRIPPING TOWER COMBINED INFLUENT | G19/179-VOASINC |
| AIR STRIPPING TOWER T-200B (S) INFLUENT | G19/179-VOASINS |
| AIR STRIPPING TOWER T-200A (N) INFLUENT | G19/179-VOASINN |
| WELLS 07 & 15 – GAC – PORT 3 – ADSORBER A | G19/179-VOACP4A |
| WELLS 07 & 15 – GAC – PORT 3 – ADSORBER B | G19/179-VOACP4B |
| WELLS 07 & 15 – GAC – PORT 3 – ADSORBER C | G19/179-VOACP4C |
| WELLS 07 & 15 – GAC – PORT 3 – ADSORBER D | G19/179-VOACP4D |
| WELLS 07 & 15 – GAC – COMBINED EFFLUENT | G19/179-VOACEFF |
| WELLS 07 & 15 – GAC – COMMON INFLUENT | G19/179-VOACINF |
| WELLS 07 & 15 – GAC – ADSORBER A – EFFLUENT | G19/179-VOACAEF |
| WELLS 07 & 15 – GAC – ADSORBER B – EFFLUENT | G19/179-VOACBEF |
| WELLS 07 & 15 – GAC – ADSORBER C – EFFLUENT | G19/179-VOACCEF |
| WELLS 07 & 15 – GAC – ADSORBER D – EFFLUENT | G19/179-VOACDEF |

11. All operators at the BOU Treatment Plant, BOU Valley Pumping Plant, and Blending Facilities shall have at least a Grade 2 certificate in accordance with CCR, Title 17, Division 1, Chapter 5. As a minimum, a Grade 3 operator certificate is required for the supervisor of the BOU Treatment Plant.
12. The City shall operate the BOU Facilities according to the approved *Final Operations and Maintenance Plan, 1,2,3-TCP Monitoring Plan, and Operations and Maintenance Manual, Blending Facilities for Burbank Operable Unit* or their replacement or amendment. The replacement document or amendments shall be approved by the Department.

BOU EXTRACTION WELL FIELD AND TREATMENT PLANT

13. Each extraction well shall be sampled, as a minimum, in accordance with the attached Vulnerability Assessment and Monitoring Frequency Guidelines or its replacement prepared by this Department. Previous analytical results may be used to comply with the monitoring requirements, and shall be submitted to this Department for review, when requesting a waiver.
14. The air stripping tower shall be operated at an air to water volumetric ratio of at least 19 to 1.
15. The air stripping towers shall be operated in series with LPGAC.
16. The air stripping tower shall be operated to optimize the removal of VOCs. The influent and the effluent of the air stripping towers shall be sampled weekly for VOCs and 1,2,3-trichloropropane (1,2,3-TCP) to monitor and evaluate chemical removal efficiency and

performance. The sampling frequency may subsequently be changed with the approval of this Department.

17. The empty bed contact time for each LPGAC Unit shall be at least 15 minutes at all times. Each LPGAC Unit shall not be operated above its design capacity of 750 gpm.
18. The dosage of Calgon CL-50 shall not exceed 28.5 mg/L.
19. The LPGAC beds shall be operated in a downflow mode.
20. The Treatment Plant shall be operated according to the approved *Burbank Operable Unit Expansion, Final Operation and Maintenance Plan for Treatment Plant and Pipeline Construction* or its replacement or amendment. Each air stripping tower shall be operated at its design capacity of 4,500 gpm. The Treatment Plant shall be limited to a maximum flow of 9,000 gpm. The replacement document or amendments shall be approved by this Department.
21. No on-site regeneration for LPGAC shall be performed unless prior approval has been received from this Department.
22. The reactivated LPGAC shall be tested for its iodine number (per ASTM D4607-86) by a third party and the test results must be at least 80 percent of the baseline iodine number. If not, then the reactivated LPGAC shall not be used in the Treatment Plant. After reactivation, virgin carbon of similar characteristics, such as size and iodine number, shall be used to make up the original volume. The LPGAC Regeneration Form shall be submitted to this Department.
23. Each time the LPGAC is replaced, the effluent shall be analyzed daily for total suspended solids for the initial five days to ensure that no carbon fines are present.
24. Each LPGAC bed shall be monitored as follows:
 - (a) Monthly VOCs samples from each LPGAC bed, when in use, shall be taken at the $\frac{1}{2}$ sampling port until any breakthrough of VOCs or 1,2,3-TCP is detected at or above the DLR.
 - (b) Once breakthrough occurs at the $\frac{1}{2}$ sampling port, a sample from the $\frac{3}{4}$ sampling port shall be taken immediately, analyzed and reported to the Department within 48 hours. Starting the following week, the VOCs sampling point shall be changed to the $\frac{3}{4}$ sampling port and the sampling frequency shall be increased to weekly.
 - (c) Once breakthrough occurs at the $\frac{3}{4}$ sampling port, a sample from the LPGAC bed effluent shall be taken immediately, analyzed and reported to the Department within 48 hours. The LPGAC bed must be taken out of service when any VOC at the $\frac{3}{4}$ sampling port has been detected. In addition, the Plant Effluent at Point of Delivery, Point of Interconnection (Blend Influent), and Point of Water System Introduction

(NO₃ Blended Effluent) shall be sampled within 24 hours of the detection and analyzed for all VOCs with the DLR of 0.5 µg/L on 24-hour turnaround.

25. Analyses for total coliform and heterotrophic plate count (HPC) shall be conducted weekly at the Point of Delivery (PS Code: G19/179VOACEFT) on the combined effluent of LPGAC beds. The weekly total coliform and HPC analyses shall be sent to the City within 24 hours of completion of the analyses and to this Department by the 10th day of the following month. If either total coliform is present or HPC exceeds 500/mL, then the following actions shall be initiated:
- (a) The City shall be notified immediately and shall sample the Valley Forebay (PS Code: G19/179-NIBLINF) for total coliform, fecal coliform or E. coli, and HPC;
 - (b) This Department shall be notified within 24 hours;
 - (c) Total coliform and HPC samples of the effluent from each LPGAC bed which is in use shall be collected to determine which bed(s) is responsible for the total coliform positive and/or high HPC result. The results shall be submitted to this Department and to the City Water Department within 24 hours of completion of the analyses;
 - (d) For any total coliform positive sample, analysis for fecal coliform or E. coli shall be performed.
26. Sampling at Point of Delivery (PS Code: G19/179VOACEFT) shall be performed annually to analyze for synthetic organic chemicals (SOCs) and base, neutral and acid organic chemicals (BNAs).
27. Sampling at Point of Delivery (PS Code: G19/179VOACEFT) shall be performed weekly to analyze for VOCs, 1,2,3-TCP, nitrate, total chromium and chromium VI.
28. Water at the Point of Delivery (PS Code: G19/179VOACEFT) shall comply with all Maximum Contaminant Levels (MCLs) and Action Levels (ALs) established by this Department at all times. Compliance with the nitrate MCL is not required in the effluent from the BOU as the water will be blended with MWD water to achieve compliance.
29. The additive effects of multiple VOC contaminants shall be considered. The following equation must be met at the Point of Delivery (PS Code: G19/179VOACEFT), when it can be accomplished in a cost effective manner:

$$\text{HAZARD INDEX} = \sum_{i=1}^n \left\{ \frac{\text{Contaminant Concentration}}{\text{MCL or AL}} \right\}_i \leq 1$$

MCL = Maximum Contaminant Level (State Drinking Water Standard);

AL = Action Level (see Appendix: Drinking Water Action Levels)

If the hazard index (HI) cannot be met, then the City shall notify this Department on the same day, unless the Department's office is closed, in which case, notification shall be completed within 24 hours. Information regarding the operation of the wells and the

Treatment Plant shall be provided to this Department. Operational changes will be discussed with the Department to optimize treatment to meet the HI. The HI shall be calculated each time water at the Point of Delivery (PS Code: G19/179VOACEFT) is sampled.

30. Analysis for SOCs, BNAs, VOCs, chromium, nitrate, and 1,2,3-TCP shall employ *EPA method, Standard Methods for the Examination of Water and Wastewater* or other drinking water methods certified by ELAP as follows. If samples need to be diluted for analyses, then a sample at the smallest dilution multiple possible shall also be analyzed to assure all analytes are reported at the lowest possible reporting limits.

Table 6. Analysis method

| Chemical | Analysis Method |
|-----------------------------|---|
| SOCs | EPA Method (If any unknown peak shown on chromatographs, it shall be reported to this Department) |
| Alachlor | 505,507,525.2,508.1 |
| Aldicarb | 531.1 |
| Aldicarb Sulfone | 531.1 |
| Aldicarb Sulfoxide | 531.1 |
| Atrazine | 505,507,525.2,508.1 |
| Bentazon | 515.1 |
| Benzo (a) pyrene | 525.2,550,550.1 |
| Carbofuran | 531.1,6610 |
| Chlordane | 505,508,525.2,508.1 |
| 2,4-D | 515.2,555,515.1 |
| Dalapon | 515.2,515.1 |
| Di (2-ethylhexyl) adipate | 506,525.2 |
| Di (2-ethylhexyl) phthalate | 506,525.2 |
| DBCP | 504.1,551 |
| Dinoseb | 515.2 |
| Diquat | 549.1 |
| Endothall | 548.1 |
| Endrin | 505,508,525.2,508.1 |
| Ethylene Dibromide (EDB) | 504.1,551 |
| Glyphosate | 547,6651 |
| Heptachlor | 505,508,525.2,508.1 |
| Heptachlor Epoxide | 505,508,525.2,508.1 |
| Hexachlorobenzene | 505,508,525.2,508.1 |
| Hexachlorocyclopentadiene | 505,508,525.2,508.1 |
| Lindane | 505,508,525.2,508.1 |
| Methoxychlor | 505,508,525.2,508.1 |
| Molinate | 507 |
| Oxamyl (Vydate) | 531.1,6610 |

| Chemical | Analysis Method |
|-----------------------|---|
| SOCs | EPA Method |
| Pentachlorophenol | 515.2,525.2,555,515.1 |
| Picloram | 515.2,555,515.1 |
| PCBs | 508A |
| Simazine | 505,507,525.2,508.1 |
| Thiobencarb | 507 |
| Toxaphene | 505,508,525.2 |
| 2,3,7,8-TCDD (Dioxin) | 1613,513 |
| 2,4,5-TP (Silvex) | 515.2,555,515.1 |
| Bromacil | 507 |
| Chlorothalonil | 508 |
| Diazinon | 507 |
| Dimethoate | 507 |
| Diuron | 632 |
| Naphthalene | 525.2 |
| Phthalates | 506,525.2 |
| Prometryn | 507 |
| 2,4,5-T | 515.1 |
| Aldrin | 505,508,525.2 |
| Butachlor | 507,525.2 |
| Carbaryl | 531.1 |
| Dicamba | 515.1 |
| Dieldrin | 505,508,525.2 |
| 3-Hydroxycarbofuran | 531.1 |
| Methomyl | 531.1 |
| Metolachlor | 507, 525.2 |
| Metribuzin | 507,508,525.2 |
| Propachlor | 507,525.2 |
| BNAs | EPA Method 8270, 525.2 (If any unknown peak shown on chromatographs, it shall be identified and reported to this Department) |
| VOCs | EPA Method 524.2 or 502.2 (If any unknown peak shown on chromatographs, it shall be confirmed by method 524.2, identified, and reported to this Department) |
| Chromium, Total | EPA Method 200.7, 200.8 or 200.9; or Standard Method 3113 B |
| Chromium VI | EPA Method 218.6 |
| Nitrate | EPA Method 300.0 or 353.2; or Standard Method 4500-NO ₃ F, 4500-NO ₃ E, 4500-NO ₃ D or 4110 |
| 1,2,3-TCP | EPA Method 524.2 or 504.1 |

31. All known and unknown peaks on the chromatographs shall be reported. The laboratory performing the analyses shall be instructed to report these peaks. All unknown peaks shown on GC-MS spectra of the analysis of the BOU effluent shall be tentatively identified and reported to this Department within seven (7) days of such determination. The Department may require that such peaks shall be positively identified within 30 days of the tentative determination. This Department shall be notified in writing within seven (7) days of the positive identification. If necessary, the Department may extend these determination times upon request.
32. Analysis for 1,2,3-trichloropropane shall be performed by an ELAP certified laboratory with the lowest achievable reporting limit or 2 ppt. On a yearly basis, laboratories shall be evaluated to determine which laboratory can achieve the lowest reporting limit or 2 ppt. At this time, a reporting limit of 50 ppt or lower shall be achieved.

VALLEY PUMPING PLANT

33. In addition to the continuous monitoring performed, additional samples shall be collected based on the following:
 - (a) QA/QC VOCs samples from the Point of Delivery (PS Code: G19/179VOACEFT) shall be analyzed at least four times per year by an ELAP certified laboratory.
 - (b) The Forebay effluent (PS Code: G19/179-NIBLINF) must be analyzed monthly for nitrate by an ELAP certified laboratory for compliance purposes.
 - (c) Daily measurements of the total chlorine residuals of the Forebay effluent (PS Code: G19/179-NIBLINF).
34. The City shall perform a daily field measurement for nitrate (as NO₃) of the Forebay effluent for operational control of the blending process. A field test kit may be used for this measurement.
35. The effluent from the Valley Pumping Plant shall contain a total chlorine residual of at least 0.2 mg/L.
36. If the samples of the Valley forebay (PS Code: G19/179-NIBLINF) are positive for total coliform, fecal coliform or E. coli or HPC exceeds 500/ml, then the Department shall be notified on the same day, unless this Department office is closed, in which case, notification shall be completed in 24 hours.

BLENDING FACILITIES

37. The blended water shall be analyzed for nitrate (as NO₃), total chromium, and chromium VI weekly by an ELAP certified laboratory at the Point of Water System Introduction (PS Code:G19/179-NIBLEFT).

- 38. The blended water shall meet the nitrate MCL. Sampling frequency may be changed upon approval by this Department.
- 39. The City shall conduct daily calculations of the nitrate blending operation and make necessary adjustments when the calculated nitrate (as NO₃) level exceeds 36.0 mg/L (80% of MCL).

OPERATING CONDITIONS

- 40. The Air Stripping towers and the Vapor Phase Granular Activated Carbon system (VPGACs) for treating the air must be operated in compliance with the substantive requirements of the South Coast Air Quality Management District (SCAQMD).
- 41. The two interconnections with the City of Glendale shall be exercised at least annually. Everytime these connections are used, the City shall document the reasons for use, the date and time, the running time period and the flow rate, and submit a reporting form to this Department within 10 days. Two interconnections with the City of Glendale for water transfers and/or emergency use are as follows:

| Connection | Location |
|-----------------------|------------|
| One way from Glendale | [REDACTED] |
| One way from Burbank | [REDACTED] |

- 42. All plant operators and supervisory personnel involved with the operation or oversight of the BOU Treatment Plant, the BOU Valley Pumping Plant, and the BOU Blending Facilities shall have a copy of and shall be familiar with the conditions of this permit amendment.

TABLES

- Table 1. Extraction Well Flow Rate Setpoints for Odd Months**
- Table 2. Extraction Well Flow Rate Setpoints for Even Months**
- Table 3. Extraction Well Operational Restrictions**
- Table 4. DHS Primary Station Codes for the LPGAC Bed Sampling Points**
- Table 5. Guidelines for Bed Selection Process**

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- Figure 1. City of Burbank Water System- Schematic Diagram**
 - Figure 2. Burbank OU Location Map & Phase 2 Extraction Well Field Layout**
 - Figure 3. BOU Treatment Facilities Diagram**
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 - Figure 6. The PFD of the Steam Regeneration & Condensate Recovery**
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Appendix

DATA FORMS

- Well Construction Summary
- Well Data
- Backflush Filter Data
- Air Stripper Data
- GAC Bed Data
- Disinfection Data
- Reservoir Data
- Pumping Station Data

SAMPLING POINTS FOR BOU FACILITIES

VULNERABILITY ASSESSMENT AND MONITORING FREQUENCY GUIDELINES

1,2,3-TRICHLOROPROPANE MONITORING PLAN

WELL VO-01 CHROMIUM BLENDING PLAN

PERMIT APPLICATION DOCUMENTS

LETTERS OF ACKNOWLEDGEMENT FROM SCAQMD AND CRWQCB

REACTIVATION OF CARBON – REPORTING FORM

DATA FORMS

Well Construction Summary

Well Data

Backflush Filter Data

Air Stripper Data

GAC Bed Data

Disinfection Data

Reservoir Data

Pumping Station Data

SAMPLING POINTS FOR BOU FACILITIES

VULNERABILITY ASSESSMENT AND MONITORING FREQUENCY GUIDELINES

1,2,3-TRICHLOROPROPANE MONITORING PLAN

WELL VO-01 CHROMIUM BLENDING PLAN

PERMIT APPLICATION DOCUMENTS

LETTERS OF ACKNOWLEDGEMENT FROM SCAQMD AND CRWQCB

REACTIVATION OF CARBON – REPORTING FORM
