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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 9

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| In The Matter Of: | ) | |
| | ) | |
| SAN GABRIEL VALLEY SUPERFUND SITES, | ) | |
| Areas 1-4 | ) | |
| BALDWIN PARK OPERABLE UNIT | ) | |
| | ) | |
| Aerojet General Corporation | ) | |
| Azusa Gas Systems | ) | |
| Azusa Pipe and Tube Bending | ) | |
| Allegiance Healthcare Corporation | ) | |
| Fairchild Holding Corporation (formerly known as Fairchild Industries) | ) | |
| The Hartwell Corporation | ) | |
| Huffy Corporation | ) | |
| J.H. Mitchell and Sons Distributors, Inc. | ) | |
| Lockheed Martin Corporation | ) | |
| Mobil Oil Corporation | ) | |
| Oil and Solvent Process Company | ) | |
| Phaostron Instrument and Electronic Company | ) | |
| Philip Morris Incorporated | ) | |
| Reichhold Inc (formerly known as Reichhold Chemicals, Inc) | ) | |
| Rubber/Urethanes Inc. | ) | |
| Screwmatic Inc. | ) | |
| The Valspar Corporation | ) | |
| White and White Properties | ) | |
| Wynn Oil Company | ) | |
| | ) | |
| | ) | |
| Respondents. | ) | U.S. EPA Docket No.2000-13 |
| | ) | |
| Proceeding Under Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9606(a), and under Section 7003 of the Solid Waste Disposal Act, as amended, 42 U.S.C. § 6973 | ) | |

ADMINISTRATIVE ORDER
FOR REMEDIAL DESIGN AND REMEDIAL ACTION

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ATTACHMENTS

Attachment 1 Map showing location of the Baldwin Park Operable Unit

Attachment 2 Baldwin Park Operable Unit Record of Decision

Attachment 3 Baldwin Park Operable Unit Explanation of Significant Differences

Attachment 4 Statement of Work for Administrative Order 2000-13

Attachment 5 Baldwin Park Operable Unit Draft Conceptual Design Report

Attachment 6 Baldwin Park Operable Unit Addendum to the Draft Conceptual Design Report

Attachment 7 EPA comments on Baldwin Park Operable Unit Draft Conceptual Design Report and Addendum

Attachment 8 Baldwin Park Operable Unit Draft Performance Standards Evaluation (and Long-Term Remedy Evaluation) Plan

## I. INTRODUCTION AND JURISDICTION

1. This Order directs Respondents to perform a remedial design for the remedy described in the Record of Decision for the Baldwin Park Operable Unit of the San Gabriel Valley Superfund Sites dated March 31, 1994, and the Explanation of Significant Differences issued in May 1999, and to implement the design by performing the remedial action. This Order is issued to Respondents by the United States Environmental Protection Agency ("EPA") under the authority vested in the President of the United States by Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 9606(a). This authority was delegated to the Administrator of EPA on January 23, 1987, by Executive Order 12580 (52 Fed. Reg. 2926, January 29, 1987), and was further delegated to EPA Regional Administrators on September 13, 1987 by EPA Delegation No. 14-14-B. This authority was further delegated to the Director of the Superfund Division, EPA Region 9, by an Order dated September 29, 1997. This Order is also issued under the authority vested in the Administrator of EPA by Section 7003 of the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act of 1976 ("RCRA"), as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. § 6901 et seq. (the "Act"), which authority has been duly delegated to the Regional Administrator of EPA, Region IX, and further delegated to the Director of the Superfund Division.

## II. FINDINGS OF FACT

2. The BPOU Area is an area of groundwater contamination over a mile wide, seven miles long, and more than 1,000 feet deep, in and near the cities of Azusa, Irwindale, Baldwin Park, and West Covina in Los Angeles County, California, and depicted generally on the map attached as Attachment 1. The contamination results from the improper handling and/or disposal of various chemicals, including but not limited to the following: perchloroethylene

(PCE); trichloroethene (TCE); carbon tetrachloride (CTC); 1,2-dichloroethane (1,2-DCA); 1,1,1-trichloroethane (1,1,1-TCA); perchlorate; N-nitrosodimethylamine (NDMA); and 1,4-dioxane. Known degradation products of PCE, TCE, and CTC are also present, including cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethene (1,1-DCE), vinyl chloride, and chloroform. TCE, PCE, and CTC are known as volatile organic compounds (VOCs) or chlorinated solvents and were used in large quantities at industrial facilities in Azusa and surrounding areas from the 1940s through the 1980s for degreasing, metal cleaning and other purposes. Perchlorate is used in solid rocket fuel; NDMA has been found in liquid rocket fuel; and 1,4-dioxane has been used as a stabilizer in chlorinated solvents. These chemicals were released to the ground by on-site disposal, careless handling, leaking tanks and pipes, and other means. More than one-quarter of the approximately 366 water supply wells in the San Gabriel Valley have been found to be contaminated with one or more of the above chemicals.

3.A. Respondent Aerojet General Corporation ("Respondent Aerojet") currently owns and conducts operations at a portion of the Site, namely, the property located at 1100 W. Hollyvale Street in Azusa, California ("the Hollyvale property"). Respondent Aerojet has operated at this location since approximately 1943 and has owned portions of this property since approximately 1948. Respondent Aerojet's activities at the Hollyvale property have included the testing and production of solid and liquid fuel rockets, torpedo research, manufacture of pressure vessels, the development and testing of electro-optical sensing devices, generator simulation systems, and semiconductor research and development. In support of these activities, Respondent Aerojet operated rocket motor and waste propellant "burn areas," vapor degreasers, leach pits, leach beds, leach fields, industrial wastewater sumps, and waste treatment systems.

B. Chemicals used at the Hollyvale property have included, but are not limited to, TCE, PCE, CTC, 1,1,1-TCA, NDMA, and perchlorate. Between 1943 and 1988, hazardous substances and solid wastes, including some or all of those described in this Section, were used at the Site. Evidence exists that releases of hazardous substances and solid wastes have occurred at Respondent Aerojet's Hollyvale property. A documented leakage of TCE from a solvent storage tank and associated piping occurred in 1979, resulting in TCE contamination of soil at up to 420 ug/kg, and excavation of 20 cubic yards of contaminated material. Numerous other written references to possible onsite disposal have been made. Respondent Aerojet has reported that beginning in approximately 1943, testing of rocket motors produced large amounts of wastewater that was allowed to evaporate or percolate into the ground. In 1947, Respondent stated that solid waste materials and organic solvents from a proposed chemical laboratory were to be accumulated and burned. In 1949, Los Angeles County officials cited Respondent Aerojet for leaching unspecified waste materials into the underlying water table through the use of seepage beds and cesspools. Written records from 1949 also describe a proposal by Respondent Aerojet to discharge 2 gallons per day of wastes containing TCE and other solvents into leachfields. Respondent Aerojet did not begin discharging wastes into an industrial waste sewer until approximately 1953. Even after Respondent Aerojet began to use the industrial waste sewer, Respondent Aerojet reported that industrial waste occasionally overflowed onto the ground due to inadequate waste storage capacity. Respondent Aerojet also reported in the 1950s that discharges to the ground of industrial wastewater occurred even after Respondent Aerojet installed a collection and disposal system, whenever rainfall exceeded 0.15 inch

C. Sampling at Respondent Aerojet's Hollyvale property has detected perchlorate, NDMA, 1,4-dioxane, TCE, PCE, CTC, 1,1,1-TCA, and other chemicals of concern in soil, soil vapor, and/or

groundwater. In 1992 to 1994, shallow soil vapor samples were collected at more than 800 locations, and numerous deep vapor wells were installed and sampled. The sampling results show that releases have occurred at or near more than one dozen likely source areas. At one likely source area, known as Building #57, multiple contaminants were detected at multiple depths. In shallow soil vapor, sampling results indicate a broad area of TCE contamination in the tens and hundreds of ug/l with a peak concentration at 690 ug/l near the location where vapor degreasers using PCE, TCE, and 1,1,1-TCA were operated from the early 1950s through the 1970s. A broad area of CTC contamination was also detected, with a peak concentration at 6 ug/l; a broad area of 1,1,1-TCA contamination was detected with a peak concentration of 100 ug/l; and a broad area of PCE contamination was detected with a peak concentration at 31 ug/l.

In vapor samples collected from a deep vapor well at the Building #57 source area, TCE was detected at 98, 170, and 310 ug/l at 5, 20, and 34 feet bgs respectively; and PCE was detected at 11, 18, and 25 ug/l at the three depths respectively. In a second vapor well east of the building, TCE was detected at 15, 72, and 75 ug/l at 5, 20, and 34 feet bgs respectively; PCE was detected at 30, 71, and 69 ug/l at the three depths respectively; and 1,1,1-TCA was detected at 300, 1600, and 1900 ug/l at the three depths respectively. In a third vapor well, TCE was detected at 27, 97, and 160 ug/l at 5, 20, and 30 feet bgs respectively; PCE was detected at 28, 74, and 98 ug/l at the three depths respectively; and CTC was detected at 4, 14, and 23 ug/l at the three depths respectively. In the annulus of a nearby groundwater monitoring well, TCE was detected at 12, 100, 78, and 260 ug/l at 38, 93, 141, and 198 feet bgs respectively; PCE was detected at 88, 90, 62, and 510 ug/l at the four depths respectively; and CTC was detected at 3, 18, 11, and 25 ug/l at the four depths respectively. In an intermediate and deep zone vapor monitoring well in the same area, TCE was detected at 220, 250, 390, and 640 ug/l at 93, 163, 202, and 306 feet bgs; PCE was

detected at 18, 4, 10, and 260 ug/l at the four depths respectively; and CTC was detected at 3, 10, 19, and 29 ug/l at the four depths respectively.

Other source areas where soil and soil vapor sampling have detected significant levels of contamination include former vapor degreaser locations DE-1a, DE-2, DE-9, DE-10, DE-11, DE-13, DE-15, DE-16, and DE-17; former leach pits LP-3 and LP-4; former drum storage areas DR-6, DR-8, DR-9, and DR-26; former ponded liquid areas PL-1 and PL-5; former storage tank location T-3; and suspected waste disposal area WD-1. The locations of these source areas are shown in the revised workplan for the Azusa/Irwindale Study Area site assessment, prepared by Harding Lawson Associates, dated July 17, 1991.

From 1992 through 1994, Respondent Aerojet installed five groundwater monitoring wells. Groundwater samples were collected and analyzed approximately 18 times between 1993 and 1999. In the three wells located most downgradient (MW-1, MW-2, and MW-4), TCE, PCE, CTC, perchlorate, NDMA, 1,4-dioxane, and other chemicals of concern have been detected. TCE has been detected at up to 4,200 ug/l; PCE has been detected at up to 2,500 ug/l; CTC has been detected at up to 66 ug/l; perchlorate has been detected at up to 2,180 ug/l; and NDMA has been detected at up to 2.2 ug/l. The chemical 1,4-dioxane has been detected at up to 26.5 ug/l.

4.A. Respondent Azusa Gas Systems (formerly known as Azusa Land Reclamation Co. and hereinafter referred to as "Respondent Azusa Gas") operated, directly or through its predecessors-in-interest, a landfill at 1201 West Gladstone Street in Azusa, California ("the Gladstone Street property") in mined areas of a sand and gravel quarry. Operations began in approximately 1974. Reports, including the 1979 Eckhardt Survey, indicate that, in addition to ordinary household and commercial refuse, the landfill received acids, bases, unspecified organic compounds, resins, scrubber

residuals, heavy metals, waste oils and waste oil sludges. Landfilling at the Gladstone Street property began in approximately 1952 (prior to Azusa Gas' operations), before liners, containment structures, leachate collection or removal systems, or leak detection systems were commonly used or required. Accordingly, filled and partially-filled portions of the landfill have none of those protective features. The recovery of vapor from within the landfill began in approximately 1978. Between 1978 and 1985, up to 1,500 to 2,000 gallons per day of condensate from the vapor recovery system were discharged into the landfill. The discharge ceased after the Los Angeles Regional Water Quality Control Board (LARWQCB) issued Clean Up and Abatement Order No. 85-2.

B. In subsurface investigations at the Gladstone Street property, PCE, TCE, trans-1,2-DCE, DCA, methylene chloride (MC), 1,2-dichlorobenzene (1,2-DCB), 1,4-dichlorobenzene (1,4-DCB), monochlorobenzene (CBN), methyl ethyl ketone (MEK), acetone, methylisobutylketone (MIBK), ethanol, propanol, butanol, butanone, tetrahydrofuran, toluene, ethylbenzene, and xylenes have been detected in soil, soil vapor, condensate (liquid samples condensed from the soil vapor), refuse, and/or groundwater. In 1985, analysis of vapor removed from the landfill through the vapor recovery system detected PCE at 2,000 parts per billion by volume (ppbv); TCE at 2,000 ppbv; trans-1,2-DCE at 3,000 ppbv; MC at 4,000 ppbv; and DCA at 500 ppbv. (In units of micrograms per liter, the concentrations are approximately 14, 11, 12, 14, and 2 ug/l respectively.) Benzene, toluene, and ethylbenzene were also detected.

C. At least eight groundwater monitoring wells have been installed on or near the Gladstone Street property. Four of those groundwater wells are upgradient of the property and four are downgradient of the property. Contaminants 1,4-DCB, 1,2-DCB, CBN, PCE, TCE, 1,1,1-TCA, and DCE have all been detected in the downgradient wells at concentrations greatly exceeding Maximum

Contaminant Levels. In addition, 1,4-dioxane, perchlorate and NDMA have been detected in groundwater at concentrations up to 99 ug/l, 430 ug/l, and 6.0 ug/l respectively.

5.A. Respondent Allegiance Healthcare Corporation ("Respondent Allegiance") and its predecessors-in-interest, including but not limited to Baxter Healthcare Corporation, operated a facility at 4401 Foxdale Avenue in Irwindale, California (the "Foxdale Avenue property") from approximately 1961 to approximately 1993. The company manufactured plastics, operated a chemical laboratory, and carried out research and development. Respondent Allegiance and its predecessors-in-interest owned the Foxdale property from approximately 1961 to approximately 1999.

B. Chemical use at the facility included Freon, MC, PCE, and phthalates. In 1988, the facility reported the use of 3,025 gallons per year of Freon, over 1,000 gallons per year of MC, and approximately 60 gallons per year of PCE. Several industrial waste clarifiers were in use at that time. In addition, PCE, chloroform, Freon, and cis-1,2-DCE were detected in wastewater and sludge.

C. In subsurface investigations. PCE, TCE, cis-1,2-DCE, Freon, chloroform, phthalates, and toluene have been detected in soil vapor and/or soil at the Foxdale Avenue property. In 1990, shallow soil vapor samples were collected at eight locations near the laboratory clarifier. PCE was detected at up to 50 ug/l near the laboratory clarifier. Freon, and trace levels of chloroform and TCE, were also detected. PCE was also detected at 110 ug/l at 16 feet below ground surface ("bgs") near the sanitary sewer. In 1990, soil samples were collected near the laboratory clarifier. In one boring, PCE was detected in soil at 17 ug/kg at two and one-half feet bgs and at 120 ug/kg at six and one-half feet bgs. Toluene and phthalates were also detected. From 1993 through 1996, several soil vapor wells were installed with permanent sampling probes. In vapor wells installed near the

laboratory clarifier, PCE was detected at up to 78, 61, 62, 2, 3, and 4 ug/l at 20, 40, 60, 90, 120, and 150 feet bgs respectively. In vapor wells installed near the sanitary sewer clarifier, PCE was detected at up to 56, 54, 33, 25, and 11 ug/l at 20, 40, 60, 120, and 150 feet bgs respectively. PCE was not detected at 90 feet bgs. In 1993, shallow soil vapor samples were collected at an additional ten locations near the sanitary sewer. PCE was detected at up to 14.7 ug/l.

D. In 1997, three groundwater monitoring wells were installed. In two of six sampling rounds, PCE and TCE were detected at up to 2.2 ug/l.

6.A. Respondent Azusa Pipe and Tube Bending ("Respondent Azusa Pipe and Tube") has operated a facility at 766 N. Todd Avenue in Azusa, California ("the N. Todd Avenue property") since 1953. The facility bends pipe and tube for commercial and aircraft use. Chemical use at the facility has included PCE and TCE. Between 1966 and 1988, in the 15 years for which information was provided, Azusa Pipe and Tube Bending reports the use of 54 to 605 gallons per year of PCE. They also report the use of 55 gallons of TCE in 1969 and 1970. Respondent Azusa Pipe and Tube Bending reports that from 1969 until approximately 1974, solvents were stored in a 250 gallon above-ground tank, and used in a vapor degreaser located in a "special concrete sump."

B. In subsurface investigations, PCE and TCE have been detected in soil and/or soil vapor. In December 1990, three soil samples were collected from two test pits near the solvent storage tank and degreaser sump. PCE was detected at up to 104,000 ug/kg; TCE was detected at up to 49,000 ug/kg. In January 1994, shallow soil vapor samples were collected at 19 locations. PCE was detected at up to 165 ug/l near the tank and degreasing area, and at lesser concentrations at 17 of the remaining locations. In August 1994, resampling at seven additional locations largely confirmed previous results. PCE was

measured at 58 to 253 ug/l. In September and October 1994, a 100 foot deep vapor well was installed with sampling probes at 10, 20, 30, 40, 50, and 94 feet bgs. In one of two sampling events, PCE was detected at 503, 832, 204, 12, 510, and 273 ug/l respectively.

7.A. Fairchild Holding Co. (formerly known as Fairchild Industries and hereafter referred to as "Respondent Fairchild") operated a facility at 601 Vincent Avenue in Azusa, California ("the Vincent Avenue property") from approximately 1965 to 1968. Respondent Fairchild also owned the property from approximately 1965 until 1987. Chemical use at the facility included PCE from 1967 through 1984 and 1,1,1-TCA beginning in the mid-1980's. Average PCE use between 1979 and 1983 was reported to be approximately 2,000 gallons per year. In 1980, 1,1,1-TCA use was reported to be approximately 800 gallons per year. In 1987, 1,1,1-TCA use was reported to be 400-500 gallons per year. Solvents have been used in an onsite vapor degreaser on the Vincent Avenue property.

B. In subsurface investigations, PCE, TCE, 1,1,1-TCA, and other compounds have been detected in soil and soil vapor. In 1990, soil samples were collected at 21 locations at one to ten feet bgs. 1,1,1-TCA was detected at 2,100 ug/kg at one foot bgs and 40 ug/kg at three feet bgs. PCE was detected at 120 ug/kg at one foot bgs and 20 ug/kg at three feet bgs. 1,1-DCE was detected at 250 ug/kg at one foot bgs. TCE was detected at 40 ug/kg at one foot bgs. In 1991, shallow soil vapor samples were collected at 58 locations. 1,1,1-TCA was detected at up to 3,000 and 11,000 ug/l at five and 20 feet bgs respectively. PCE was detected at up to 500 and 460 ug/l at five and 20 feet bgs respectively. TCE was detected at up to 300 and 400 ug/l at five and 20 feet bgs respectively. In 1992, two vapor wells were installed with permanent vapor probes, and sampled twice. The patterns of contamination were similar in the two sampling events. In one of the two vapor wells, in July 1992, 1,1,1-TCA

was detected in soil vapor at 6, 21, 230, 147, and 63 ug/l at 5, 11, 47, 103, and 143 feet bgs respectively. PCE was detected at 25, 54, 21, 14, and 10 at the same five depths respectively. TCE and DCA, and a number of other chemicals were also detected. In the second vapor well, in July 1992, 1,1,1-TCA was detected at 133, 188, 250, 46, and 42 ug/l at 6, 11, 48, 103, and 125 feet bgs respectively. PCE was detected at 22, 51, 36, 9, and 3 ug/l at the same five depths respectively.

C. In 1994, one groundwater monitoring well was installed. In eight samples collected between August 1994 and February 1999, PCE was detected at up to 21 ug/l, TCE was detected at up to 10 ug/l, and cis-1,2-DCE was detected at up to 200 ug/l. Chloroethane, dichlorodiflouromethane, 1,1-DCA, 1,2-DCA, 1,1-DCE, trans-1,2-DCE, 1,2-dichloropropane, trichloroflouromethane (TCFM), vinyl chloride, benzene, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, acetone, sec-butylbenzene, 2-chlorovinyl ether, isopropylbenzene, and napthalene were also detected.

8.A. Respondent Hartwell Corporation ("Respondent Hartwell") operated a facility at 701 W. Foothill Boulevard in Azusa, California ("the 701 W. Foothill property") from approximately 1964 to 1986, manufacturing a product line known as "quick release pins" for the aerospace industry. Respondent also owned the 701 W. Foothill property from approximately 1967 to 1988. Chemical use at the facility included PCE and 1,1,1-TCA. Respondent Hartwell operated a vapor degreaser at the 701 W. Foothill property.

B. In subsurface investigations, PCE, TCE, 1,1,1-TCA, 1,1-DCE and other chemicals have been detected in soil, soil vapor, and/or groundwater at the 701 W. Foothill property. In 1991 and 1993, soil samples were collected. PCE was detected at 560 ug/kg at two feet bgs and at 22 ug/kg at 110 feet bgs. In 1992, shallow soil vapor samples were collected at approximately 30

locations on the property. PCE was detected at most locations sampled at up to 1,242 ug/l. 1,1,1-TCA was detected at up to 5 ug/l and 1,1-DCE was detected at up to 18 ug/l. In 1992, a deep vapor probe well was installed with five permanent vapor sampling probes. In the first sampling event, in November 1992, PCE was detected at 537, 659, 990, 164, and 10 ug/l at 10, 20, 40, 60, and 80 feet bgs respectively. In the second sampling event, in September 1994, PCE was detected at 96, 125, 197, 219, and 138 ug/l at the same five depths respectively. 1,1,1-TCA, TCE, and 1,1-DCE were also detected at lesser concentrations. In the third sampling event, in September 1999, PCE was detected at 38, 116, 117, and 106 ug/l at 20, 40, 60, and 80 feet bgs respectively. PCE was not detected at 10 feet bgs. 1,1,1-TCA, TCE, and 1,1-DCE were also detected at lesser concentrations. A second set of soil gas probes were installed at the same time the groundwater monitoring well was installed, and sampled in 1993, 1994, and 1999.

C. In 1993, one groundwater monitoring well was installed. In multiple sampling rounds, PCE was detected at up to 210 ug/l. TCE, 1,1,1-TCA, 1,1,2-TCA, and 1,2-DCE were also detected.

9.A. Respondent Huffy Corporation ("Respondent Huffy") operated a facility at 1120 W. Foothill Boulevard in Azusa, California ("the 1120 W. Foothill property") from approximately 1959 to approximately 1982, manufacturing and assembling bicycles. Respondent Huffy owned the facility from approximately 1959 until approximately 1983. Chemical use at the facility has included PCE, TCE, and 1,1,1-TCA. Respondent Huffy used approximately 2,000 gallons per year of TCE from approximately 1960 until at least 1968 and possibly until 1975. Respondent Huffy used an average of approximately 4,000 gallons per year of PCE from approximately 1968 to 1978. Respondent Huffy used the solvents in a vapor degreaser.

B. In subsurface investigations PCE, TCE, 1,1,1-TCA, and other chemicals have been detected in soil, soil vapor, and/or groundwater at the 1120 W. Foothill property. In 1993, soil samples were collected from one boring and from four trenches. PCE was detected at 100 ug/kg at 2.5 feet bgs, 85 ug/kg at 1.7 feet bgs, and 9 ug/kg at 3 feet bgs. TCE was detected at 8 ug/kg at 4.4 feet bgs. In 1991 and 1993, shallow soil vapor samples were collected at approximately 70 locations. PCE was detected at up to 2,100 ug/l near the former vapor degreaser, and at hundreds of ug/l at numerous other locations. TCE and 1,1,1-TCA were also detected. In 1993, two deep vapor wells were installed with a total of six permanent vapor sampling probes. In one of three sampling events, PCE was detected at 1,500, 5,700, 1,900, 330, 630, and 690 ug/l at approximately 25, 50, 100, 175, 250, and 291 feet bgs respectively. TCE and 1,1,1-TCA were also detected at or below 100 feet bgs. In February 2000, PCE was detected at 6,300, 13,000, 22,000, 21,000, 14,000, and 6,400 ug/l at the five depths respectively. TCE was also detected.

C. In 1994, one groundwater monitoring well was installed at the 1120 W. Foothill property. In multiple sampling events between 1994 and 1996, PCE was detected at up to 8,000 ug/l, and TCE was detected at up to 5,800 ug/l. These concentrations far exceed contaminant levels in upgradient wells. Other chemicals, including 1,1,1-TCA, 1,1-DCE, cis-1,2-DCE, carbon tetrachloride, chloroform, and methylene chloride, were also detected. In a more recent sampling event, in March 1999, perchlorate was detected at 16 ug/l.

10. A. Respondent J.H. Mitchell and Sons Distributors, Inc. ("Respondent Mitchell") has operated a facility at 14515 Joanbridge Street, in Baldwin Park, California ("the Joanbridge Street property") since approximately 1960, distributing gasoline, industrial and automotive oils, petroleum products, and solvents. Products (and reported 1987 sales in gallons) include: 1,1,1-TCA (25,831); PCE (6,195); MC (7,077); acetone (29,689);

MEK (26,949); MIBK (216); toluene (16,635); and xylenes (13,298). TCE purchases of 2,675 and 1,800 gallons were also reported for 1978 and 1979 respectively.

B. In subsurface investigations at the Joanbridge Street property, PCE, TCE, 1,1,1-TCA, 1,2-DCE, 1,2-DCA, 1,1-DCE, TCFM, and numerous non-chlorinated hydrocarbons have been detected in soil, soil vapor, and/or groundwater. In 1987, 36 soil samples were collected. PCE was detected at 140 ug/kg at 25 feet bgs and 500 ug/kg at 45 feet bgs. Benzene, toluene, ethylbenzene, and xylenes were also detected at 170, 14,000, 76,900, and 91,700 ug/kg respectively, all at 45 feet bgs. In 1992, soil samples were collected from multiple borings. PCE was detected at 330 ug/kg at one foot bgs. TCE was detected at 9 ug/kg at one foot bgs. Toluene, ethylbenzene, xylenes, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, ethylmethylbenzene, and n-butylbenzene were detected at thousands to hundreds of thousands of ug/kg at 25, 40, and/or 45 feet bgs. In 1992, two deep vapor wells were installed with a total of twelve permanent vapor sampling probes. In the shallower well, in the first sampling event, PCE was detected at 2,5,11,5, and 12 ug/l at 25, 40, 60, 80, and 100 feet bgs respectively. In the deeper well, PCE was detected at 31, 0.2, 8, and 43 ug/l at 80, 100, 120, and 150 feet bgs respectively.

C. In 1993, one groundwater monitoring well was installed. In nine sampling events, PCE was detected at up to 30 ug/l and 1,2-DCA was detected at up to 25 ug/l. A number of non-chlorinated compounds were also detected, including benzene at up to 95 ug/l; xylenes at up to 4,600 ug/l; ethylbenzene at up to 450 ug/l; and toluene at up to 2,400 ug/l. N-butylbenzene, isopropylbenzene, tert-butylbenzene, napthalene, n-propylbenzene, ethylene dibromide, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene were also detected.

11.A. Respondent Oil and Solvent Process Company ("Respondent OSCO") has operated and owned an approximately seven acre facility at 1704 West First Street in Azusa, California ("the 1704 West First Street property") since approximately 1954, recycling and distributing used solvents and repackaging and distributing virgin solvents. Chemicals recycled and/or distributed at the facility have included 1,1,1-TCA, PCE, TCE, MC, 1,2-DCA, and 1,1-DCE. For the period 1978-1980, Respondent OSCO reported TCE sales of 20,000 to 24,000 gallons per year. In 1980, Respondent OSCO reported that 6 million gallons of solvent were recycled. Respondent OSCO also reported that it has been aware that throughout its history of operations there have been instances of spills and releases in the production, shipping, loading, and drum storage areas. During the majority of the years of operation, large areas of the facility have been unpaved. Some areas that were paved, such as the storage pad, lacked structures to contain a spill. Certain of Respondent OSCO's employees recall a spill of approximately 1,000 gallons in the 1970s. In 1980, stormwater runoff collected in the unpaved southern portion of the facility. After TCE was detected in the ponded water, the LARWQCB issued a Clean Up and Abatement Order to Respondent OSCO, leading to the cleanup of approximately 8 to 10 cubic yards of contaminated soil.

B. In subsurface investigations at the 1704 West First Street property, PCE, TCE, 1,1,1-TCA, 1,1-DCA, MC, and other chemicals have been detected in soil, soil vapor, and/or groundwater. In 1987, 21 soil samples were collected in the drum storage area at depths of two to five feet bgs. At 2.5 feet bgs, PCE was detected in 11 of 21 samples at up to 38,000 ug/kg. The chemical 1,1,1-TCA was detected in six of 21 samples at up to 4,000 ug/kg at the same depth. In 1989, as part of its RCRA facility investigation, shallow soil vapor samples were collected at 77 locations throughout the facility. PCE was detected at multiple locations with peak concentrations of 5,100, 2,200, and 1,600 ug/l. TCE was detected at multiple locations with peak

concentrations of 220, 150, 120, and 43 ug/l. In 1991, nine borings were drilled at the 1704 West First property and from one to three permanent vapor sampling probes were installed in each boring. The deep soil vapor wells were sampled in 1991 and again in 1993. PCE was detected in all probes from all wells in both sampling events. The maximum detected PCE concentration was 16,000 ug/l. Maximum concentrations of other contaminants at depth included 2,800 ug/l for 1,1-DCE at 136 feet bgs and 1,400 ug/l for 1,1,1-TCA at 190 feet bgs respectively.

In approximately 1997, Respondent OSCO installed five additional vapor monitoring wells and seven vapor remediation wells. In these wells, PCE, TCE, 1,1,1-TCA, 1,1-DCE, cis-1,2-DCE, and other chemicals have been detected at high concentrations at multiple depths. In one of the vapor monitoring wells, in samples collected in October and November 1997, PCE was detected at 850, 1,200, 2,700, 5,000, 11,000, 310, 8,200, 5,000, 5,100, 1,500, 1,200, 58, 140, and 83 ug/l at 18, 38, 58, 78, 98, 118, 138, 158, 178, 198, 218, 238, 258, and 269 bgs respectively. In the same well at the same 14 depths sampled in October and November 1997, 1,1,1-TCA was detected at 150, 470, 710, 640, 530, 20, 320, 280, 290, 180, 220, 77, 260, and 270 ug/l.

C. In 1992, five groundwater monitoring wells were installed at the 1704 West First Street property. Groundwater quality data from Respondent OSCO's wells are available from August 1992 through August 1999. Contaminants detected in downgradient wells (MW-03, MW-04, and MW-05) include PCE (up to 2,200 ug/l), TCE (up to 1,900 ug/l), 1,1,1-TCA (up to 900 ug/l), 1,1-DCE (up to 360 ug/l), 1,2-DCA (up to 410 ug/l), and 1,4-dioxane (up to 69 ug/l).

D. In 1998 and 1999, Respondent OSCO operated a soil vapor extraction system to remove VOCs from the subsurface beneath the facility. In February 1999, after 10 months of operation,

Respondent OSCO's consultant estimated that 32,000 pounds of VOCs had been removed from the subsurface.

12.A. Respondent Phaostron Instruments & Electronic Company ("Respondent Phaostron") has operated a facility at 717 North Coney Avenue in Azusa, California ("the North Coney Avenue property") since 1985, manufacturing meters and other instruments for U.S. military and aircraft applications. Respondent Phaostron has reported using approximately 400 to 600 gallons per year of PCE through 1989. Phaostron has reported three spills in 1988 and 1990 of less than one-half gallon of PCE and minor spillage of PCE at the storage tank spigot. Respondent Philip Morris Incorporated ("Respondent Philip Morris"), through its predecessor-in-interest U.S. Relay Company and subsequently through the U.S. Relay Electronics Division of Respondent Philip Morris, operated a facility at the North Coney Avenue property from approximately 1958 to approximately September 1960, manufacturing electronic and power relays and electronic accessories. Chlorinated solvents were used for degreasing and parts cleaning.

B. In subsurface investigations at the North Coney Avenue property PCE, CTC, TCE, 1,1,1-TCA, cis-1,2-DCE, and other chemicals have been detected in soil and/or soil vapor. In 1990, four soil samples were collected at two locations. In one location PCE was detected at 21,000 ug/kg at one foot bgs and 17,000 at three feet bgs. At the second location PCE was detected at 18,000 ug/kg at one foot bgs and 13,000 ug/kg at four feet bgs. In 1991, two permanent vapor sampling probes were installed in the annulus of a groundwater monitoring well. In four sampling events, PCE was detected at a maximum concentration of 870 ug/l at an estimated depth of 100 feet bgs. In 1992, shallow soil vapor samples were collected at 15 locations. PCE was detected at up to 10,900 ug/l near the former degreasing area, and at thousands of ug/l at other locations. Cis-1,2-DCE was detected at up to 1,020 ug/l. TCE was detected at up to 340

ug/l. In 1995, a deep vapor well was installed with sampling probes at 20, 40, 100, 120, 140, 160, 180, and 200 feet bgs. In one of three sampling events, PCE was detected at 90, 52, 27, 44, and 54 ug/l at 20, 140, 160, 180, and 200 feet bgs respectively. TCE was detected at 7, 57, 38, 49, and 126 ug/l at the five depths respectively.

13.A. Respondent Reichhold Chemicals, Inc. ("Respondent Reichhold") has owned and operated a facility at 237 S. Motor Avenue in Azusa, California ("the 237 S. Motor Avenue property") since at least 1949, manufacturing resins and other products. Chemical use at the facility has included TCE 1,1,1-TCA, and Freon, primarily to clean process tanks. From approximately 1968 to 1975, TCE use was approximately 2,900 gallons per year. In 1980, 1,1,1-TCA use was approximately 3,000 gallons per year. Average Freon use was approximately 30,000 gallons per year. TCE, 1,1,1-TCA, PCE, Freon, and chloroform have been detected in wastewater in samples collected between 1976 and 1990.

B. Local records contain indications of past releases of hazardous substances. In 1949 it was reported that 6,000 gallons per year of liquid waste, comprising tank washdowns and floor washings were pumped to a tank for disposal at sea. It was also reported that steel drums were cleaned and discharged to an open ditch south of the plant that flowed to a concrete-lined sump and then to a seepage pit. According to another local inspection report, surface water runoff and also process waters, including resin tank washings, were allowed to flow to the south end of the plant and remain in a low area which was at one point unpaved. According to this report, it was at one time the practice of Respondent Reichhold to let such runoff, which may have included certain chemical products and solvents, to absorb into the soil. In 1958, a local inspector noted a small leak from process equipment. A xylene spill was documented in 1983. An explosion involving styrene occurred in 1984.

C. In subsurface investigations at the 237 S. Motor Avenue property PCE, TCE, 1,1,1-TCA, 1,1-DCA, 1,1-DCE, and other chemicals have been detected in the soil vapor. In 1991, 60 shallow soil vapor samples were collected. TCE was detected at up to 300 ug/l. 1,1,1-TCA was detected at up to 2,000 ug/l. PCE was detected at up to 11 ug/l, and 1,1-DCE was detected at up to 160 ug/l. In 1994, an additional 50 soil vapor samples were collected. Significant concentrations of TCE, 1,1,1-TCA, 1,1-DCE, and 1,1-DCA were detected. In 1996 and 1997, additional soil gas samples were collected and analyzed. In samples collected in February 1996 at one of the soil vapor monitoring wells (SVMW #6), TCE was detected at 214, 81, and 77 ug/l at 15, 25, and 40 feet bgs. In more recent samples collected in April 1997 from the same well at the same three depths, TCE concentrations were 1, 79, and 128 ug/l respectively and 1,1,1-TCA was detected at 90, 58, and 122 ug/l respectively.

14.A. Respondent Rubber/Urethanes, Inc. ("Respondent Rubber/Urethanes") operated a facility at 968 W. Foothill Blvd. in Azusa, California ("the 968 W. Foothill property") from 1969 to approximately 1996, manufacturing computer rollers and other "precision metal-to-rubber bonded components. Chemical use at the facility included PCE, TCE, 1,1,1-TCA, MC, Freon-113, and MEK. In 1983 and in 1988, Respondent Rubber/Urethanes reported solvent usage as 17,000 pounds per year MC (approximately 1,530 gallons), 920 pounds per year PCE (approximately 67 gallons), 350 gallons per year TCE, 23 gallons per year Freon-113, and 10 gallons per year 1,1,1-TCA. A vapor degreaser was in use from at least 1976.

B. In subsurface investigations at the 968 W. Foothill property, PCE, TCE, 1,1,1-TCA, cis-1,2-DCE, trans-1,2-DCE, 1,-DCE, Freon-113, and MC have been detected in the soil, soil vapor, and/or groundwater. In 1990, shallow soil vapor samples were collected at 23 locations. PCE was detected at up to 9,800 ug/l; TCE was detected at up to 1,400 ug/l; MC was detected at up

to 6,700 ug/l; and 1,1,1-TCA was detected up to 13 ug/l. In 1990, soil samples were collected at 1,3,4, and 10 feet bgs. PCE was detected at up to 60,000 ug/kg at 10 feet bgs; TCE was detected at up to 3,100 ug/kg at 10 feet bgs; and 1,1,1-TCA was detected at up to 27 ug/kg at one foot bgs. In 1992, three deep vapor wells were installed. Each well had permanent vapor sampling probes installed at four depths. In one of the vapor wells, sampled in September 1992, PCE was detected at 2,402, 2,902, 1,560, and 1,641 ug/l at 25, 60, 100, and 155 feet bgs respectively. TCE was detected at 1,293, 1,462, 576, and 617 at the four depths respectively. Cis-1,2-DCE was detected at 176, 44, 419 and 53 ug/l at the four depths respectively. Moderate to high concentrations of PCE, TCE, and/or cis-1,2-DCE were also detected in three other vapor wells. Additional soil vapor samples were collected and analyzed in May 1994 and June 1994, confirming moderate to high levels of contamination.

C. In 1994, one groundwater monitoring well was installed. In one round of sampling in May 1994, TCE was detected at 642 ug/l; PCE was detected at 187 ug/l; and cis-1,2-DCE was detected at 118 ug/l.

15.A. Respondent Screwmatic, Inc. ("Respondent Screwmatic") has operated a facility at 925 W. First Street in Azusa, California ("the 925 W. First Street facility") since 1964 for the manufacture of precision metal parts. Chemical use at the facility has included 1,1,1-TCA, for parts cleaning. Reported historical use of 1,1,1-TCA is approximately 2,400 gallons per year. Analysis of wastewater and sludge confirms the use of 1,1,1-TCA and toluene. A vapor degreaser and above-ground storage tank have been in use at the facility.

B. In 1991, at the 925 W. First Street facility, two soil samples were collected from a borehole near the vapor degreaser. In one sample at 0.5 foot bgs, 1,1,1-TCA was detected at 340 ug/kg; TCE was detected at 250 ug/kg; PCE was detected at 190

ug/kg; 1,1-DCE was detected at 57 ug/kg; and 1,1-DCA was detected at 6.9 ug/kg. In a second sample collected at 3.5 feet bgs, PCE was detected at 170 ug/kg and 1,1,1-TCA was detected at 7 ug/kg. In 1992, shallow soil vapor samples were collected at 15 locations. 1,1,1-TCA was detected at up to 1,270 ug/kg, with peak levels at the solvent storage tank. PCE, TCE, and 1,1-DCE were also detected. In 1994, a deep vapor well was installed with permanent vapor sampling probes. In samples collected in November 1994, 1,1,1-TCA was detected at 339, 621, 5,038, 8,332, 9,863, 39,482, and 46,705 ug/l at 9, 24, 49, 74, 99, 124, and 144 feet bgs respectively. The chemical 1,1-DCE was detected at 94, 72, 284, 233, 396, 655, and 774 ug/l at the seven depths respectively. In a second round of samples collected in at the same seven depths in April 1998, 1,1,1-TCA was detected at 1,933, 2,885, 7,587, 13,000, 21,853, 3,460, and 36,332 ug/l respectively; and 1,1-DCE was detected at 187, 310, 527, 585, 744, 313, 1,131 ug/l respectively. TCE, 1,2-DCA, 1,1,2-trichloroethane (1,1,2-TCA), 1,1-DCA, toluene, chloroform, and methylene chloride have also been detected. Additional vapor samples, showing significant concentrations of 1,1,1-TCA, 1,1-DCE, PCE, TCE, 1.2-DCA, and 1,1,2-TCA were collected in January, February, and March 2000.

C. A groundwater monitoring well has not been installed at the 925 W. First Street facility but a well installed at the Azusa Gas landfill in late 1993, known as MW10, is located approximately 1,000 feet downgradient of the facility. At MW10, 1,1,1-TCA and 1,1-DCE have been detected at over 2,500 ug/l; TCE has been detected at 740 ug/l; and CTC has been detected at 220 ug/l. Benzene, 1,1-DCA, 1,2-DCA, 1,1,2-TCA, and PCE have also been detected.

16.A. Respondent Valspar Corporation ("Respondent Valspar") has owned and operated a facility at 1004 W. 10th Street in Azusa, California ("the W. 10th Street property") since approximately

1986. Respondent Mobil Oil Corporation ("Respondent Mobil") owned and operated a facility at the W. 10th Street property from approximately 1963 to approximately 1984. Respondent Lockheed Martin Corporation ("Respondent Lockheed"),through its predecessor-in-interest Martin Marietta Corporation, owned and operated a facility at the W. 10th Street property from approximately 1955 to approximately 1963. Operations at the W. 10th Street property have included the production of vinyl resins in adhesives, coatings, linings for tinplate beverage containers, the manufacture of printing inks, and the manufacture and blending of paint. Chemical use at the facility has included TCE, MC, xylenes, toluene, ethylbenzene, and MEK. In 1987, Respondent Valspar reported the purchase of approximately 113,000 gallons of xylenes, approximately 6,500 gallons of toluene, approximately 220 gallons of ethylbenzene, and less than one pound per day of TCE. Respondent Mobil reported the use of 100-500 gallons per year of MC between 1975 and 1979 to clean portable tanks. Analysis of a wastewater sludge sample in 1981 confirmed the presence of TCE and 1,1,1-TCA. Indications of past releases of hazardous substances are apparent in Los Angeles County records. The reports refer to evidence of prior spills at permanent rail tank cars, rail docks, and portable tank cleaning areas. The records also report a violation of the California Health and Safety Code because the truck turnaround area for the receiving area collected 20,000 to 30,000 gallons of rainwater during storms, and numerous spills of solvents and pigments washed into the area. Spillage onto the ground from tank cars used as storage was also observed. The records indicate that some stored materials in spillage areas were highly hazardous. In addition, in 1981, Respondent Mobil reported a spill of 1,500 gallons of non-chlorinated solvents, with partial recovery.

B. In subsurface investigations at the W. 10th Street property PCE, TCE, 1,1,1-TCA, cis-1,2-DCE, 1,2-DCA, 1,1-DCA, 1,1-DCE, xylene, benzene, toluene, and other chemicals have been detected in soil, soil vapor, and/or groundwater. In 1986, soil

samples were collected during the removal of five underground storage tanks. PCE was detected in one sample at 150 ug/kg. In 1991, shallow soil vapor samples were collected at 29 locations. PCE was detected at relatively uniform concentrations between one and 8.7 ug/l. 1,1,1-TCA was detected at up to 3.9 ug/l. In 1994, three deep vapor wells were installed with permanent sampling probes. PCE was detected at 3.1 and 1.2 ug/l at 18 feet bgs and 88 feet bgs respectively. Cis-1,2 DCE was detected at 3.4 and 1.8 ug/l at 41.5 feet bgs and 65 feet bgs respectively.

C. In 1990, three groundwater monitoring wells were installed. In the two downgradient wells, in more than twenty sampling events, PCE has been detected at up to 42 ug/l. TCE has been detected at up to 30 ug/l. Cis-1,2-DCE has been detected at up to 210 ug/l. Very high levels of non-chlorinated chemicals have also been detected, including a sheen of petroleum product observed floating at the top of the water table in May 1991. Benzene has been detected at up to 54 ug/l; toluene at up to 37,000 ug/l; and xylenes at up to 120,000 ug/l. The chemicals 1,1-DCA, 1,2-DCA, 1,1-DCE, methylene chloride, 1,1,1-TCA, cis-1,3-dichloropropene, bromodichloromethane, bromoform, chlorobenzene, chloroethane, chloroform, dibromochloroethane, and dibromochloromethane have also been detected. A fourth groundwater well was installed in 1994.

17.A. Respondent White and White Properties ("Respondent White and White"), directly or through its predecessor in interest White, White, White, and White (whose general partners were Donald White and John White), has owned a facility at 145 S. Irwindale Avenue in Azusa, California ("the 145 S. Irwindale Avenue property"), since approximately 1963, and has owned a facility at 204 S. Motor Avenue in Azusa, California ("the 204 S. Motor Avenue property") since approximately 1992. Respondent White and White is also the successor-in-interest to Whico Machine Co., Whico, and RPM Merit, which operated at the 145 S, Irwindale property and the 204 S. Motor property at various times

between approximately 1963 and approximately 1995. Chemical use at the two facilities has included TCE, PCE, 1,1,1-TCA, and other chemicals.

B. In subsurface investigations, PCE, TCE, 1,1,1-TCA, 1,1-DCA, 1,1-DCE and other chemicals have been detected in soil, soil vapor, and/or groundwater. In 1990, soil samples were collected at several locations at the 145 S. Irwindale Avenue property. PCE was detected adjacent to the wastewater clarifier influent lines at 490 ug/kg at 1.5 feet bgs, 5900 ug/kg at 4 feet bgs, and 860 ug/kg at 4.5 feet bgs. 1,1,1-TCA was detected at 700, 3500, and 750 ug/kg at the same three depths respectively. In 1991, shallow soil vapor samples were collected at 39 locations at the 145 S. Irwindale property. 1,1,1-TCA was detected at multiple locations in the thousands of ug/l, at up to 12,800 ug/l. PCE was detected at multiple locations in the hundreds of ug/l, at up to 825 ug/l. TCE and other chemicals were also detected. In 1992 and 1994, vapor wells were installed with ten permanent vapor sampling probes. In several sampling events, PCE was detected at concentrations up to 213 ug/l at various depths up to 100 feet bgs. 1,1,1-TCA was detected at concentrations up to 2246 ug/l at various depths up to 100 feet bgs.

C. In 1991, soil samples were collected from two borings at the 204 S. Motor Avenue property. PCE was detected in 3 of 6 samples, at 15 ug/kg at one foot bgs, at 65 ug/kg at 5 feet bgs, and at 20 ug/kg at one foot bgs. In 1991, shallow soil vapor samples were collected at 17 locations at the 204 S. Motor Avenue property. PCE was detected at 17 of 17 locations at 100 to 470 ug/l. 1,1,1-TCA was detected at 17 of 17 locations at 40 to 500 ug/l. In 1992, a vapor well was installed with four permanent vapor sampling probes at the 204 S. Motor Avenue property. In samples collected in August 1992, October 1992, November 1992, March 1995, and June 1997, extensive PCE, 1,1-DCE, and 1,1,1-TCA contamination was measured. In August 1992, PCE was detected at

226, 568, 849, and 1141 ug/l at 10, 20, 30, and 40 feet bgs respectively.

D. In 1996, a groundwater monitoring well with nested soil gas probes was installed and sampled at the 204 S. Motor Avenue property. In soil vapor samples collected in March 1996, PCE was detected at 20, 58, 134, 150, 385, 603, 755, 630, 706, 1,070, 2,140, and 964 ug/l at approximately 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, and 240 feet bgs respectively. The chemicals TCE, cis-1,2-DCE, trans-1,2-DCE and 1,1,1-TCA were also detected. Additional samples collected in April 1996, June 1997, and July 1997 also showed extensive PCE, TCE, 1,1,1-TCA, and 1,1-DCE contamination. In groundwater samples collected in February 1996, May 1996, and July 1997, PCE was detected at up to 340 ug/l; TCE was detected at up to 260 ug/l; 1,1-DCE was detected at up to 106 ug/l; and 1,1,1-TCA was detected at up to 45 ug/l. The chemicals 1,4-dioxane, perchlorate, CTC, 1,2-DCA, 1,1-DCA, bromodichloromethane, and chloroform were also detected in groundwater.

18.A. Respondent Wynn Oil ("Respondent Wynn") has owned and operated a facility at 1151 W. 5th Street in Azusa, California ("the 5th Street property") since approximately 1951 for the manufacture and distribution of petrochemical lubricants and additives for automotive and industrial use. Chemical use at the facility has included 1,1,1-TCA, PCE, TCE, 1,2-DCA, MC, xylene, and other chemicals. In 1985, Respondent was issued a notice of violation by Los Angeles County and subsequently removed approximately 120 cubic yards of contaminated soil.

B. In subsurface investigations, PCE, TCE, 1,1,1-TCA, cis-1,2-DCE, 1,1-DCA, 1,1-DCE, MC, benzene, toluene, xylenes, and other chemicals have been detected in soil, soil vapor, and/or groundwater. In 1988 and 1990, soil samples were collected at more than 40 locations and depths. At various locations PCE was detected at 35 ug/kg at one foot bgs, 8,000 ug/kg at three feet

bgs, 100 ug/kg at six feet bgs, and 200 ug/kg at 10 feet bgs. MC was detected at 2,400 ug/kg at three feet bgs, at 4,200 ug/kg at six feet bgs, and at 4,200 ug/kg at 10 feet bgs. TCE, 1,1,1-TCA, benzene, toluene, xylenes, and other chemicals were also detected. In 1991, shallow soil vapor samples were collected at 24 locations. 1,1,1-TCA was detected at 23 of 24 locations, at up to 80 ug/l. PCE was detected at 23 of 24 locations, at up to 70 ug/kg. TCE, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, and other chemicals were also detected. In 1992, three deep vapor wells were installed, each with permanent vapor sampling probes at four depths. In vapor well VW-3, in the last of four sampling events completed in 1992 and 1993, PCE was detected at 16, 48, 5,100, and 1,450 ug/l at 25 feet, 75 feet, 125 feet, and 175 feet bgs respectively. In January and February 2000, the three vapor wells were resampled. In vapor well VW-3, in January 2000, PCE was detected at 100, 300, 21,000, and 9,500 ug/l at 25 feet, 75 feet, 125 feet, and 175 feet bgs respectively. TCE, 1,1-DCE, 1,1-DCA, 1,1,1-TCA and other chemicals were also detected.

C. In 1992, one groundwater monitoring well was installed. In eight quarterly sampling events, the following were detected: PCE up to 38,000 ug/l, TCE up to 7,840 ug/l, cis-1,2 DCE up to 2,630 ug/l, 1,2-DCA up to 490 ug/l, and 1,1-DCE up to 150 ug/l.

19. The respondents identified in Paragraphs 3 through 18 are referred to throughout this Order as "Respondents."

20. On October 15, 1984, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the San Gabriel Valley Area 2 site (the Baldwin Park Operable Unit Area) on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B (49 Fed. Reg. 40320).

21. From approximately October 1984 to April 1993, EPA undertook a Remedial Investigation and Feasibility Study ("RI/FS") for the BPOU Area, pursuant to CERCLA and the National Contingency Plan,

40 C.F.R. Part 300. In a report dated April 2, 1993, EPA presented the results of the BPOU RI/FS.

22. Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the completion of the FS and the proposed plan for remedial action on May 7, 1993, and provided opportunity for public comment on the proposed remedial action.

23. The decision by EPA on the interim remedial action to be implemented at the BPOU Area is embodied in an interim Record of Decision ("ROD"), executed on March 31, 1994, and supplemented by an Explanation of Significant Differences ("ESD") issued in May 1999, on which the State has given its concurrence. The ROD (Attachment 2) and the ESD (Attachment 3) are attached to this Order and are incorporated by reference. The ROD and ESD are supported by an administrative record that contains the documents and information upon which EPA based the selection of the response action.

24. Hazardous substances and solid wastes released from Respondents' facilities have moved downward from the surface, through soil, contaminating groundwater beneath Respondents' facilities. The contamination has generally migrated southward and westward from Respondents' facilities, leaving large plumes of contaminated groundwater. Evidence of downward migration through the soil includes hundreds of soil vapor and soil samples collected beneath Respondents' facilities demonstrating the presence of PCE, TCE, CTC, and other chemicals used at the Respondents' facilities, and geologic investigations which have documented the highly permeable nature of the subsurface soils. Evidence of migration through the aquifer includes the presence of chemicals in samples collected from a network of monitoring wells installed in the BPOU Area downgradient of the Respondents' facilities; the elapsed time of approximately 50 years since hazardous substances and solid wastes were first handled at some of the Respondents' facilities (allowing ample time for the

hazardous substances and solid wastes to migrate significant distances); and computer simulations of groundwater flow and particle movement indicating that contamination originating at Respondents' facilities has migrated at rates and directions sufficient to reach the extraction locations to be used in the Baldwin Park OU remedy.

25. The San Gabriel groundwater basin provides drinking water to more than one million residents of the San Gabriel Valley and nearby areas. Given the absence of dependable alternatives to the aquifer as the region's primary water supply, the groundwater is expected to remain as residents' primary source of drinking water indefinitely. Numerous water supply wells draw water directly from contaminated portions of the aquifer.

26. The groundwater contamination in the Baldwin Park area has forced the closure of numerous public water supply wells, which previously had the capacity to produce thousands of gallons per minute of potable water. Many other wells have low levels of contamination, and are at risk of having to shut down. Most of these wells are in the area described in the ROD and ESD as Subarea 3.

27. The affected water producers in the BPOU Area include the La Puente Valley County Water District (LPVCWD), Valley County Water District (VCWD), San Gabriel Valley Water Company (SGVWC), Suburban Water Systems, the City of Industry Waterworks System, and California Domestic Water Co. The LPVCWD was forced to shut down its three groundwater wells (its entire supply) due to VOC, perchlorate, and NDMA contamination. The VCWD has shut down six wells due to VOC, perchlorate, and NDMA contamination, and has been forced to shut down two VOC treatment systems. The SGVWC has been forced to shut down its B4 and B6 wellfields, and has detected contaminants in its B5 wellfield. Suburban Water Systems has detected VOCs and NDMA in its No. 139 and No. 140

wellfields. The City of Industry Waterworks System has detected VOCs and NDMA in its wells.

28. When perchlorate was first detected at potentially unsafe levels in public water supply wells in the San Gabriel Valley in 1997, there were no approved technologies available to use in its treatment. In California, water treatment technologies must be approved by the California Department of Health Services (CA DHS) before they can be used to provide potable water to the public via a public water supply.

29. Several perchlorate-removal technologies have been tested since 1997. As of the date of this Order, only one technology, an ion exchange process, has been approved by the CA DHS for removal of perchlorate from water. A full-scale treatment system, which includes the approved ion exchange process, has been constructed for the La Puente Valley County Water District. A biological reduction process is currently being tested, but has not yet been approved by CA DHS for removal of perchlorate from water.

30. Response actions at the site have included EPA's RI/FS activities (approximately 1984 through 1993); soil, soil gas, and groundwater investigations completed by Respondents and other parties (approximately 1990 through 2000); pre-design work completed by certain Respondents and other parties (approximately 1995 through 1999); remedial design activities completed by certain Respondents (1999 through early 2000); and construction and operation of "wellhead treatment" facilities by affected water utilities in the BPOU Area.

31. The selected remedy, as embodied in the interim ROD and the ESD, provides for the extraction and treatment of contaminated groundwater from two broad areas of contamination. The northernmost of the two areas is termed subarea 1. Subarea 1 is located east of the I-605 freeway, south of the I-210 freeway,

and west of Azusa Avenue, as depicted in Attachment 1. Subarea 1 includes most of the Respondents' facilities and most of the known sources of the groundwater contamination, where contaminant concentrations in groundwater are hundreds of times drinking water standards. The southernmost subarea is termed Subarea 3, where contaminant concentrations are generally lower than in Subarea 1 but still exceed drinking water standards. Subarea 3 is downgradient of Subarea 1, and is located in the vicinity of the intersection of the I-10 and I-605 freeways, as depicted in Attachment 1. Planned extraction locations in each of the Subareas are shown in Figure 1 included in the attached Statement of Work ("SOW"). The objectives of the selected remedy are to limit the movement of contaminated groundwater into clean or less contaminated areas and depths, remove a significant mass of contamination from the groundwater, and provide the data necessary to determine, in a subsequent final Record of Decision, "in situ" cleanup standards for the BPOU Area. The remedy provides for the construction and operation of groundwater extraction wells, treatment facilities, and conveyance facilities capable of pumping and treating approximately 21,000 gallons per minute of contaminated groundwater. The remedy requires the construction of new groundwater extraction wells, treatment systems, and pipelines, but also allows the use of existing facilities where appropriate.

32. The BPOU Record of Decision expresses a preference that the treated groundwater be delivered to water purveyors, rather than discharged to the aquifer.

33. The remedy will reduce exposure to the contaminated groundwater by limiting the spread of the contamination into less contaminated and uncontaminated portions of the aquifer, by reducing contaminant concentrations in the aquifer and, most likely, by providing a supply of potable water to residents.

## III. CONCLUSIONS OF LAW AND DETERMINATIONS

34. The BPOU Area is a "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9). The BPOU Area also contains "facilities" as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

35. The substances listed in Paragraphs 3 through 18 are found at the Site and are "hazardous substances" as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), and are "solid wastes" as defined in Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

36. These hazardous substances and solid wastes have been disposed of at the Site and have migrated or threaten to migrate from the Site into the soil and groundwater.

37. Respondents are "persons" as defined in Section 101(21) of CERCLA, 42 U.S.C. § 9601(21). Respondents are "persons" as defined in Section 1004(15) of RCRA, 42 U.S.C. § 6903(15), whose past or present handling, storage, treatment, transportation or disposal of "solid wastes" as defined by Section 1004(27) of RCRA, 42 U.S.C. § 6903(27), may present an imminent and substantial endangerment to health or the environment under Section 7003 of RCRA, 42 U.S.C. § 6973.

38. Respondents are liable parties as defined in Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and are subject to this Order under Section 106(a) of CERCLA, 42 U.S.C. § 9606(a). Respondents are liable under Section 7003 of RCRA, 42 U.S.C. § 6973, because they contributed to the handling, storage, treatment, transportation or disposal of solid wastes at the BPOU Area.

39. There have been releases of hazardous substances at or from the Site as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22), including but not limited to the past disposal of hazardous substances at the Site and the migration of hazardous substances from the Site.

40. The potential for future migration of hazardous substances from the Site poses a threat of a "release" as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

41. The release or threat of release of one or more hazardous substances from a facility may present an imminent and substantial endangerment to the public health or welfare or the environment under Section 106(a) of CERCLA, 42 U.S.C. § 9606(a). The substances listed in Paragraphs 3 through 18 are solid wastes that may present an imminent and substantial endangerment to health or the environment under Section 7003 of RCRA, 42 U.S.C. § 6973.

42. The contamination and endangerment at this Site constitute an indivisible injury. The actions required by this Order are necessary to protect the public health, welfare, and the environment. Respondents are jointly and severally responsible for all of the contamination at the Site.

## IV. NOTICE TO THE STATE

43. On August 13, 1999 and June 19, 2000, prior to issuing this Order, EPA notified the State of California Department of Toxic Substances Control that EPA would be issuing this Order.

## V. ORDER

44. Based on the foregoing, Respondents are hereby ordered to comply with the following provisions, including but not limited to all attachments to this Order, all documents incorporated by reference into this Order, and all schedules and deadlines in this Order, attached to this Order, or incorporated by reference into this Order:

## VI. DEFINITIONS

45. Unless otherwise expressly provided herein, terms used in this Order which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them

in the statute or its implementing regulations. Whenever terms listed below are used in this Order or in the documents attached to this Order or incorporated by reference into this Order, the following definitions shall apply:

A. "BPOU Area" shall mean the Baldwin Park Operable Unit of the San Gabriel Valley Superfund Sites, Areas 1-4, in and near the cities of Azusa, Irwindale, Baldwin Park, and West Covina in Los Angeles County, California, and depicted generally on the map attached as Attachment 1.

B. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

C. "Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the end of the next working day.

D. "EPA" shall mean the United States Environmental Protection Agency.

E. "Explanation of Significant Differences" or "ESD" shall mean the Explanation of Significant Differences relating to the BPOU Area, issued by EPA in May 1999.

F. "DTSC" shall mean the California Department of Toxic Substances Control and any successor departments or agencies of DTSC.

G. "LARWQCB" shall mean the Los Angeles Regional Water Quality Control Board and any successor boards, departments, or agencies of LARWQCB.

H. "National Contingency Plan" or "NCP" shall mean the National Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, including any amendments thereto.

I. "Operation and Maintenance" or "O&M" shall mean all activities required under the Performance Standards Evaluation Plan and Operation and Maintenance Manual developed by Respondents pursuant to this Order and Section IV of the SOW, and approved by EPA.

J. "Paragraph" shall mean a portion of this Order identified by an arabic numeral.

K. "Performance Standards" shall mean those cleanup standards, standards of control, and other substantive requirements, criteria or limitations, identified in the SOW, that the Remedial Action and Work required by this Order must attain and maintain.

L. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

M. "Record of Decision" or "ROD" shall mean the EPA Record of Decision relating to the BPOU Area, signed on March 31, 1994, by the Regional Administrator, EPA Region 9, or her delegate, and all attachments thereto, as modified by the ESD issued in May 1999.

N. "Remedial Action" or "RA" shall mean those activities, except for Operation and Maintenance, to be undertaken by Respondents to implement the final plans and specifications submitted by Respondents pursuant to the Remedial Design / Remedial Action (RD/RA) Work Plan approved by EPA, including any

additional activities required under Sections X, XI, XII, XIII, and XIV of this Order.

O. "Remedial Design" or "RD" shall mean those activities to be undertaken by Respondents to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design/Remedial Action Work Plan.

P. "Remedial Design/Remedial Action (RD/RA) Work Plan" shall mean the work plan setting forth the Work to be performed by Respondents under this Order, as more fully described in Section IX of this Order and in the SOW.

Q. "Response Costs" shall mean all costs, including direct costs, indirect costs, and accrued interest incurred by the United States to perform or support response actions at the BPOU Area. Response costs include but are not limited to the costs of overseeing the Work, such as the costs of reviewing or developing plans, reports and other items pursuant to this Order and costs associated with verifying the Work.

R. "Statement of Work" or "SOW" shall mean the statement of work for implementation of the portions of the Remedial Design, Remedial Action, and Operation and Maintenance at the BPOU Area, that is set forth in Attachment 4 to this Order. The Statement of Work is incorporated into this Order and is an enforceable part of this Order.

S. "Section" shall mean a portion of this Order identified by a roman numeral and includes one or more paragraphs.

T. "Site" shall have the same meaning as the "BPOU Area," defined above.

U. "State" shall mean the State of California, including but not limited to the California Department of Toxic Substances,

the California Regional Water Quality Control Board, and the California Department of Health Services, Drinking Water Field Operations Branch.

V. "United States" shall mean the United States of America.

W. "Work" shall mean all activities Respondents are required to perform under this Order, including Remedial Design, Remedial Action, Operation and Maintenance, and any activities required to be undertaken pursuant to Sections VII through XXIV, and XXVII of this Order.

## VII. NOTICE OF INTENT TO COMPLY

46. Respondents shall provide, not later than four (4) days after the effective date of this Order, written notice to EPA's Project Manager stating whether they will comply with the terms of this Order. If Respondents do not unequivocally commit to perform the RD and RA as provided by this Order, they shall be deemed to have violated this Order and to have failed or refused to comply with this Order. Respondents' written notice shall describe, using facts that exist on or prior to the effective date of this Order, any "sufficient cause" defenses asserted by Respondents under Sections 106(b) and 107(c)(3) of CERCLA, 42 U.S.C. §§ 9606(b) and 9607(c)(3). The absence of a response by EPA to the notice required by this paragraph shall not be deemed to be acceptance of Respondents' assertions.

## VIII. PARTIES BOUND

47. This Order shall apply to and be binding upon each Respondent identified in Paragraphs 3 through 18, its directors, officers, employees, agents, successors, and assigns. Respondents are jointly and severally responsible for carrying out all activities required by this Order. Each Respondent shall communicate and cooperate with the other Respondents. No change in the ownership, corporate status, or other control of any

Respondent shall alter any of the Respondents' responsibilities under this Order.

48. Respondents shall make best efforts to coordinate in the performance of the Work required by this Order with any person not a Respondent to this Order who offers to perform or, in lieu of performance, to pay for, in whole or in part, the Work required by this Order. Best efforts to coordinate shall include, at a minimum:

(A) Replying in writing within a reasonable period of time to an offer to perform or pay for, in whole or in part, the Work required by this Order;

(B) Engaging in good-faith negotiations with any party not a Respondent to this Order who offers to perform or to pay for, in whole or in part, the Work required by this Order; and

(C) Good-faith consideration of a good-faith offer to perform or pay for, in whole or in part, the Work required by this Order.

49. Respondents shall provide a copy of this Order to any prospective owners or successors before a controlling interest in any Respondent's assets, property rights, or stock are transferred to the prospective owner or successor. Respondents shall provide a copy of this Order to each contractor, sub-contractor, laboratory, or consultant retained to perform any Work under this Order, within five days after the effective date of this Order or on the date such services are retained, whichever date occurs later. Respondents shall also provide a copy of this Order to each person representing Respondents with respect to the BPOU Area or the Work and shall condition all contracts and subcontracts entered into hereunder upon performance of the Work in conformity with the terms of this Order. With regard to the activities undertaken pursuant to this Order, each contractor and subcontractor shall be deemed to be related by contract to the Respondents within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

Notwithstanding the terms of any contract, Respondents are responsible for compliance with this Order and for ensuring that their contractors, subcontractors and agents comply with this Order, and perform any Work in accordance with this Order.

50. Certain Respondents have been negotiating with representatives of the Main San Gabriel Basin Watermaster and individual water companies ("Watermaster") regarding a potential Watermaster role in the implementation of the remedy. Watermaster representatives have expressed an interest in designing, constructing, and operating some or all of the remedy if Respondents and other potentially responsible parties provide appropriate funding. Although Watermaster is not a party to this Order and this Order does not specify any role for Watermaster, Respondents may make arrangements with Watermaster or other qualified parties to implement appropriate portions of the Work required under the Order. Notwithstanding the terms of any agreement between Respondents and Watermaster, however, Respondents are responsible for compliance with this Order and for ensuring that any Work performed by Watermaster is performed in accordance with this Order.

51. Not later than sixty (60) days prior to any transfer by any Respondent of any real property interest in any property included within the BPOU Area, such Respondent shall submit a true and correct copy of the transfer document(s) to EPA, and shall identify the transferee by name, principal business address and effective date of the transfer.

## IX. WORK TO BE PERFORMED

52. Respondents shall cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, Respondents shall participate in the preparation of such information for distribution to the public and in public meetings which may be held or sponsored by EPA to explain activities at or relating to the BPOU Area.

53. All aspects of the Work to be performed by Respondents pursuant to this Order shall be under the direction and supervision of a qualified project manager the selection of whom shall be subject to approval by EPA. Within 5 days after the effective date of this Order, Respondents shall notify EPA in writing of the name and qualifications of the project manager, including primary support entities and staff, proposed to be used in carrying out Work under this Order. If at any time Respondents propose to use a different project manager, Respondents shall notify EPA and shall obtain approval from EPA before the new project manager performs any Work under this Order.

54. EPA will review Respondents' selection of a project manager according to the terms of this paragraph and Section XIV of this Order. If EPA disapproves of the selection of the project manager, Respondents shall submit to EPA within 30 days after receipt of EPA's disapproval of the project manager previously selected, a list of project managers, including primary support entities and staff, that would be acceptable to Respondents. EPA will thereafter provide written notice to Respondents of the names of the project managers that are acceptable to EPA. Respondents may then select any approved project manager from that list and shall notify EPA of the name of the project manager selected within twenty-one (21) days of EPA's designation of approved project managers.

55. From approximately September 1999 to early June 2000, EPA conducted RD/RA negotiations relating to the BPOU Area with certain of the Respondents ("the Offering Parties"). These negotiations did not result in an agreement. The Offering Parties submitted a work plan for the Remedial Design and Remedial Action at the Baldwin Park Operable Unit dated February 10, 2000 ("the February 10,2000 Work Plan). This Order (and the attached SOW) supersedes the February 10, 2000 RD/RA Work Plan,

and directs Respondents to submit a new RD/RA Work Plan ("RD/RA Work Plan ") as required by the following paragraphs.

56. The Offering Parties submitted a draft Conceptual Design Report, and Addendum to the draft Conceptual Design Report, dated April 18, 2000 and May 18, 2000 respectively. EPA provided comments on these two reports on June 29, 2000. Respondents shall respond to EPA's comments and provide a revised Conceptual Design Report within twenty-eight (28) days after the effective date of the Order.

57. Within twenty-one (21) days after EPA approval of the Conceptual Design Report, Respondents shall submit a RD/RA Work Plan to EPA for review and approval. The RD/RA Work Plan shall include a step-by-step plan for completing the remedial design and remedial action for the remedy described in the attached SOW and for attaining and maintaining all requirements, including Performance Standards, identified in the SOW. The RD/RA Work Plan must describe in detail the tasks and deliverables Respondents will complete during the remedial design and remedial action phases, and a schedule for completing all tasks and deliverables. The major tasks and deliverables described in the RD/RA Work Plan shall include, but not be limited to, the following: (1) a conceptual design; (2) a preliminary design; (3) a pre-final design; (4) identification and satisfactory compliance with applicable permitting requirements; (5) a sampling and analysis plan; (6) a Construction Quality Assurance Plan (CQAP); (7) an Operation and Maintenance Manual; and (8) a Performance Standards Evaluation Plan.

58. The RD/RA Work Plan shall provide for implementing the SOW, and shall comport with EPA's "Superfund Remedial Design/Remedial Action Handbook," U.S. EPA, Office of Emergency and Remedial Response, June 15, 1995, EPA 540/R-95/059. Upon approval by EPA, the RD/RA Work Plan and future revisions or addenda to the RD/RA

Work Plan are incorporated into this Order as a requirement of this Order and shall be an enforceable part of this Order.

59. Upon approval of the RD/RA Work Plan by EPA, Respondents shall complete the remedial design and perform the remedial action by implementing the RD/RA Work Plan according to the schedule in the approved RD/RA Work Plan. Any violation of the RD/RA Work Plan shall be a violation of this Order.

60. In March 2000, the Offering Parties submitted a draft Performance Standards and Long-Term Remedy Evaluation Plan for the Baldwin Park Operable Unit dated March 31, 2000. EPA expects to provide comments on the draft plan by July 28, 2000.

61. Within thirty-five (35) days after the date of EPA comments on the draft Performance Standards and Long-Term Remedy Evaluation Plan, Respondents shall submit a revised version of the Plan, which responds to EPA's comments, to EPA for review and approval.

62. Within thirty (30) days after EPA approval of the Performance Standards and Long-Term Remedy Evaluation Plan, Respondents shall submit a Sampling and Analysis Plan and Site Health and Safety Plan for field activities. The Site Health and Safety Plan shall conform to the applicable Occupational Safety and Health Administration and EPA requirements, including but not limited to the requirements in 29 C.F.R. § 1910.120.

63. Within seventy (70) days after EPA approval of the RD/RA Conceptual Design Report, Respondents shall submit a Preliminary Design, to EPA for review and approval. The Preliminary Design submittal shall include, at a minimum, the following: (1) any changes to the Design Basis submitted as part of the Conceptual Design; (2) plans, drawings, sketches, and specifications for groundwater extraction, treatment, conveyance, and monitoring systems; (3) an updated schedule for design, construction and

operation of the Remedial Action; and (4) an updated list of substantive requirements, permits, regulatory agency approvals, MOUs, access or use agreements, easements, and properties developed or acquired to date; copies of permits, approvals, and agreements not previously supplied to EPA; and activities and schedules for obtaining outstanding items required before start of construction (e.g., for use of existing facilities or disposition of the treated water).

64. Within twenty-eight (28) days after EPA approval of the Preliminary Design, Respondents shall submit a Pre-Final Design to EPA for review and approval. The Pre-Final Design shall be a draft version of the Final Design. The Pre-Final Design submittal shall include, at a minimum, the following: (1) revised plans and specifications; (2) a draft Operation and Maintenance Manual; and (3) the Construction Quality Assurance Plan (CQAP). The CQAP shall describe the approach to quality assurance during construction activities at the BPOU Area and shall specify a quality assurance official (QA Official), independent of the construction contractor, to conduct a quality assurance program during the construction phase of the project.

65. Upon EPA approval, the Pre-Final Design submittal shall become the Final Design and be incorporated into this Order as a requirement of this Order and shall be an enforceable part of this Order.

66. Within thirty-five (35) days after EPA approval of the Preliminary Design Submittal, Respondents shall prepare and submit to EPA for review a Construction Health and Safety Plan, as required by Section IV.F.3 and Section V of the SOW.

67. If Respondents seek to retain a construction contractor to assist in the performance of the Remedial Action, then Respondents shall submit a copy of the contractor solicitation

documents to EPA not later than five (5) days after issuance of the solicitation documents.

68. Within twenty-eight (28) days after the effective date of this Order, Respondents shall notify EPA in writing of the name, title, and qualifications of any construction contractors that may be used in carrying out work under this Order. EPA shall thereafter provide written notice of the name(s) of the contractor(s) it disapproves, if any. Respondents may select any contractor not disapproved and shall notify EPA of the name of the contractor selected within 5 days of selection. If at any time Respondents propose to change the construction contractor, Respondents shall notify EPA and shall obtain approval from EPA as provided in this Paragraph, before the new construction contractor performs any work under this Order. If EPA disapproves of the selection of any contractor as the construction contractor, Respondents shall submit a list of contractors that would be acceptable to them to EPA within thirty (30) days after receipt of EPA's disapproval of the contractor previously selected.

69. The Work performed by Respondents pursuant to this Order shall, at a minimum, achieve the Performance Standards specified in Section III of the SOW, consistent with the approved Performance Standards Evaluation Plan.

70. Notwithstanding any action by EPA, Respondents remain fully responsible for achievement of the Performance Standards in the SOW. Nothing in this Order, or in the SOW, or in EPA's approval of the Remedial Design/ Remedial Action Work Plan, or approval of any other submission, shall be deemed to constitute a warranty or representation of any kind by EPA that full performance of the Remedial Design or Remedial Action will achieve the Performance Standards set forth in Section III of the SOW. Respondents' compliance with such approved documents does not foreclose EPA

from seeking additional work to achieve the applicable performance standards.

71. Respondents shall, prior to any off-site shipment of hazardous substances from the BPOU Area to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving state and to EPA's RPM of such shipment of hazardous substances. However, the notification of shipments shall not apply to any shipments when the total volume of all shipments from the BPOU Area to the state will not exceed ten (10) cubic yards.

A. The notification shall be in writing, and shall include the following information, where available: (1) the name and location of the facility to which the hazardous substances are to be shipped; (2) the type and quantity of the hazardous substances to be shipped; (3) the expected schedule for the shipment of the hazardous substances; and (4) the method of transportation. Respondents shall notify the receiving state of major changes in the shipment plan, such as a decision to ship the hazardous substances to another facility within the same state, or to a facility in another state.

B. The identity of the receiving facility and State will be determined by Respondents following the award of the contract for Remedial Action construction. Respondents shall provide all relevant information, including information under the categories noted in paragraph 71.A above, on the shipments as soon as practicable after the award of the contract and before the hazardous substances are actually shipped.

72. Within thirty (30) days after Respondents conclude that the Remedial Action has been fully performed, Respondents shall so notify EPA and shall schedule and conduct a pre-certification inspection to be attended by Respondents and EPA. The pre-certification inspection shall be followed by a written report,

submitted within thirty (30) days of the inspection by a registered professional engineer and Respondents' Project Manager, certifying that the Remedial Action has been completed in full satisfaction of the requirements of this Order. If, after completion of the pre-certification inspection and receipt and review of the written report, EPA determines that the Remedial Action or any portion thereof has not been completed in accordance with this Order, EPA shall notify Respondents in writing of the activities that must be undertaken to complete the Remedial Action and shall set forth in the notice a schedule for performance of such activities. Respondents shall perform all activities described in the notice in accordance with the specifications and schedules established therein. If EPA concludes, following the initial or any subsequent certification of completion by Respondents that the Remedial Action has been fully performed in accordance with this Order, EPA may notify Respondents that the Remedial Action has been fully performed. EPA's notification shall be based on present knowledge and Respondents' certification to EPA, and shall not limit EPA's right to perform periodic reviews pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), or to take or require any action that in the judgment of EPA is appropriate at the BPOU Area, in accordance with Sections 104, 106, or 107 of CERCLA, 42 U.S.C. §§ 9604, 9606, or 9607, or in accordance with Section 7003 of RCRA, 42 U.S.C § 6973.

73. Within thirty (30) days after Respondents conclude that all phases of the Work have been fully performed, that the Performance Standards have been attained, and that all Operation and Maintenance activities have been completed, Respondents shall submit to EPA a written report by a registered professional engineer certifying that the Work has been completed in full satisfaction of the requirements of this Order. EPA shall require such additional activities as may be necessary to complete the Work or EPA may, based upon present knowledge and Respondents' certification to EPA, issue written notification to

Respondents that the Work has been completed, as appropriate. EPA's notification shall not limit EPA's right to perform periodic reviews pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), or to take or require any action that in the judgment of EPA is appropriate at the BPOU Area, in accordance with Sections 104, 106, or 107 of CERCLA, 42 U.S.C. §§ 9604, 9606, or 9607, or in accordance with Section 7003 of RCRA, 42 U.S.C § 6973.

## X. FAILURE TO ATTAIN PERFORMANCE STANDARDS

74. In the event that EPA determines that additional response activities are necessary to meet applicable Performance Standards, EPA may notify Respondents that additional response actions are necessary.

75. Unless otherwise stated by EPA, within thirty (30) days of receipt of notice from EPA that additional response activities are necessary to meet any applicable Performance Standards, Respondents shall submit for approval by EPA a work plan for the additional response activities. The plan shall conform to the applicable requirements of Sections IX, XVI, and XVII of this Order. Upon EPA's approval of the plan pursuant to Section XIV, Respondents shall implement the plan for additional response activities in accordance with the provisions and schedule contained therein.

## XI. EPA PERIODIC REVIEW

76. Under Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations, EPA may conduct a review at the BPOU Area to assure that the Work performed pursuant to this Order adequately protects human health and the environment. Until such time as EPA certifies completion of the Work, Respondents shall conduct the requisite studies, investigations, or other response actions as determined necessary by EPA in order to permit EPA to conduct the review under Section 121(c) of CERCLA, 42 U.S.C. § 9621(c). As a result of any review performed under this

paragraph, Respondents may be required to perform additional Work or to modify Work previously performed.

## XII. ADDITIONAL RESPONSE ACTIONS

77. EPA may determine that in addition to the Work identified in this Order and attachments to this Order, additional response activities may be necessary to protect human health and the environment. If EPA determines that additional response activities are necessary, EPA may require Respondents to submit a work plan for additional response activities. EPA may also require Respondents to modify any plan, design, or other deliverable required by this Order, including any approved modifications.

78. Not later than thirty (30) days after receiving EPA's notice that additional response activities are required pursuant to this Section, Respondents shall submit a work plan for the response activities to EPA for review and approval. Upon approval by EPA, the work plan is incorporated into this Order as a requirement of this Order and shall be an enforceable part of this Order. Upon approval of the work plan by EPA, Respondents shall implement the work plan according to the standards, specifications, and schedule in the approved work plan. Respondents shall notify EPA of their intent to perform such additional response activities within seven (7) days after receipt of EPA's request for additional response activities.

## XIII. ENDANGERMENT AND EMERGENCY RESPONSE

79. In the event of any action or occurrence during the performance of the Work which causes or threatens to cause a release of a hazardous substance or which may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action to prevent, abate, or minimize the threat, and shall immediately notify EPA's Remedial Project Manager (RPM) or, if the RPM is unavailable, the RPM's Section Chief. If neither of these

persons is available, Respondents shall notify the EPA Emergency Response Section, Region 9. Respondents shall take such action in consultation with EPA's RPM and in accordance with all applicable provisions of this Order, including but not limited to the Health and Safety Plan. In the event that Respondents fail to take appropriate response action as required by this Section, and EPA takes that action instead, Respondents shall reimburse EPA for all costs of the response action not inconsistent with the NCP. Respondents shall pay the response costs in the manner described in Section XXIV of this Order, within thirty (30) days of Respondents' receipt of demand for payment and a reconciled EPA financial cost summary of the costs incurred.

80. Nothing in the preceding paragraph shall be deemed to limit any authority of the United States to take, direct, or order all appropriate action to protect human health and the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances on, at, or from the BPOU Area.

## XIV. EPA REVIEW OF SUBMISSIONS

81. All deliverables shall be submitted to EPA, LARWQCB, and DTSC concurrently. EPA will, to the extent feasible, incorporate LARWQCB's and DTSC's comments, if any, into EPA's comments on the deliverable. After review of any deliverable, plan, report or other item which is required to be submitted for review and approval pursuant to this Order, EPA may: (a) approve the submission; (b) approve the submission with modifications; (c) disapprove the submission and direct Respondents to re-submit the document after incorporating EPA's comments; or (d) disapprove the submission and assume responsibility for performing all or any part of the response action. As used in this Order, the terms "approval by EPA," "EPA approval," or a similar term means the action described in items (a) or (b) of this paragraph.

82. In the event of approval or approval with modifications by EPA, Respondents shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA.

83. Upon receipt of a notice of disapproval or a request for a modification, Respondents shall, within the time specified in the attached SOW or such longer time as specified by EPA in its notice of disapproval or request for modification, correct the deficiencies and resubmit the plan, report, or other item for approval. Notwithstanding the notice of disapproval, or approval with modifications, Respondents shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission.

84. If any submission is not approved by EPA, Respondents shall be deemed to be in violation of this Order.

## XV. PROGRESS REPORTS

85. In addition to the other deliverables set forth in this Order, Respondents shall provide monthly progress reports to EPA with respect to actions and activities undertaken pursuant to this Order. The progress reports shall be submitted on or before the 10th day of each month following the effective date of this Order. Respondents' obligation to submit progress reports continues until EPA gives Respondents written notice that the Work has been completed. At a minimum these progress reports shall: (1) describe the actions which have been taken to comply with this Order during the prior month; (2) summarize test, sampling, or operating data generated or obtained by Respondents and not previously submitted to EPA; (3) provide any preliminary calculations and supporting data used to evaluate performance; (4) describe all work planned for the next two months with schedules relating such work to the overall project schedule for RD/RA completion; and (4) describe all problems encountered (including the nature of and duration of any noncompliance) and any anticipated problems, any actual or anticipated delays, and

solutions developed and implemented to address any actual or anticipated problems or delays.

## XVI. QUALITY ASSURANCE, SAMPLING AND DATA ANALYSIS

86. Respondent shall use the quality assurance, quality control, and chain of custody procedures described in the "EPA NEIC Policies and Procedures Manual," May 1978, revised May 1986, "EPA Guidance for the Data Quality Objectives Process" (EPA QA/G-4), "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," November 1999 (EPA QA/R-5), "Guidance for Quality Assurance Project Plans" February 1998 (EPA QA/G-5), EPA Region 9 "Sampling and Analysis Plan Guidance and Template, Version 2," March 2000 (R9QA/002), and any amendments to these documents, while conducting all sample collection and analysis activities required herein by any plan. To provide quality assurance and maintain quality control, Respondents shall:

A. Use only laboratories which have a documented Quality Assurance Program that complies with EPA guidance document EPA QA/R-5 (EPA Requirements for Quality Assurance Project Plans).

B. Ensure that the laboratory used by the Respondents for analyses performs according to a method or methods deemed satisfactory to EPA, is prepared to submit all protocols to be used for analyses to EPA at least 14 days before beginning analysis (if requested), and maintains protocols according to the record preservation requirements included in Section XXI.

C. Ensure that EPA personnel and EPA's authorized representatives are allowed access to the laboratory and personnel utilized by the Respondents for analyses.

87. Respondents shall notify EPA not less than fourteen (14) days in advance of any sample collection activity. At the

request of EPA, Respondents shall allow split or duplicate samples to be taken by EPA or its authorized representatives, of any samples collected by Respondents with regard to the BPOU Area or pursuant to the implementation of this Order. In addition, EPA shall have the right to take any additional samples that EPA deems necessary.

## XVII. COMPLIANCE WITH APPLICABLE LAWS

88. All activities by Respondents pursuant to this Order shall be performed in accordance with the requirements of all Federal and state laws and regulations. EPA has determined that the activities contemplated by this Order are consistent with the National Contingency Plan (NCP).

89. Except as provided in Section 121(e) of CERCLA and the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (i.e., within the areal extent of contamination at the BPOU Area or in very close proximity to the contamination and necessary for implementation of the Work.) Where any portion of the Work requires a Federal or state permit or approval, Respondents shall submit timely applications and take all other actions necessary to obtain and to comply with all such permits or approvals. For treated water which will be put into a public water supply, all legal requirements for drinking water in existence at the time that the water is served will have to be met because EPA considers serving of the water to the public (at the tap) to be off-site.

90. This Order is not, and shall not be construed to be, a permit issued pursuant to any Federal or state statute or regulation.

91. All materials removed from the BPOU Area shall be disposed of or treated at a facility approved by EPA's RPM and in accordance with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3); with the U.S. EPA Off-Site Rule, 40 C.F.R §

300.440; and with all other applicable Federal, state, and local requirements.

## XVIII. EPA PROJECT MANAGER

92. (A) All communications, whether written or oral, from Respondents to EPA shall be directed to EPA's Project Manager. Respondents shall submit to EPA three copies of all documents, including plans, reports, and other correspondence, which are developed pursuant to this Order, and shall send these documents by overnight mail or by certified mail, return receipt requested. Respondents shall also submit one copy of each deliverable to the project managers for DTSC, LARWQCB, and any other State agencies, as specified by the EPA Project Manager. EPA's Project Manager is:

Wayne Praskins
U.S. Environmental Protection Agency
75 Hawthorne Street (SFD-7-3)
San Francisco, CA 94105
(415) 744-2256 [PRASKINS.WAYNE@EPA.GOV]

(B) DTSC's project manager is:

Jacalyn Spiszman
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630
(714) 484-5460 [JSPISZMA@DTSC.CA.GOV]

(C) LARWQCB's project manager is:

Arthur Heath
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013
(213) 576-6725 [AHEATH@RB4SWRCB.CA.GOV]

(D) One or more copies of each deliverable shall also be sent to EPA contractors, as specified by the EPA Project Manager.

93. EPA has the unreviewable right to change its Project Manager. If EPA changes its Project Manager, EPA will inform Respondents in writing of the name, address, and telephone number of the new Project Manager.

94. EPA's Project Manager shall have the authority lawfully vested in a Remedial Project Manager (RPM) and On-Scene Coordinator (OSC) by the National Contingency Plan, 40 C.F.R. Part 300. EPA's Project Manager shall have authority, consistent with the National Contingency Plan, to halt any work required by this Order, and to take any necessary response action.

## XIX. ACCESS TO SITE NOT OWNED BY RESPONDENTS

95. To the extent that access to any portion of the BPOU Area, or any other property, owned or controlled by persons other than Respondents is necessary in order to perform the Work required by this Order, Respondents will obtain, or use their best efforts to obtain, site access agreements from the present owner within 60 days of the effective date of this Order. Such agreements shall provide access for EPA, its contractors and oversight officials, the state and its contractors, and Respondents or Respondents' authorized representatives and contractors, and such agreements shall specify that Respondents are not EPA's representatives with respect to liability associated with activities at the property. Respondents shall save and hold harmless the United States and its officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action or other costs incurred by the United States including but not limited to attorneys fees and other expenses of litigation and settlement arising from or on account of acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Order, including any claims arising from any designation of Respondents as EPA's authorized representatives under Section 104(e) of CERCLA. Copies of such agreements shall

be provided to EPA prior to Respondents' initiation of field activities. Respondents' best efforts shall include the payment of reasonable sums of money in consideration of access. If access agreements are not obtained within the time referenced above, Respondents shall immediately notify EPA of their failure to obtain access. Subject to the United States' non-reviewable discretion, EPA may use its legal authorities to obtain access for the Respondents, may perform those response actions with EPA contractors at the property in question, or may terminate the Order if Respondents cannot obtain access agreements. If EPA performs those tasks or activities with contractors and does not terminate the Order, Respondents shall perform all other activities not requiring access to that property, and shall reimburse EPA, pursuant to Section XXIV of this Order, for all costs incurred in performing such activities. Respondents shall integrate the results of any such tasks undertaken by EPA into its reports and deliverables. Respondents shall reimburse EPA, pursuant to Section XXIV of this Order, for all response costs (including attorney fees) incurred by the United States to obtain access for Respondents.

## XX. SITE ACCESS AND DATA/DOCUMENT AVAILABILITY

96. Respondents shall allow EPA and its authorized representatives and contractors to enter and freely move about all property at the BPOU Area to which Respondents have access and which is subject to or affected by the work under this Order or where documents required to be prepared or maintained by this Order are located, for the following purposes: inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to the Work or Respondents and their representatives or contractors pursuant to this Order; reviewing the progress of the Respondents in carrying out the terms of this Order; conducting tests as EPA or its authorized representatives or contractors deem necessary; using a camera, sound recording device or other documentary type equipment; and verifying the data submitted to EPA by Respondents. Respondents

shall allow EPA and its authorized representatives to enter any property within the BPOU Area to which Respondents have access, to inspect and copy all records, files, photographs, documents, sampling and monitoring data, and other writings related to Work undertaken in carrying out this Order. Nothing herein shall be interpreted as limiting or affecting EPA's right of entry or inspection authority under Federal law.

97. Respondents may assert a claim of business confidentiality covering part or all of the information submitted to EPA pursuant to the terms of this Order under 40 C.F.R. § 2.203, provided such claim is not inconsistent with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7) or other provisions of law. This claim shall be asserted in the manner described by 40 C.F.R. § 2.203(b) and substantiated by Respondents at the time the claim is made. Information determined to be confidential by EPA will be given the protection specified in 40 C.F.R. Part 2. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA or the state without further notice to the Respondents. Respondents shall not assert confidentiality claims with respect to any data related to conditions, sampling, or monitoring within the BPOU Area.

98. Respondents shall maintain for the period during which this Order is in effect, an index of documents that Respondents claim contain confidential business information. The index shall contain, for each document, the date, author, addressee, and subject of the document. Upon written request from EPA, Respondents shall submit a copy of the index to EPA.

## XXI. RECORD PRESERVATION

99. Respondents shall provide to EPA upon request, copies of all documents and information within their possession and/or control or that of their contractors or agents relating to activities at or near the BPOU Area or to the implementation of this Order, including but not limited to sampling, analysis, chain of custody

records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make available to EPA for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

100. Until six (6) years after EPA provides notice that all Work required under this Order has been completed, Respondents shall preserve and retain all records and documents in their possession or control, and shall instruct their contractors and agents to preserve and retain all records and documents in their possession or control, that relate in any manner to the BPOU Area or the Work. At the conclusion of this document retention period, Respondents shall notify the United States at least ninety (90) calendar days prior to the destruction of any such records or documents, and upon request by the United States, Respondents shall deliver any such records or documents to EPA.

101. Within forty-five (45) after the effective date of this Order, Respondents shall submit a written certification to EPA's RPM that they have not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to their potential liability with regard to the BPOU Area since notification of potential liability by the United States or the State or the filing of suit against them regarding the BPOU Area. Respondents shall not dispose of any such documents without prior approval by EPA. Respondents shall, upon EPA's request and at no cost to EPA, deliver the documents or copies of the documents to EPA.

## XXII. DELAY IN PERFORMANCE

102. Any delay in performance of this Order that, in EPA's judgment, is not properly justified by Respondents under the terms of this Section shall be considered a violation of this

Order. Any delay in performance of this Order shall not affect Respondents' obligations to fully perform all obligations under the terms and conditions of this Order.

103. Respondents shall notify EPA of any delay or anticipated delay in performing any requirement of this Order. Such notification shall be made by telephone to EPA's Project Manager within forty eight (48) hours after Respondents first knew or should have known that a delay might occur. Respondents shall adopt all reasonable measures to avoid or minimize any such delay. Within five (5) business days after notifying EPA by telephone, Respondents shall provide written notification fully describing the nature of the delay, any justification for delay, any reason why Respondents should not be held strictly accountable for failing to comply with any relevant requirements of this Order, the measures planned and taken to minimize the delay, and a schedule for implementing the measures that will be taken to mitigate the effect of the delay. Increased costs or expenses associated with implementation of the activities called for in this Order is not a justification for any delay in performance.

## XXIII. ASSURANCE OF ABILITY TO COMPLETE WORK

104. Respondents shall demonstrate the ability to complete the Work required by this Order and to pay all claims that arise from the performance of the Work by obtaining and presenting to EPA within 60 days after the effective dated of the Order, one of the following: (1) a performance bond; (2) a letter of credit; (3) a guarantee by a third party; or (4) internal financial information to allow EPA to determine that one or more of the Respondents have sufficient assets available to perform the Work. Respondents shall demonstrate financial assurance in an amount no less than $200,000,000.00. If Respondents seek to demonstrate ability to complete the remedial action by means of internal financial information, or by guarantee of a third party, Respondents shall re-submit such information annually, on the

anniversary of the effective date of this Order. If EPA determines that such financial information is inadequate, Respondents shall, within thirty (30) days after receipt of EPA's notice of determination, obtain and present to EPA for approval one of the other three forms of financial assurance listed above.

105. At least seven (7) days prior to commencing any work at the BPOU Area pursuant to this Order, Respondents shall submit to EPA a certification that Respondents or their contractors and subcontractors have adequate insurance coverage or have indemnification for liabilities for injuries or damages to persons or property which may result from the activities to be conducted by or on behalf of Respondents pursuant to this Order. Respondents shall ensure that such insurance or indemnification is maintained for the duration of the Work required by this Order.

## XXIV. REIMBURSEMENT OF RESPONSE COSTS

106. Respondents shall reimburse EPA, upon written demand, for all response costs incurred by the United States in overseeing Respondents' implementation of the requirements of this Order or in performing any response action which Respondents fail to perform in compliance with this Order. EPA may submit to Respondents on a periodic basis an accounting of all response costs incurred by the United States with respect to this Order. EPA's certified Agency Financial Management System summary data (SPUR Reports), or such other summary as certified by EPA, shall serve as basis for payment demands.

107. Respondents shall, within thirty (30) days of receipt of each EPA accounting, remit a certified or cashier's check for the amount of those costs. Interest shall accrue from the later of the date that payment of a specified amount is demanded in writing or the date of the expenditure. The interest rate is the rate established by the Department of the Treasury pursuant to 31 U.S.C. § 3717 and 4 C.F.R. § 102.13.

108. Checks shall be made payable to the Hazardous Substances Superfund and shall include a reference to the Baldwin Park Operable Unit of the San Gabriel Valley Superfund Sites, the site identification number (CAD980818512), the account number (09M5), and the title of this Order. Checks shall be forwarded to:

U.S. Environmental Protection Agency - Region 9
ATTENTION: Superfund Accounting
P.O. Box 360863M
Pittsburgh, PA 15251

109. Respondents shall send copies of each transmittal letter and check to the EPA Project Manager.

## XXV. UNITED STATES NOT LIABLE

110. The United States, by issuance of this Order, assumes no liability for any injuries or damages to persons or property resulting from acts or omissions by Respondents, or their directors, officers, employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Order. Neither EPA nor the United States may be deemed to be a party to any contract entered into by Respondents or their directors, officers, employees, agents, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Order.

## XXVI. ENFORCEMENT AND RESERVATIONS

111. EPA reserves the right to bring an action against Respondents under Section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of any response costs incurred by the United States related to this Order and not reimbursed by Respondents. This reservation shall include but not be limited to past costs, direct costs, indirect costs, the costs of oversight, the costs of compiling the cost documentation to support oversight cost demand, as well as accrued interest as provided in Section 107(a) of CERCLA.

112. Notwithstanding any other provision of this Order, at any time during the response action, EPA may perform its own studies, complete the response action (or any portion of the response action) as provided in CERCLA and the NCP, and seek reimbursement from Respondents for its costs, or seek any other appropriate relief.

113. Nothing in this Order shall preclude EPA from taking any additional enforcement actions, including modification of this Order or issuance of additional Orders, and/or additional remedial or removal actions as EPA may deem necessary, or from requiring Respondents in the future to perform additional activities pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a), Section 7003 of RCRA, 42 U.S.C. § 6973, or any other applicable law. Respondents shall be liable under CERCLA Section 107(a), 42 U.S.C. § 9607(a), for the costs of any such additional actions under CERCLA.

114. Notwithstanding any provision of this Order, the United States hereby retains all of its information gathering, inspection and enforcement authorities and rights under CERCLA, RCRA and any other applicable statutes or regulations.

115. Respondents shall be subject to civil penalties under Section 106(b) of CERCLA, 42 U.S.C. § 9606(b), of not more than $27,500 for each day in which Respondents willfully violate, or fail or refuse to comply with this Order without sufficient cause. In addition, failure to properly provide response action under this Order, or any portion hereof, without sufficient cause, may result in liability under Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3), for punitive damages in an amount at least equal to, and not more than three times the amount of any costs incurred by the Fund as a result of such failure to take proper action.

116. Nothing in this Order shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person for any liability it may have arising out of or relating in any way to the BPOU Area.

117. If a court issues an order that invalidates any provision of this Order or finds that Respondents have sufficient cause not to comply with one or more provisions of this Order, Respondents shall remain bound to comply with all provisions of this Order not invalidated by the court's order.

## XXVII. ADMINISTRATIVE RECORD

118. Upon request by EPA, Respondents must submit to EPA all documents related to the selection of the response action for possible inclusion in the administrative record file.

## XXVIII. EFFECTIVE DATE AND COMPUTATION OF TIME

119. This Order shall be effective ten (10) days after the Order is signed by the Director of the Superfund Division, U.S. EPA Region 9. All times for performance of ordered activities shall be calculated from this effective date.

## XXIX. OPPORTUNITY TO CONFER

120. Respondents may, within ten (10) days after the date this Order is signed, request a conference with EPA's RPM and Assistant Regional Counsel to discuss this Order. If requested, the conference shall occur at EPA's regional offices at a date and time to be determined by EPA.

121. The purpose and scope of the conference shall be limited to issues involving the implementation of the response actions required by this Order and the extent to which Respondents intend to comply with this Order. This conference is not an evidentiary hearing, and does not constitute a proceeding to challenge this Order. It does not give Respondents a right to seek review of this Order, or to seek resolution of potential liability, and no

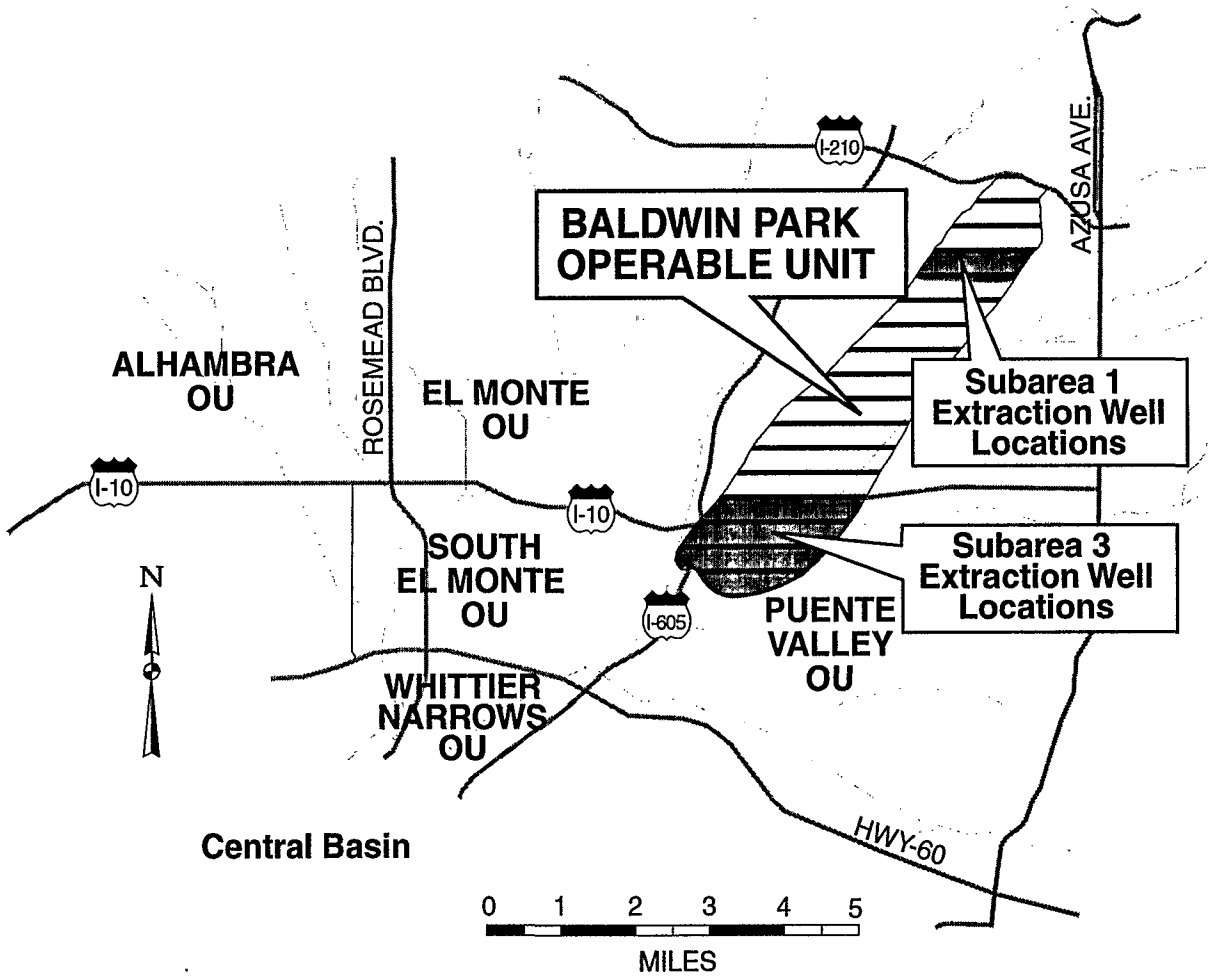
official stenographic record of the conference will be made. At any conference held pursuant to Respondents' request, Respondents may appear in person or by an attorney or other representative.

122. Requests for a conference must be by telephone followed by written confirmation mailed that day to Wayne Praskins, (415) 744-2256, U.S. EPA Region 9, 75 Hawthorne Street (SFD-7-3), San Francisco, CA 94105.

So Ordered, this 30th day of June, 2000.

BY: Keith Takata

Keith Takata
Director, Superfund Division
U.S. Environmental Protection Agency, Region 9




**Attachment 1: Location map of the Baldwin Park Operable Unit**

76150

76150

Attachment 2

# RECORD OF DECISION

## BALDWIN PARK OPERABLE UNIT
## SAN GABRIEL VALLEY SUPERFUND SITES
## LOS ANGELES COUNTY, CALIFORNIA

**United States Environmental Protection Agency**
**Region 9 - San Francisco, California**

# BALDWIN PARK RECORD OF DECISION
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# PART I. DECLARATION

## SITE NAME AND LOCATION

Baldwin Park Operable Unit
San Gabriel Valley Area 2 Superfund Site
Los Angeles County, California

## STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Baldwin Park Operable Unit (OU), San Gabriel Valley Superfund Sites, chosen in accordance with CERCLA as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this operable unit.

In a letter from Margaret Felts, Deputy Director, Site Mitigation Program, Department of Toxic Substances Control, the State of California concurred with EPA's selected remedy.

## ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

## DESCRIPTION OF THE REMEDY

The Baldwin Park Operable Unit addresses a large area of groundwater contamination in the San Gabriel Valley. Volatile organic compounds (VOCs) are present in the groundwater throughout a several mile long area, extending beneath the cities of Azusa, Irwindale, and Baldwin Park. Six other operable units address contamination in other portions of the San Gabriel Basin (see Figure ROD-4).

The remedy will limit further migration of contaminated groundwater to areas and depths that would benefit most from additional protection, remove a significant mass of contamination from the aquifer, and collect data necessary to determine final clean up standards for the Baldwin Park area. The Baldwin Park Operable Unit is classified as an interim action.

The selected remedy includes extraction of contaminated groundwater at the downgradient end of two broad subareas of contamination. The first of the two subareas is the *lower area*, where concentrations of trichloroethene (TCE), tetrachloroethene

(PCE), carbon tetrachloride (CTC), or other contaminants are five to 10 times Federal or State drinking water standards, and where downgradient portions of the aquifer are significantly less contaminated. The second area is the *upper area*, where concentrations of PCE or TCE exceed 200 times drinking water standards, indicating the presence of *non-aqueous phase contamination* or other surface or subsurface sources of TCE, PCE, CTC, or other contaminants that are acting as continuing sources of dissolved-phase groundwater contamination.

The remedy includes extraction of contaminated groundwater at locations and rates sufficient to *capture* contaminated groundwater moving from the upper and lower areas of contamination during all anticipated recharge conditions. EPA's analyses indicate that its remedial objectives will be efficiently met by extracting approximately 19,000 gallons per minute of contaminated groundwater as continuously as feasible. The final decision on precise extraction rates and locations will be made during remedial design. One or more existing groundwater extraction wells may be used in the remedy.

The remedy includes treatment facilities needed to remove TCE, PCE, CTC, and other contaminants from the extracted groundwater by either or both of two proven treatment technologies: *liquid-phase granular activated carbon* filtration and *air stripping* (with offgas controls). Treatment technologies will be determined during remedial design after additional groundwater quality data are obtained. One or more existing treatment facilities may be incorporated into the remedy.

The remedy includes pipelines, pump stations, and other conveyance facilities needed to deliver the treated groundwater to one or more uses or users. EPA's preference is that treated water be supplied to one or more water purveyors, possibly including Metropolitan Water District of Southern California, for distribution to their residential and business customers. The final decision will be made after completion of the ROD depending on the outcome of additional negotiations with potential recipients of the treated water to identify recipients that can be supplied at least cost with the fewest institutional obstacles.

If water purveyors can accept water for most, but not all, of the year, excess water may be piped to spreading basins and flood control channels operated by the Los Angeles County Department of Public Works for recharge into the aquifer. If agreements cannot be reached with water purveyors, water may be recharged year-round. If necessary, recharge location(s) will be determined during remedial design.

The remedy includes the installation and sampling of groundwater monitoring wells, the sampling of existing monitoring wells, measurement of groundwater elevations at monitoring and production wells, and the measurement of other aquifer properties to verify or refine plume boundaries, predict treatment facility influent concentrations, and evaluate the effectiveness of the remedy.

EPA will review this action every five years throughout the interim remedy period.

EPA is the lead agency for this project and the Department of Toxic Substances Control of the State of California Environmental Protection Agency is the support agency.

**DECLARATION**

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action and is cost effective. This action utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this interim action. The statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed at the time of the final response action. Subsequent actions are planned to fully address the principal threats at the site.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, at least once every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

3/31/94

Felicia Marcus
Regional Administrator

# PART II. DECISION SUMMARY

This Decision Summary summarizes site-specific information and analyses relevant to the selection of an interim remedy for the Baldwin Park Operable Unit of the San Gabriel Valley Area 2 Superfund Site. The Decision Summary includes a description of the nature and extent of contamination, a comparative analysis of *remedial alternatives* (i.e., clean up options), a description of the selected remedial alternative, and the rationale for the selected remedy. The Decision Summary presents some of the same information included in the Declaration (Part I), but in significantly greater detail.

## 1. SITE LOCATION AND DESCRIPTION

Section 1.1 briefly describes the location and physical characteristics of the San Gabriel Valley, including its topography, geology, hydrology, land use, and water management practices. Section 1.2 describes the Baldwin Park area in more detail.

### 1.1 The San Gabriel Valley: Location, Physical Characteristics, and Water Management Practices

#### 1.1.1 Location and Topography

The San Gabriel Valley is a suburban, largely developed portion of Los Angeles County covering more than 170 square miles (see Figure ROD-1). More than one million residents live in the Valley, alongside a variety of commercial and industrial operations.

The San Gabriel Mountains are a major geologic feature of the region. They form the northern boundary of the San Gabriel Valley, rising up to 10,000 feet in elevation. The Valley surface is a broad piedmont plain, which slopes from the San Gabriel Mountains southward towards a gap in the southern hills known as the Whittier Narrows. The average slope of the valley floor is about 65 feet per mile. Figure ROD-2 shows major features of the area.

#### 1.1.2 Surface Water, Groundwater, and Water Management

Major surface water features in the San Gabriel Valley include the San Gabriel River, tributaries to the San Gabriel River, and *spreading basins* located to the river channels. The San Gabriel River system drains a portion of the San Gabriel Mountains. Surface flow in much of the San Gabriel River is

intermittent; the river channel is often dry, except during significant storm events and spring runoff.

Tributaries to the San Gabriel River present in the Baldwin Park area include Big Dalton Wash, Little Dalton Wash, and Walnut Creek. Much of the length of these tributaries has been lined with concrete. As in the San Gabriel River, flow in the tributaries is intermittent, limited to storm events or when the channels are being used to transport water to recharge facilities.

Los Angeles County operates two *spreading basins* in the Baldwin Park area to increase recharge of the aquifer. Groundwater producers in the San Gabriel Valley typically extract more water than is "naturally" replenished; the overdraft is replaced by "artificially" recharging water in the spreading basins. The recharged water originates as local storm runoff or is imported surface water transported from Northern California and the Colorado River. The two spreading basins are the large Santa Fe Spreading Grounds, located in the northern part of the Baldwin Park area along the San Gabriel River, and the smaller Irwindale Spreading Grounds (ISG), located in the eastern portion of the Baldwin Park area adjacent to Big Dalton Wash.

### 1.1.3 Water Rights and Water Management Institutions

The San Gabriel Basin aquifer underlies most of the San Gabriel Valley. It stores an estimated three trillion gallons of water and is the primary source of water for most of the Basin's one million residents. In the last 20 years, annual groundwater extraction (pumping) in the Basin has ranged from approximately 59 to 78 billion gallons per year. A typical household uses 150 to 250 gallons per day.

Water resource management in the San Gabriel Basin is governed by two court decisions resulting from intra- and inter-basin conflicts over the use of water.

The first lawsuit, settled in 1964 as the Long Beach Judgment, requires that the water users in the San Gabriel Basin deliver an average of 98,415 acre-feet/year of usable water to the downstream Central Basin. (One acre-foot equals 325,829 gallons.) The San Gabriel River Watermaster administers the interbasin agreement.

The second lawsuit, settled in 1973 as the Alhambra Judgment, allocates water rights within the San Gabriel Basin. The Main San Gabriel Basin Watermaster was established to administer the Alhambra Judgment. This Judgment includes a monetary *assessment* on those water purveyors pumping more than

their annual share of the *Operating Safe Yield*, as set by the Watermaster. Assessment fees are used to buy imported water for basin replenishment.

Agencies which use or manage water in the Basin currently includes 3 watermasters, 3 municipal water districts, the Metropolitan Water District, the San Gabriel Basin Water Quality Authority, 45 water purveyors, and 105 individual water-rights holders. The role of the municipal districts is mainly to provide supplemental water supplies from Metropolitan Water District of Southern California (Metropolitan) or the State Water Project (SWP). The water purveyors vary in size and type and include investor-owned utilities, special districts, city water departments, and small mutual water companies.

Water purveyors in the Baldwin Park area include the: City of Azusa, California Domestic Water Company, City of Glendora, La Puente Valley County Water District, San Gabriel Valley Water Company (SGVWC), Suburban Water Systems (Suburban), Valley County Water District (VCWD), and others.

Purveyors in the basin have, for the most part, acted independently in deciding where, when, or in what quantities they pump groundwater. In 1991, due in large part to EPA and State efforts, the Watermaster adopted rules to regulate water supply actions that may affect the movement of contaminated groundwater in the San Gabriel Basin. There is not yet a consensus on the adequacy of Watermaster's efforts to regulate water supply actions in the Basin.

### 1.2 The Baldwin Park Area

The Baldwin Park Operable Unit (OU) addresses groundwater contamination in and near the cities of Azusa, Irwindale, and Baldwin Park, in the area EPA has designated as Remedial Investigation (RI) Area 5 (Figure ROD-2). The approximate location of this multiple square-mile area, referred to as the "OU area" or "Baldwin Park area," is west of Azusa Avenue (Highway 39), south of the San Gabriel Mountains, east of the San Gabriel River, and north of Walnut Creek.

Nearly all of the Baldwin Park area is fully developed for residential, commercial, and industrial use. The largest parcels of open land are active and inactive gravel pits and the Santa Fe Flood Control Basin.

The Sierra Madre Fault system passes through the northern portion of the Baldwin Park area, generally east/west, near the base of the San Gabriel Mountains. The system presents a low-permeability barrier that limits groundwater movement southward

from the San Gabriel Mountains. In the OU area, groundwater levels north of the fault system are substantially higher than those to the south.

The surficial geology of the Baldwin Park area is composed of alluvial materials deposited by the San Gabriel River and its tributaries. Braided stream deposits occur along River channels; outcrops of stream channel deposits also occur along River channels and major tributaries. Floodplain deposits and undifferentiated alluvium cover the area between the stream channels. The underlying sediments are derived from the dominantly crystalline San Gabriel Mountains and are typically coarse-grained (e.g., sand, gravel, and boulders). These sediments are unconsolidated to partially consolidated non-marine sediments of Recent and Pleistocene Age. They were deposited by fluvial and geomorphic processes associated with the San Gabriel River and its tributaries. Marine sediments, probably of Pleistocene and Pliocene Age, underlie some of the non-marine sediments and are included within the groundwater system.

The northern and central portions of the Baldwin Park area consist almost entirely of massive gravel deposits. Lithologic evaluations of well logs indicate gravel deposits greater than 500 feet in thickness in the northern portions of the Baldwin Park area, mixed with 10- to 30-foot-thick layers of clay and gravelly clay further south. The thickness of alluvial sediments is believed to range from a few hundred feet in the north to over 2,000 feet in the south.

Hydraulic conductivity estimates in the Baldwin Park area are some of the highest in the basin. Aquifer test results from seven locations yield hydraulic conductivity estimates between about 270 and 5,000 ft/day. The highest estimates are for the northern and central portion of the basin; lower values are observed toward the southwestern and southeastern margins. These high hydraulic conductivity estimates indicate that very large extraction volumes are required to create significant changes in the flow of groundwater. Estimates of specific yield are 0.1 to 0.2, reflecting the coarse-grained materials in the area.

Figure ROD-3 reprints a map prepared by the Los Angeles County Department of Public Works (LACDPW) illustrating water levels during fall 1990. The figure shows water level contours drawn using data from 150 to 200 wells. (Groundwater flows in a direction perpendicular to groundwater level contours.) The figure provides a snapshot of regional flow, but does not show local-scale variations in groundwater flow caused by pumping, recharge, or geologic faults.

Figure ROD-3 indicates that groundwater flow in the OU area is generally towards the Whittier Narrows to the southwest. The direction of flow can vary significantly from Figure ROD-3 (by more than ninety degrees), however, particularly in the vicinity of the Santa Fe Spreading Grounds during periods of significant recharge.

An estimate of the average horizontal gradient in the Baldwin Park area in the fall 1990 is approximately 0.002 foot per foot (ft/ft), which is among the lowest in the basin (estimate derived from Figure ROD-3). Deviations from this regional estimate are expected to be greatest in the vicinity of pumping wells, recharge areas, and faults. Vertical gradients are not well known. At one location in the middle of the Baldwin Park area where data are available on vertical gradients across 1300' of the aquifer, gradients are low (< 0.004 ft/ft in September 1991). Vertical gradients may be locally higher, however, near pumping wells, geologic faults, and zones of recharge, such as spreading basins.

The elevation of the water table in the Baldwin Park area can vary significantly year to year, decreasing during dry years and rapidly increasing during periods of above-average rainfall. In the period 1982-1992, the groundwater level at the "Baldwin Park Key Well" (identified in the Alhambra Judgment) began 1982 at approximately 240', declined during subsequent drought years to just under 200' in 1991, then rebounded to over 250' after the two relatively wet years of 1991/92 and 1992/93. This variability in water levels influences the movement of contaminants and complicates the installation of shallow monitoring wells (e.g., requiring relatively long-screened intervals).

## 2. SITE HISTORY: Origins, Discovery, and Local Response to the Groundwater Contamination

### 2.1 Origins and Discovery of the Contamination

Volatile Organic Compounds (VOCs), the contaminants responsible for placement of portions of the San Gabriel Basin on the National Priorities List (NPL), were apparently used in large quantities at industrial facilities as early as the 1940s. Throughout the 1940s, 50s, 60s, 70s, and 80s, carbon tetrachloride (CTC), tetrachloroethene (PCE), trichloroethene (TCE) and other VOCs were used by hundreds of businesses in the OU area for degreasing, as raw materials for automotive products, by a solvent recycler, for chemical extractions, and for other purposes. VOCs have probably been released to the ground by a

combination of intentional disposal, careless handling during loading and unloading, leaking tanks and piping, and other means.

The significant depth to water in most of the OU area (100 to 400' below ground surface) provides some sorptive capacity for VOCs released to the soil. More importantly, however, the absence of extensive fine-grained layers (e.g., clay or silt layers) in the OU area increases the likelihood that contaminants released to the subsurface will reach groundwater. Fine-grained materials inhibit the downward movement of contaminants due to their lower permeability and higher sorptive capacity.

VOCs may have reached the groundwater as early as the 1940s or 1950s, but were not detected in groundwater until 1979 during environmental monitoring activities conducted by Aerojet Electrosystems near its facility in Azusa. In May 1984, four areas of contamination were listed as San Gabriel Valley Areas 1-4 on EPA's National Priorities List based on water quality information available at the time of listing. Subsequent investigation by EPA and others revealed widespread VOC contamination. During the past 12 years, more than two-thirds of the 366 *water supply wells* (also known as *production wells*) for which VOC data are available have shown detectable concentrations of VOCs; about one-quarter of the 366 wells have shown concentrations exceeding drinking water standards.

### 2.2 Remedial Investigation

EPA's Remedial Investigation of the San Gabriel Basin began in 1985 with a basinwide groundwater sampling program known as the Supplemental Sampling Program. In subsequent years, EPA completed additional field sampling efforts, which have included sampling of inactive water supply wells, depth-specific sampling of water supply wells, and monitoring well installation and sampling. The results of EPA's sampling efforts are summarized in numerous EPA documents:

*Draft Technical Memorandum, Well Logging and Depth-Specific Sampling, San Gabriel Area 5 Remedial Investigation...* May 22, 1990.

*Technical Memorandum, Sampling of Existing Wells, San Gabriel Area 5 Remedial Investigation.* June 25, 1991.

*Technical Memorandum, Well Logging and Depth-Specific Sampling, San Gabriel Area 5 Remedial Investigation.* December 2, 1991.

*Interim Report of Remedial Investigations, San Gabriel Basin...* July 1992. (This report summarizes sampling activities up through 1989.)

*Technical Memorandum, Sampling of Existing Wells--Second Round, San Gabriel Area 5 Remedial Investigation.* July 1992.

*Technical Memorandum, Area 5 Monitoring Well Installation and Sampling, San Gabriel Area 5 Remedial Investigation...* October 26, 1992.

EPA's Remedial Investigation has included the compilation and analysis of data collected by individual water purveyors, business and property owners, and the Main San Gabriel Basin Watermaster. Individual water purveyors regularly sample more than 50 water supply wells in the Baldwin Park area in accordance with Federal and State drinking water requirements. Individual businesses and property owners have installed and sampled more than 25 groundwater monitoring wells in *facility-specific* investigations in the Baldwin Park area, most of which are overseen by the California Regional Water Quality Control Board (Regional Board). EPA works cooperatively with the Regional Board to set investigation priorities and provide assistance at individual sites as needed. The Main San Gabriel Basin Watermaster has also sampled several inactive water supply wells in the Baldwin Park area.

EPA has summarized and analyzed the results of the Remedial Investigation, making use of data collected by EPA and others, in the *Baldwin Park Operable Unit Feasibility Study Report*, dated April 2, 1993.

### 2.3 Local Response to the Contamination

EPA has not implemented any remedial actions in the Baldwin Park area, but water purveyors and local agencies have implemented or plan to implement projects that contribute or will contribute to EPA's remedial objectives.

As the contaminated groundwater has spread and existing water supply wells have become contaminated, water purveyors have installed treatment facilities and responded in a variety of other ways to satisfy their obligations to supply water meeting State and Federal drinking water standards. Some purveyors have shut down wells. In other cases they have been able to continue to operate contaminated wells by pumping wells intermittently, at reduced rates, or by blending contaminated water with better quality water from other wells. In other cases, they have drilled wells deeper or installed new wells in search of cleaner

water, acquired water from other San Gabriel Basin water purveyors, or purchased imported water. More recently, as other options become less feasible and more costly, purveyors have installed wellhead treatment systems.

In the OU area, purveyors have made use of all of these options to respond to the contamination. The Valley County Water District (VCWD) has shut down four wells and installed wellhead treatment facilities at three others; the San Gabriel Valley Water Company (SGVWC) has shut down wells, deepened existing wells, drilled new deep wells, used blending, and installed wellhead treatment; Suburban Water Systems has blended and installed new deeper wells; and the City of Glendora has purchased additional imported water. Although more than 12 existing water supply wells have become contaminated in the area, the Baldwin Park area continues to serve as a significant source of drinking water. Periodic monitoring ensures that drinking water supplied to consumers meets EPA and State drinking water standards.

Three water purveyors (VCWD, SGVWC, and La Puente Valley County Water District) have funded treatment projects in the Baldwin Park area. The State Water Resources Control Board and the California Department of Toxic Substances Control have contributed funding for two other treatment facilities. State funding has been provided to the San Gabriel Basin Water Quality Authority, which has overseen the construction of a second Valley County Water District treatment facility (at the Arrow Highway well) and, as of March 1994, is preparing to begin construction of another treatment project at the Big Dalton well. If constructed and operated as planned, the project at the Big Dalton well site may partially satisfy EPA's remedial objectives in the Baldwin Park area. The Authority's planned project would result in the extraction and treatment of 2,000 to 3,000 gallons per minute (gpm) of contaminated groundwater, a small but significant portion of the approximately 19,000 gpm of extraction that EPA's studies indicate may be needed.

Water purveyors' response to the contamination has been driven by their need to supply safe drinking water to their customers. Initially, some purveyor actions (e.g., relocating wells from contaminated to clean areas) may have marginally contributed to the spread of contamination in the aquifer, but more recent actions (e.g., the installation of treatment) contribute to the cleanup. Still, EPA does not believe that actions by water purveyors provide an adequate, cumulative response to the contamination. The limitations of installing treatment only at existing water supply wells after the contamination has spread (occasionally termed *wellhead treatment*)

are described further in Section 7 of this document (*Summary of Site Risks*).

## 3. ENFORCEMENT ACTIVITIES

EPA began its enforcement efforts in the Baldwin Park area in approximately 1985 with searches for and evaluations of historical Federal, State, and local records on chemical usage, handling, and disposal.

In 1985, the California Regional Water Quality Control Board (Regional Board) began its Well Investigation Program (WIP) to identify the sources of groundwater contamination detected in water supply wells. In 1989, EPA entered into a cooperative agreement with the Regional Board to expand the WIP program, in order to assist EPA in determining the nature and extent of the sources of the groundwater contamination in the Baldwin Park area and other portions of the San Gabriel Valley, and to identify responsible parties. The cooperative agreement has been renewed annually. Regional Board staff directly oversee *facility-specific* investigations in the Baldwin Park area; EPA's role has been to help fund the Regional Board, help set priorities, and, as needed, to intervene in individual investigations to obtain information, evaluate claims of inability to pay, and threaten or use Federal enforcement authority to ensure that necessary investigation work is promptly completed.

As of October 1993, the Regional Board has, in the Baldwin Park area, sent chemical use questionnaires to more than 1,600 facilities; inspected more than 600 of these facilities; directed more than 70 facilities to investigate potential soil or soil gas contamination; and directed approximately 17 facilities to investigate groundwater contamination. EPA has used its authority to request information (CERCLA section 104(e)) to supplement the Regional Board's efforts by sending information requests and evaluating responses from more than 150 current and historical property owners and businesses.

Concurrent with source identification efforts, EPA carried out a *fund-lead* Remedial Investigation and Feasibility Study (RI/FS) (i.e., using funding from the Superfund trust fund), rather than through enforcement action. In the RI/FS, EPA supplemented data generated during *facility-specific* investigations with *regional* information on the nature and extent of contamination.

A subset of the 70+ facilities investigating contamination in the Baldwin Park area are believed to be contributors to the groundwater contamination. EPA has sent General Notice of

Liability for the Baldwin Park Operable Unit to approximately 110 owners and/or operators, representing 20 to 25 contaminated parcels. Most of the General Notice letters were sent in three mailings: in May 1990, September 1990, and August 1993.

EPA anticipates issuing special notice for the Baldwin Park Operable Unit in 1994 to a subset of recipients of General Notice. EPA has begun discussions with individual Potentially Responsible Parties (PRPs) and the San Gabriel Basin Industry Coalition (representing multiple PRPs) in an effort to speed the start of clean up work in the Baldwin Park area. To date, however, no Administrative Orders on Consent or Consent Decrees have been attempted or reached, and no Unilateral Administrative Orders (UAOs) have been issued, to or with PRPs in the Baldwin Park area. One Baldwin Park area PRP, the Aerojet Gencorp, agreed in 1990 to pay $554,678.59 associated with investigating Aerojet's Azusa, California facility in partial settlement of EPA past costs.

Enforcement efforts in other parts of the San Gabriel Valley Superfund Sites include a Consent Order reached in September 1993 with 42 PRPs for the Puente Valley Operable Unit (see Figure ROD-4). In addition, as of March 1994, four parties in the Puente Valley and El Monte Operable Units of the San Gabriel Valley have been issued UAOs for Remedial Investigation. Work required by one of the UAOs is complete; work required by two of the UAOs is in progress; and work required by the fourth UAO is expected to begin soon.

## 4. HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for the Baldwin Park Operable Unit, in the form of a fact sheet, was distributed in May 1993 to more than 2,000 parties on EPA's mailing list for the San Gabriel Valley Superfund Sites. Additional copies of the Proposed Plan were distributed to water purveyors and to Baldwin Park area businesses known to have subsurface contamination. The Proposed Plan, together with the Baldwin Park Operable Unit Feasibility Study, were also made available in the San Gabriel Valley at the West Covina Public Library, the office of the Upper San Gabriel Valley Municipal Water District in El Monte, and the office of the San Gabriel Valley Municipal Water District in Azusa, California. The entire Administrative Record File, containing these two documents and other documents considered or relied upon in developing the Proposed Plan, is available at the West Covina Public Library and at EPA's Regional Office in San Francisco.

Notice of a public meeting, availability of the Proposed Plan and Feasibility Study, and the announcement of a 30 day

public comment period were published in the San Gabriel Valley Tribune newspaper on May 7, 1993. EPA also issued a press release announcing the Proposed Plan on May 7, 1993. In addition, the Los Angeles Times and San Gabriel Valley Tribune newspapers published articles about the remedial investigation, feasibility study, and Proposed Plan.

A public meeting was held on May 20, 1993 in the Baldwin Park City Council Chambers to discuss EPA's clean up plans. At this meeting, EPA representatives made a brief presentation of the Proposed Plan, answered questions, and solicited comments from members of the public. A response to comments received during the public meeting is included in the Baldwin Park OU Responsiveness Summary, which is included as Part III of this Record of Decision (ROD).

EPA extended the public comment period twice in response to requests for extensions from members of the public. A public notice printed in the San Gabriel Valley Tribune on June 12, 1993 extended the original 30 day public comment period to 60 days. Another notice printed in the San Gabriel Valley Tribune on July 15, 1993 extended the public comment period to 91 days. The public comment period closed on August 12, 1993. EPA received more than 400 written comments from 26 individuals or entities, as well as a three hour videotape. These comments and EPA's responses to these comments are summarized in Part III of this ROD.

Other community relations activities have included extensive consultation with local water purveyors, State and local agencies, and local groups and individuals potentially affected by EPA's planned action in the Baldwin Park area, including participation at numerous public meetings attended by representatives of more than a dozen state and local agencies and members of the public. These public meetings have typically been held bimonthly or quarterly, from 1990 through late 1993. EPA representatives have also made presentations to interested groups, including the San Gabriel Basin Water Quality Authority Public Advisory Group and the Superfund Working Information Group (SWIG). In addition to the Baldwin Park Proposed Plan fact sheet, EPA has issued fourteen fact sheets between 1986 and 1993 describing investigation and clean up activities throughout the San Gabriel Valley.

This decision document presents the selected remedial action for the Baldwin Park Operable Unit in Los Angeles County, California, chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the Administrative Record.

## 5. SCOPE AND ROLE OF THE OPERABLE UNIT

There are four areas of groundwater contamination in the San Gabriel Basin listed on the National Priorities List (NPL). They are San Gabriel Valley Area 1, San Gabriel Valley Area 2, San Gabriel Valley Area 3, and San Gabriel Valley Area 4.

The Baldwin Park Operable Unit is one of seven operable units initiated by EPA to date (see Figure ROD-4). The OU addresses groundwater contamination extending across the cities of Azusa, Irwindale, and Baldwin Park, corresponding to the San Gabriel Valley Area 2 NPL site. Other OUs address groundwater contamination in one or more of the other three NPL areas of the Basin.

The available data indicate the presence of groundwater contamination in the Baldwin Park area far in excess of drinking water standards (demonstrating a need for action) and are sufficient to determine the approximate size and locations of the needed action (allowing specification of the remedy). EPA believes that the available data are sufficient to select a remedy that will meet EPA's remedial objectives, described in Section Eight of this ROD. EPA is confident that the OU represents a significant step toward complete clean up of the area and will not be inconsistent with, or preclude implementation of, a final remedy. EPA has not yet selected a final remedy for the San Gabriel Valley Superfund sites, but the final remedy is expected to include, at a minimum, limiting contaminant migration in and/or from the Baldwin Park area, the Puente Valley, and other highly contaminated areas of the basin.

The Baldwin Park OU is classified as an interim action to reflect the possibility that additional projects in the Baldwin Park area may be needed. EPA will use information collected during operation of the selected remedy to help determine the need for additional actions and the nature of the final remedy. Among the critical decisions to be made are: the need for and extent of cleanup of soil contamination in the *vadose zone* (i.e., above the water table); how to address lower levels of groundwater contamination which may remain after the remedy is implemented; and the feasibility of complete restoration of all or portions of the site.

EPA has initiated six other operable units in the San Gabriel Valley in addition to the Baldwin Park OU. Three of the six projects, the Richwood, Whittier Narrows, and Suburban Water Systems Bartolo Wellfield Operable Units, resulted in the construction of a carbon adsorption treatment facility for the Richwood Mutual Water Company and installation of monitoring wells in the Whittier Narrows/Suburban Water Systems area. The

other projects are in the planning or investigation stages. They are the Puente Valley Operable Unit (addressing groundwater contamination in the cities of Industry and La Puente), the El Monte Operable Unit, and the South El Monte Operable Unit.

Record of Decision (ROD) documents were signed for the Richwood and Suburban Water Systems Operable Units in 1984, 1987, 1988, and 1993. The ROD for the Whittier Narrows Operable Unit was signed in March 1993. The Whittier Narrows OU ROD and the Suburban Water Systems OU *Amended ROD* both conclude that treatment facilities are not now needed, but call for continued monitoring.

As of February, 1994, ROD documents have not been signed for the Puente Valley, El Monte, or South El Monte areas. In September 1993, EPA reached an agreement with Puente Valley area PRPs to complete a detailed investigation and evaluation of cleanup options for groundwater contamination in the Puente Valley. EPA is currently evaluating existing water quality data in the El Monte and South El Monte areas to determine the need for additional remedial investigation in these areas

## 6. SUMMARY OF BALDWIN PARK OPERABLE UNIT CHARACTERISTICS

Figure ROD-5 presents a simplified, *smoothed* picture of the extent of groundwater contamination in 1993 in the OU area and in other areas of the San Gabriel Basin. The most prevalent contaminants in the Baldwin Park area are the solvents TCE, PCE, and CTC.

TCE, PCE, or CTC have been detected in more than one dozen water supply wells in the Baldwin Park area at concentrations exceeding Federal and State drinking water standards. The contaminated wells are scattered across a five to 10 square mile area. EPA and the State have set safe levels for TCE and PCE in drinking water at 5 parts per billion (ppb); the State standard for CTC is 0.5 ppb. Other VOCs detected above State and/or Federal standards in the Baldwin Park area include: 1,2-dichloroethane (1,2-DCA); 1,1-dichloroethene (1,1-DCE); 1,1-dichloroethane (1,1-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1,1,1-trichloroethane (1,1,1-TCA), and chloroform. Table ROD-1 presents a list of VOCs detected in soil, soil gas, or groundwater in the Baldwin Park area. VOCs include contaminants detectable with EPA analytical methods 502.1, 503.1, 524.1, or 524.2. In addition, nitrate, an inorganic contaminant, has been detected at significant concentrations in groundwater at or near the proposed extraction areas, approaching the drinking water standard of 45 milligrams per liter (mg/l). Nitrate concentrations upgradient of proposed

extraction areas are significantly higher, exceeding 45 mg/l over a large area and exceeding 90 mg/l northeast of the Baldwin Park area.

Figures ROD-6, ROD-7, and ROD-8 illustrate the lateral extent of groundwater contamination for TCE, CTC, and nitrate. Assumptions and simplifications made in preparing Figures ROD-6 and ROD-7 include: the figures aggregate data over a 15 month period; they aggregate data collected from over 100 wells that vary in the number and depth of perforated intervals; contaminant contours included in the figures are interpreted in areas where no wells are present; and the figures do not delineate individual plumes that may be present within the areas of contamination shown in the figure. Figure ROD-8 aggregates nitrate data over a 3 year period (nitrate has been sampled less frequently than VOCs).

Figure ROD-9 presents one of several possible interpretations of the vertical extent of TCE contamination, based on depth-specific sampling data.

The groundwater contamination appears to be the result of multiple sources, located mostly in the city of Azusa. Also see Section 11.2.

## 7. SUMMARY OF SITE RISKS

As part of its evaluation of the need for action, EPA has completed a preliminary assessment of the risks that could result if no action is taken to address the groundwater contamination in the Baldwin Park area (the *baseline risk assessment*). Interim remedial actions do not require a completed baseline risk assessment, although enough information must be available to demonstrate that action is necessary to stabilize the site, prevent further degradation, or achieve significant risk reduction quickly (Preamble to the NCP Final Rule, 55 Federal Register 8704).

The preliminary risk assessment estimates potential, not actual, risk. The risk estimates are based on the unlikely assumption that Federal and State drinking water standards are <u>not</u> enforced, in which case residents of the Baldwin Park area could be served contaminated groundwater extracted from within or near the OU area of contamination without treatment. This is only an assumption; groundwater served to consumers is currently believed to satisfy all enforceable drinking water standards.

The risk assessment estimates human health and environmental risks that could result from exposure to contaminated ground-

water. Vadose zone remediation is not a goal of the interim action, therefore, exposure to contaminated soil or soil gas are not addressed in this preliminary risk assessment.

The risk assessment includes four steps:

**7.1 Identification of Chemicals of Potential Concern (COPC):**

This step involves the identification of the chemicals found in the groundwater in the OU area whose presence may contribute to risk. EPA selected as COPC contaminants detected in groundwater during EPA-sponsored sampling of two monitoring wells and 14 production wells in the Baldwin Park OU area between September 1990 and September 1991. Seventeen VOCs were detected in groundwater from the OU area. The contaminants, average concentrations, and upper 95th confidence limits are presented in Table ROD-2.

**7.2 Exposure Assessment:**

Two exposure pathways (routes by which the contamination can enter the body) are considered in the risk assessment: ingestion of contaminated groundwater and inhalation of VOCs released from the water into the household air during showering, bathing, cooking, or other routes. Exposure could also occur through the transport of VOCs from groundwater through soil and into ambient air or into the foundation of a building. Any exposure through soil is assumed to be insignificant because the depth to groundwater is greater than 100 feet. Dermal absorption (through skin contact) of contaminants was also considered but is believed to present a zero or insignificant risk.

The potentially exposed populations are residents and workers in the OU area and individuals visiting the Santa Fe Dam Recreation Lake. The maximally exposed population is assumed to be residents exposed to contaminated groundwater used for domestic purposes.

The monitoring data and assumptions used to characterize exposure point concentrations are analytical results from EPA-sponsored sampling of 15 of 16 wells in the Baldwin Park area between September 1990 and September 1991. Arithmetic mean chemical concentration are calculated to evaluate groundwater exposures for the average exposure scenario; the 95 percent upper confidence limit on the arithmetic mean of the data set is used for the reasonable maximum exposure scenario. These calculations assume complete blending of groundwater from the 15 wells. The blended concentration estimates are significantly less than the average or maximum concentrations measured at selected wells.

For example, the blended arithmetic mean and upper 95th confidence limit concentrations for TCE are 55.1 and 96.9 microgram/liter, respectively. The average and maximum concentrations at one well (well no. 01902169) are 335 and 450 microgram/liter.

If a chemical is not detected in a particular sample, but is detected in other groundwater samples in the same well or in another well in the OU area, a value equal to 1/2 the detection limit is used to estimate the exposure concentration. In cases where duplicate samples have been taken, the sample and duplicate results are averaged before summary statistics are calculated. It is assumed that the concentration remains constant for the duration of the exposure period.

Major exposure assumptions are summarized below. The dose from inhalation of VOCs is assumed to be equivalent to the dose from ingestion of 2 liters/day.

| **Exposure Factors** | | |
|---|---|---|
| | **Intake Value (Adult)** | |
| **Parameter** | **Average** | **Reasonable Maximum** |
| Ingestion Rate | 2 liter/day | 2 liter/day |
| Body Weight | 70 kg | 70 kg |
| Exposure Frequency<br>Exposure Duration<br>Years in Lifetime | 350 days/year<br>9 years<br>70 years | 350 days/year<br>30 years<br>70 years |

### 7.3 Toxicity Assessment:

An individual's response to a contaminant depends on the dose and the contaminant's toxicity. The risk assessment makes use of quantitative information on the toxicity (i.e., the dose-response relationship) of each of the contaminants of concern. Table ROD-3 presents the toxicity factors, which take the form of reference doses (RfDs) for noncarcinogenic effects and cancer slope factors (CSFs) for carcinogenic effects. Both RfDs and CSFs are specific to the exposure route.

Cancer slope factors have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potential carcinogenic chemicals. CSFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$,

are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide a conservative, upper-bound estimate of the excess lifetime cancer risk associated with the exposure. Underestimation of the actual cancer risk is highly unlikely. Cancer slope factors incorporate uncertainty factors to account for the use of animal data to predict effects on humans and other uncertainties.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects (e.g., harm to the liver). RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, which are likely to be without an appreciable risk of deleterious effects during a lifetime. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. As with CSFs, RfDs incorporate uncertainty factors and are unlikely to underestimate the potential for adverse effects.

A modified RfD approach is used to estimate the cancer risk potential from oral exposure to 1,1-DCE due to its weak evidence of carcinogenicity. The modified RfD is estimated by dividing the oral RfD by an additional safety factor of 10.

## 7.4 Human Health Risk Characterization

The last portion of the risk assessment integrates the toxicity and exposure assessments to estimate the potential risks to human health from exposure to site chemicals. The risk assessment examines three measures of human health risk: cancer risk, non-cancer effects, and groundwater concentrations in relation to drinking water standards. Also included is a summary of limitations of the data and methodology used in the risk assessment

### 7.4.1 Potential Carcinogenic Effects

The potential for carcinogenic effects is evaluated by estimating excess lifetime cancer risk, which is the probability of developing cancer during one's lifetime over the background probability of developing cancer (i.e., if no exposure to site contaminants occurred). Excess lifetime cancer risks are determined by multiplying the intake level by the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure

to a carcinogen over a 70 year lifetime under the specific exposure conditions at a site. The probability of developing cancer from all causes in California is approximately 250,000 out of 1,000,000 people (1 in 4). A risk of 1 out of 1,000,000 means that one additional person out of a group of 1,000,000 people could develop cancer as a result of the chemical exposure.

Because of the methods used to estimate CSFs, the excess lifetime cancer risks estimated in this preliminary risk assessment should be regarded as upper bounds on the potential cancer risks rather than an accurate representation of the true cancer risk. The actual risk could be as low as zero. Carcinogenic risks are assumed to be additive within a route of exposure. Any synergistic or antagonistic interactions are not considered.

In the Baldwin Park Risk Assessment, EPA predicts that <u>if</u> contaminated groundwater were used as a drinking water source without treatment, as many as 60 out of 1,000,000 ($6 \times 10^{-5}$) persons may develop cancer during their lifetimes (based on the Reasonable Maximum Exposure). The risk was incorrectly reported as 30 out of 1,000,000 ($3 \times 10^{-5}$) in the Proposed Plan. The excess lifetime cancer risk for average residential exposure through domestic use of groundwater is estimated as 10 out of 1,000,000 ($1 \times 10^{-5}$). EPA generally considers excess cancer risks greater than 100 out of a million to be unacceptable.

Table ROD-4 shows carcinogenic risks associated with each contaminant of concern and each exposure pathway. The estimated excess lifetime cancer risk for reasonable maximum exposure from tap water is $3 \times 10^{-5}$ for ingestion exposures (incorrectly reported as $4 \times 10^{-5}$ in Table ROD-4) and $3 \times 10^{-5}$ for inhalation exposures.

Since completion of the risk assessment, the inhalation slope factor for TCE has been revised downward from 0.017 $mg/kg/day^{-1}$ to 0.006 $mg/kg/day^{-1}$. Use of the revised slope factor would reduce the estimated excess lifetime cancer risk for reasonable maximum exposure from $6 \times 10^{-5}$ to $5 \times 10^{-5}$.

The major chemical contributors to the estimated lifetime cancer risk based on reasonable maximum exposure are PCE and TCE, with estimated risks of $1 \times 10^{-5}$ and $2 \times 10^{-5}$ (assuming the revised TCE slope factor).

### 7.4.2 Potential Noncancer Effects

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the *Hazard Quotient* (HQ), the ratio of the estimated intake derived from the

contaminant concentration in a given medium to the contaminant's reference dose. When the hazard quotient significantly exceeds one (i.e., intake significantly exceeds RfD), there is potential for health concern. A *Hazard Index* (HI) can be generated by adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The method assumes dose additivity.

When the HI exceeds one, there is a potential for health risk. If a single HQ exceeds one, the HI will exceed one. The HI can also exceed one even if no single chemical intake exceeds its RfD.

In the Baldwin Park Risk Assessment, EPA estimates the non-cancer Hazard Index from reasonable maximum exposure to groundwater in the Baldwin Park OU area as 1.8, assuming that contaminated groundwater will be served to consumers without treatment (incorrectly reported as 0.9 in the Proposed Plan). The total HI, based on an average exposure scenario, is 1.

Non-cancer effects associated with each contaminant of concern and each exposure pathway are summarized in Table ROD-5. Noncarcinogen exposure levels do not exceed the RfDs for individual COPC. The major chemical contributors to the overall noncancer Hazard Index based on reasonable maximum ingestion and inhalation exposures are TCE with an estimated Hazard Index of 0.8, 1,1-DCE with an estimated Hazard Index of 0.4, and carbon tetrachloride with an estimated Hazard Index of 0.2.

#### 7.4.3 Contaminant Concentrations in Relation to Drinking Water Standards

The third measure of risk examined in the risk assessment is contaminant concentrations in groundwater in the Baldwin Park area in relation to drinking water standards (the lower of the State or Federal Maximum Contaminant Level (MCL) for each contaminant). The comparison assumes that the contaminated water is delivered directly to local residents without treatment. The comparison shows unacceptably high concentrations of TCE, PCE, CTC, 1,1-DCE, 1,2-DCA, and cis-1,2-DCE. The highest TCE concentrations at Baldwin Park area wells are more than 100 times safe levels; the average TCE concentration for recent sampling of 15 Baldwin Park area wells is approximately 10 times safe levels.

The bases for EPA's decision to take action are the amount by which groundwater concentrations in the Baldwin Park area exceed acceptable levels, migration of the contamination into clean and less contaminated areas, and the importance of the San

Gabriel Basin as a source of drinking water. EPA believes that remedial action is necessary even though the carcinogenic risk levels do not exceed 100 in a million.

Table ROD-6 summarizes uncertainties associated with this preliminary risk assessment. One critical assumption is the use of average (i.e., blended) chemical concentrations measured at 15 different wells. A risk estimate that assumes exposure to groundwater produced at the more highly contaminated wells (rather than the blended concentrations assumed in the risk assessment) would be higher.

In conclusion, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

### 7.5 Health Risk Characterization, Environmental Risks

The risk assessment also includes an evaluation of ecological (non human-health) impacts.

Significant impacts to potential environmental receptors are unlikely since most of the Baldwin Park area is developed (i.e., paved) and the primary exposure pathway is via contaminated groundwater. There are few environmental receptors present since urbanization has destroyed most wildlife habitat.

One of the only possible environmental exposure pathways is if significant VOC contamination reached the Santa Fe Dam Recreation Lake. PCE and TCE have been detected at production well 08000070 used to fill the man-made lake, although at low concentrations of less than 1 microgram/liter. No effects are expected since concentrations which may affect aquatic life are significantly higher. The National Ambient Water Quality Criterion (AWQC) for chronic effects resulting from exposure to PCE is 840 microgram/liter. There is no chronic AWQC for TCE.

Of greater potential significance is the presence of riparian and upland vegetation around the lake, and any construction or operating impacts on the vegetation. One plant community, Riversidian sage scrub, is considered to be a sensitive biological resource. The Riversidian sage scrub plant community is dominated by plant species that potentially provide habitat for a variety of animal species. Two special-status species, the California gnatcatcher and San Diego horned lizard, potentially occur in this habitat type.

## 8. DESCRIPTION OF ALTERNATIVES

The remedial objectives of the Baldwin Park OU, which guided the development and evaluation of the remedial alternatives, are:

> ... to prevent future increases in, and begin to reduce, concentrations of all VOCs in groundwater in the Baldwin Park area by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection and by removing contamination from the aquifer.

The Baldwin Park OU is an interim action. Accordingly, the remedy does not include *in situ* (i.e., in the aquifer) remediation standards or a restoration timeframe.

Portions of the aquifer that would benefit most from additional protection include: (i) areas downgradient of residual subsurface contamination (e.g., dense non-aqueous phase liquids (DNAPLs) or other non-aqueous phase contamination) that are clean or contaminated only by dissolved-phase contamination; and (ii) clean or less contaminated areas with active water supply wells, downgradient of more highly contaminated areas.

EPA interpreted the remedial objectives to require, at a minimum, groundwater extraction in two areas. Each of the four cleanup alternatives (Alternatives 1-4) evaluated in the Baldwin Park Operable Unit Feasibility Study includes the construction and operation of new groundwater extraction wells in two or three areas, treatment facilities to remove VOCs from groundwater (assumed, in the FS, to be *air stripping* with *vapor phase granular activated carbon*), pipelines and related conveyance facilities to deliver the treated water, and groundwater monitoring. Selected existing facilities may also be used. The differences between cleanup alternatives are in project size and recipient of the treated water. EPA also evaluated a *no action* alternative.

Existing beneficial uses of the San Gabriel Basin aquifer include municipal and domestic supply (defined in California water quality standards as "uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply").

The following sections describe the *No Action* Alternative and the four *action* alternatives.

### 8.1 The *No Action* Alternative

A *No Action* Alternative (more accurately described as a *No Active Response* Alternative since it includes installation and sampling of monitoring wells) provides a baseline for comparison of other cleanup alternatives. In a *No Action* Alternative, no action is taken to limit contaminant migration beyond actions already taken by water purveyors or local agencies such as the San Gabriel Basin Water Quality Authority. The *No Action* Alternative would include a monitoring program to provide early warning of increasing contaminant concentrations at existing, active water supply wells downgradient of the Baldwin Park area of contamination. Three clusters of production wells are active within approximately 1 mile of the downgradient end of the OU area of contamination (San Gabriel Valley Water Company's B4 and B6 well clusters and La Puente Valley County Water District's well cluster), but two of the three clusters are located within several hundred feet of each other. For cost-estimating purposes, it is assumed that three new monitoring wells would be required to meet the objectives of the monitoring program. The cost of constructing the monitoring wells would be approximately $ 0.4 million in initial, capital costs and less than $ 0.1 million in annual sampling costs.

The monitoring program would provide data to help predict when contaminants in downgradient production wells may increase to levels requiring installation of new wellhead treatment or modification of existing wellhead treatment facilities.

## 8.2 Remedial Alternative No. 1: Extract, Treat, and Distribute Approximately 19,000 gpm of Groundwater to San Gabriel Valley Water Purveyors

### 8.2.1 Extraction Locations and Rates

Alternative 1 calls for extraction of groundwater from two broad areas of contamination (referred to as the *upper* and *lower* areas). Figure ROD-10 shows the two areas marked *approximate extraction well locations*. The precise locations of the new extraction wells and treatment facilities would be determined during the remedial design phase of the project, after the installation and interpretation of data from new groundwater monitoring wells. The remedy may use two existing groundwater extraction wells and a planned wellhead treatment system if, during remedial design, EPA determines that they are suitably located, if agreements can be reached for their use, and if they meet other requirements of this Record of Decision.

EPA's computer simulations of groundwater flow and particle movement indicate that approximately 19,000 gpm of water must be extracted to meet EPA's objectives of controlling contaminant

migration. EPA's analyses indicate that approximately 10,500 gpm of groundwater must be extracted more or less continuously in the lower area; approximately 8,500 gpm of groundwater must be extracted in the upper area. These extraction rates would limit contaminant migration out of the upper and lower areas of contamination (i.e., to *capture* or *contain* the areas of contamination).

Extraction in the lower area would limit further migration of groundwater contaminated with VOCs at concentrations approximately five to 10 times drinking water standards. Sampling results from two locations in 1989 - 1992 show average TCE concentrations between 40 and 50 ppb (the MCL for TCE is 5 ppb). Actual concentrations vary month to month and year to year. EPA sampling at a third location has shown average CTC concentrations of 12 ppb (the MCL for CTC is 0.5 ppb). Concentrations of TCE and CTC downgradient of the lower area are significantly lower.

Extraction in the upper area would limit further migration of groundwater containing VOCs at concentrations more than 200 times safe levels (e.g., more than 1,000 ppb TCE or PCE, or more than 100 ppb 1,2-DCA). The highest concentration measured at a monitoring well in the upper area exceeds 30,000 ppb PCE. Extraction in the upper area would help prevent highly contaminated areas adjacent to the likely sources of the groundwater contamination from moving into less contaminated downgradient areas, increasing the likelihood that downgradient areas could eventually be restored. Extraction in both the upper and lower areas would significantly reduce contaminant concentrations throughout the Baldwin Park area, although the rate and magnitude of the reduction are difficult to predict.

### 8.2.2 Treatment

After the contaminated groundwater is pumped above-ground, it would be piped to treatment facilities capable of removing VOCs from groundwater. Contaminant concentrations in the treated water would meet State or Federal Maximum Contaminant Levels for VOCs, whichever are more stringent. Initial studies completed by EPA indicate that the most efficient, proven treatment technologies will be *air stripping* (with offgas controls) or *liquid phase granular activated carbon* (LGAC). EPA's analyses indicate that both technologies are effective for most mixes of contaminants, but differ in cost depending on the VOC influent concentrations expected at the treatment facilities, which are dependent on precise extraction locations and whether groundwater from multiple extraction locations are blended and treated at a centralized facility. The two technologies may also be combined into a *treatment train*.

*Liquid phase granular activated carbon* transfers the contaminants from water to a charcoal-like material. *Air stripping* transfers volatile contaminants (e.g., VOCs) from water to air; *vapor phase granular activated carbon* transfers the contaminants from air to a charcoal-like material. If *air stripping* is used, it would include *vapor phase granular activated carbon* or other offgas controls to meet air emission requirements of the South Coast Air Quality Management District.

EPA also evaluated the cost, effectiveness, and feasibility of advanced oxidation processes. Advanced oxidation processes are innovative treatment methods capable of destroying contaminants. EPA's initial studies indicate that advanced oxidation processes would be considerably more expensive than either *air stripping* or LGAC.

The extracted groundwater would be treated for VOCs at one or more locations to be determined during remedial design. If treated water is supplied for local use, the most cost-effective arrangement would probably be to construct multiple treatment facilities (possibly four separate facilities).

### 8.2.3 Distribution/Use of Treated Water

If the necessary agreements are reached, the treated water will be supplied to agencies that directly or indirectly supply drinking water to San Gabriel Valley residents and businesses (water purveyors). Excess water would be piped to spreading basins, the San Gabriel River channel, or tributary flood control channels operated by the Los Angeles County Department of Public Works for recharge into the aquifer when water purveyors are not able to use all of the treated water.

EPA expressed a preference to supply treated water to purveyors, rather than for recharge, due to lower pumping costs (although higher initial capital costs) and the risk that existing recharge areas may not offer enough recharge capacity during winter and spring rainy season. There is excess capacity in recharge areas for much, but not all of the year. In each of the last two years, existing users of Baldwin Park area spreading grounds used all of the available capacity for several consecutive months. In contrast, supplying treated water to purveyors has the advantage that purveyors should be able to accept water close to year-round, minimizing the risk of not being able to distribute extracted water during winter and spring months.

In the FS it is assumed that water would be supplied to San Gabriel Valley Water Company, Suburban Water Systems, Covina Irrigating Company, and the city of Glendora, although other

purveyors could substitute. There are pros and cons to supplying each purveyor which could potentially accept treated water. Some purveyors could distribute large quantities of water year-round; others could distribute less water for only part of the year. Some purveyors are located near likely treatment plant locations (requiring minimal pipeline); others are located further away or at higher elevations (requiring more pumping). Purveyors also vary in how much they are willing to pay for additional supplies, in whether they could accept water without first resolving water rights issues (e.g., exporting water from the basin), and in their expertise in operating treatment facilities.

### 8.2.4 Project Duration, Cost, and Evaluation

The project would operate for an initial period of five years, after which EPA will conduct a formal assessment of the project's effectiveness. The results of the assessment may lead to continued operation of the project as is, or recommended modifications in the extraction rates and locations or other project components. The project would be expected to operate until contaminant concentrations decrease sufficiently that continued efforts to limit the migration of contaminated groundwater or remove contaminant mass are no longer necessary. The assessment will include an evaluation of the effects of the operation of nearby public water supply wells on the attainment of EPA's remedial objectives.

It is estimated that implementation of Alternative 1 would require approximately 36 months from the date the ROD is signed. During this period, EPA intends to negotiate an agreement for funding of the selected remedy, and then proceed with design, construction, and initial testing of the equipment to make sure it functions properly.

The estimated cost of Alternative 1 is $47 million in capital costs and $4 million in annual operation and maintenance costs. More than half of the capital costs would be for construction of treatment facilities; the remainder of the costs would be for well systems, pipelines, and land acquisition. The estimate assumes that new treatment facilities must be constructed, although one or more existing or planned facilities may be used. The biggest contributor to the operating costs would be the cost of regenerating or replacing the granular activated carbon used in the treatment process. The cost estimates for Alternatives 1-4 each include an added 35% to account for the risk of higher than expected labor or material costs, unforeseen delays, and other factors that may increase costs.

**8.3 Remedial Alternative No. 2: Extract, Treat, and Distribute Approximately 29,000 gpm of Groundwater to San Gabriel Valley Water Purveyors and Recharge Areas**

Alternative 2 differs from Alternative 1 in that it involves the extraction of groundwater from three (rather than two) broad areas of contamination (the *lower*, *middle* and *upper* areas). See Figure ROD-10. Extraction in the lower and upper areas would be the same as described for Alternative 1. Alternative 2 would add extraction in the middle area to prevent further degradation of the area in between the upper and lower extraction areas and remove additional contaminants. Approximately 10,000 gpm of water would need to be extracted in the middle area to provide the additional migration control. The additional 10,000 gpm would be distributed in part to water purveyors and in part to the San Gabriel River channel and the Irwindale Spreading Grounds. In the FS it is assumed that water would be supplied to San Gabriel Valley Water Company, Suburban Water Systems, Covina Irrigating Company, the city of Glendora, and the city of Azusa, although other purveyors could substitute.

The estimated cost of Alternative 2 is $65 million in initial, capital costs and $7 million in annual operation and maintenance costs. Implementation may take longer than Alternative 1 due to the need to construct additional facilities and reach agreements to distribute approximately an additional 10,000 gpm of treated water.

**8.4 Remedial Alternative No. 3: Extract, Treat, and Distribute Approximately 29,000 gpm of Groundwater to San Gabriel Valley Water Purveyors and Metropolitan Water District of Southern California**

Alternative 3 shares the same extraction component as Alternative 2, and the same water use option for groundwater extracted from the lower area, but differs in the disposition of extracted groundwater from the upper and middle areas. Instead of supplying treated water to local purveyors, treated water would be piped from the treatment facilities to Metropolitan's *Middle Feeder* pipeline, which passes through the city of Baldwin Park. Metropolitan would export the treated water to its member agencies located in the northeastern and south central sections of Los Angeles County during summer months or drought years. Because Metropolitan possesses only negligible pumping rights in the San Gabriel Basin, Metropolitan would be required to replace every gallon of exported water by recharging an equivalent amount of imported water during the winter or spring offpeak months when imported water is relatively abundant. This type of operation is often described as a *conjunctive use* operation.

Metropolitan may distribute the treated water to secondary recipients during offpeak winter and spring months. Possible arrangements include direct recharge from the treatment facilities, or discharge of the treated water into Metropolitan's existing conveyance facilities for distribution (*wheeling*) to local water purveyors. The local water purveyors would use the treated groundwater in lieu of pumping clean groundwater.

The estimated cost of Alternative 3 is approximately $76 million in capital costs and $9 million in annual operation and maintenance costs, higher than for Alternatives 1 or 2. The actual cost to EPA is assumed to be equal to the cost of Alternative 2, however. Metropolitan would be expected to fund the difference in cost, referred to as an *enhancement cost*.

### 8.5 Remedial Alternative No. 4: Extract, Treat, and Distribute Approximately 29,000 gpm of Groundwater to Metropolitan Water District of Southern California

Alternative 4 shares the same extraction component as Alternatives 2 and 3, but differs in the disposition of the treated water from the upper and middle areas. All treated water would be piped from a treatment facility to Metropolitan's Middle Feeder pipeline.

The estimated cost of Alternative 4 is approximately $78 million in capital costs and $10 million in annual operation and maintenance costs, higher than for Alternatives 1, 2, or 3. The actual cost is assumed to be equal to the cost of Alternative 2, however. Metropolitan would be expected to fund the difference in cost, referred to as an *enhancement cost*.

## 9. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section ranks the five remedial alternatives in relation to the nine Superfund evaluation criteria listed in 40 CFR Part 300.430.

### 9.1 Overall Protection of Human Health and the Environment

Remedial Alternatives 1-4 protect human health and the environment without substantial negative impacts. Alternatives 2, 3, and 4 would include additional extraction in a *middle* portion of the aquifer not included in Alternative 1. The additional extraction would provide additional protection for the area in between the upper and lower extraction areas and remove additional contaminant mass. Negative impacts associated with Alternatives 1-4 include the disruption that would result from

installation of pipelines and other components of the remedy and the impacts of handling, treating, and disposing of treatment residuals (e.g., air emissions and spent carbon).

Alternative 1 (and Alternatives 2, 3, and 4) would reduce short- and long-term risks to human health and the environment by inhibiting contaminant migration from two highly contaminated portions of the aquifer (the upper and lower areas) to less contaminated areas or depths to reduce the impact of continued contaminant migration on downgradient water supply wells and to protect future uses of less contaminated and uncontaminated areas. Alternatives 1-4 would reduce the toxicity, mobility, and volume of the contaminants and remove significant contaminant mass from the aquifer. The VOC treatment technologies that would be used are effective in meeting Federal and State drinking water standards for VOCs.

Alternative 1 (and Alternatives 2 and 3, but not Alternative 4) also offer the benefit of providing treated water to purveyors whose wells are threatened by continued contaminant migration, providing the vulnerable purveyors with an alternative water supply.

The no-action alternative provides the least overall protection of human health and the environment. It would not provide any additional migration control beyond that provided by projects that may be built by parties other than EPA (e.g., by local water purveyors or local water agencies). Contaminant concentrations in a significant portion of the aquifer exceed State or Federal drinking water standards.

Limitations of the no-action alternative include: the increased potential for human exposure; leaving the burden of constructing treatment facilities to water purveyors; the increased cost and difficulty of operating existing treatment facilities if more highly contaminated groundwater reaches existing facilities; the increased likelihood that future increases in contaminant concentrations at active water supply wells would result in emergencies requiring immediate actions not consistent with long-term remediation goals (e.g., pumping in relatively clean portions of the aquifer, potentially spreading the contamination); and the increased eventual cost, difficulty, and time required for containment or restoration of the aquifer. (If no action is taken, continued contaminant migration would result in the need to treat larger volumes of contaminated water and may result in the increased presence of vinyl chloride or other VOC degradation products that are more difficult to treat or more toxic than the parent compounds.)

Alternatives 1-4 may not achieve final cleanup levels for the groundwater. MCLs/MCLGs *in situ* are not ARARs for this action because they are beyond the scope of this interim action.

### 9.2 Compliance with ARARs

Each of Alternatives 1-4 is configured to comply with the ARARs described in Section 10 of this ROD. No differences are expected among these remedial alternatives in compliance with ARARs. No ARARs waivers are expected to be needed.

### 9.3 Long-Term Effectiveness and Permanence

This evaluation criterion assesses the extent to which each remedial alternative reduces risk after the remedial response objectives are met. Residual risks in this interim remedy could result from exposure to contaminated groundwater not removed from the aquifer, or exposure to used *granular activated carbon* or other treatment residuals. The performance of the alternatives in relation to this criterion is evaluated by estimating the extent to which each alternative prevents the migration of contamination into less contaminated areas and the rate of contaminant removal.

Alternatives 2, 3, and 4 would provide the greatest long term effectiveness because they include additional extraction in three subareas, which would limit downgradient and vertical migration in and beyond the upper, middle, and lower subareas and remove significant contaminant mass from all three subareas.

Alternative 1 would provide the same protection in and downgradient of the upper and lower subareas, but lacks the additional benefits of extraction in the middle subarea. These benefits are added protection for the area in between the upper and lower extraction areas and removal of additional contaminant mass.

The no-action alternative would not limit further downgradient contaminant plume migration, or remove contaminant mass, beyond that provided by projects that may be built by parties other than EPA.

Figures ROD-11 and ROD-12 depict the results of computer simulations that provide a measure of the effect of the no-action alternative and the remedial alternatives on the movement of the contamination in the OU area. The figures depict the movement of particles representing selected drops of contaminated groundwater. Particles that terminate at black dots indicating extraction well locations are captured, representing contaminant molecules that are removed from the aquifer. Particles that

extend past extraction well locations represent an increase in downgradient contaminant concentrations or a downgradient expansion of the area of contamination.

Figure ROD-12 illustrates the effectiveness of Alternatives 2, 3, and 4. The effectiveness of Alternative 1 would be similar to that shown in the figure, except that particles originating in Subarea 2 (the middle subarea) would be captured in Subarea 3 rather than Subarea 2. In each of Alternatives 1-4, most of the particles shown in the figure are captured by OU wells in Subareas 1 and 3. A few particles continue beyond the downgradient margin of the OU area of contamination, although the downgradient distances traveled are much shorter than shown for the no-action alternative.

There are some other minor differences in effectiveness between Alternatives. Alternatives 1, 2, and 3 may be slightly more effective than Alternative 4 because of reductions in pumping at existing water supply wells at the periphery of Subarea 3. Alternative 1 may also be slightly more effective than Alternatives 2, 3, and 4 if Alternatives 2, 3, or 4 include significant recharge in areas that increases the rate of contaminant migration downgradient of recharge areas. Alternative 1 assumes no recharge of treated groundwater and Alternative 2 assumes recharge of 6,500 gpm of treated water. Alternatives 3 and 4 assume no recharge, a project in which treated water is supplied to Metropolitan could result in recharge during offpeak periods.

Figure ROD-11 depicts the extent and degree of contaminant migration for the no-action alternative. The figure shows that some contaminated groundwater is extracted by an existing well cluster in the OU area, but much of the contaminated groundwater continues to migrate unimpeded. This effect is illustrated by the number of particles moving beyond the current downgradient extent of contamination and the distances that these particles travel.

Alternatives 1-4 may result in air emissions (if *air stripping* is used) and generate spent carbon or other treatment residuals. Air emissions and risks associated with treatment residuals are expected to be within acceptable levels. The magnitude of the residual risks from treatment residuals for Alternative 1 would be less than for Alternatives 2, 3, and 4 because of the lower extraction rate.

### 9.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion addresses the statutory preference for selecting remedial actions employing treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as a principal element of the action.

Alternatives 1, 2, 3, and 4 all satisfy the statutory preference for treatment. Each of these four alternatives would employ treatment processes that would significantly reduce the volume of hazardous contaminants by inhibiting contaminant migration, and reduce the toxicity and volume of hazardous contaminants by treating the groundwater so that it meets MCLs for VOCs.

The VOC treatment technologies assumed in Alternatives 1-4, *LGAC or air stripping with offgas controls*, are technically feasible and effective in meeting ARARs for VOCs in the extracted and treated groundwater. Treatment of the contaminated groundwater with LGAC or *air stripping* with carbon offgas controls would substantially reduce the volume of contaminated media and mobility of the contaminants by transferring contaminants from groundwater to the GAC. This contaminated GAC would require disposal or regeneration.

The Alternatives are similar in their capability to satisfy this criterion. The major difference is the omission of groundwater extraction in the *middle area* in Alternative 1. This difference among alternatives is described in the *long-term effectiveness and permanence* criterion and is not duplicated here.

### 9.5 Short-Term Effectiveness

This criterion evaluates the effects of each remedial alternative on human health and the environment during the construction and start-up of the remedy. It also addresses the time elapsed during construction and start-up.

Alternative 1 may be designed and built more quickly than Alternatives 2-4 because of its smaller size, although any of the alternatives could be built in phases to minimize delay. There may also be differences in the number or severity of institutional obstacles, but these differences are taken into account in the *implementability* criterion and not duplicated here. We conclude that Alternatives 1-4 are similar in short-term effectiveness and do not present unmitigable risks to the community, workers, or the environment during construction and implementation.

### 9.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. Of particular importance in the Baldwin Park OU is the administrative feasibility of the Alternatives, especially the need for agreements with parties other than EPA to distribute treated water.

The technical feasibility of Alternatives 1-4 is similar. The extraction, treatment, and conveyance technologies included in all of the Alternatives are widely used and are generally known to be proven and reliable. All of the Alternatives share some risk that higher than estimated contaminant concentrations could interfere with the ability of the treatment facility to attain treatment objectives.

Numerous administrative obstacles must be overcome to implement any of the alternatives, but Alternative 1 is potentially more feasible than Alternatives 2-4 due to the lower amount of treated water that needs to be distributed (approximately 10,000 gpm less water - 1/3 less). This would result in the need to reach agreements with fewer parties that would receive treated water from an OU; acquisition of less property and/or fewer easements for the construction of extraction wells, treatment facilities, and conveyance facilities (and resolving other issues associated with a large construction project in a developed area); and acquisition of fewer offsets for air emissions if *air stripping* is used. Agreements with recipients of treated water will need to specify the amount of treated water to be delivered, the delivery location, responsibility for any necessary capital improvements to the recipient's distribution system to accept the water, and operational, liability, financial, and other arrangements. Resolving these issues could potentially delay implementation of the project.

If water purveyors accept treated water, they will be responsible for obtaining approval for modifications to their water supply permits. If treated water is recharged, arrangements would need to be made with the Los Angeles County Department of Public Works for use of its spreading grounds. An agreement may not guarantee the required amount of spreading capacity because of competition for use of available spreading capacity.

In addition, for Alternatives 3 and 4, the following administrative feasibility issues associated with the involvement of Metropolitan would need to be resolved.

• Arrangements may need to be made with secondary recipients for distribution of treated water during offpeak periods (i.e., winter and spring months);

• Arrangements would need to be made with the LACDPW for recharge of imported water. Although imported surface water is already recharged for replenishment and cyclic storage, significant additional amounts would increase the risk that there may insufficient capacity in existing recharge areas.

• Metropolitan would need to reach agreement with the Watermaster (and/or obtain court approval) for export of additional water from the basin and the storage of imported water recharged in the basin. The existing water rights agreement (the Alhambra Judgment) currently prohibits any additional export of extracted groundwater from the basin without Watermaster and/or court approval. Metropolitan and Watermaster are in their second year of negotiations over the terms of an agreement.

• Before accepting treated water, Metropolitan may need to reach agreement with the Watermaster (and/or obtain court approval) to increase the available storage capacity in the basin by modifying the operating criteria in the Alhambra Judgment. Metropolitan may also need to mitigate adverse effects of higher or lower water levels.

• Metropolitan staff have stated the possibility that Metropolitan would impose more stringent treatment requirements, which would require the construction of additional treatment facilities.

• Financial agreements with Metropolitan for funding of system enhancements would be necessary. Enhancement costs are capital or operating costs that are not necessary for attainment of remedial objectives. State or Metropolitan funding may trigger the need for Metropolitan to prepare an Environmental Impact Report to comply with the California Environmental Quality Act (CEQA).

• Financial and operation agreements (including staffing, maintenance schedules) may be needed to arrange for seasonal changes in the operating scenario if the level of treatment required by recipients of treated water during offpeak periods differs from Metropolitan's requirements.

• Acquisition of property for a treatment facility could be more difficult because of Metropolitan's likely requirement that a single centralized treatment facility be constructed.

These disadvantages may be partially offset by Metropolitan's expertise in constructing large water supply projects, and by eliminating the need to reach agreements with local water purveyors if arrangements for distribution of treated water during offpeak periods do not involve local purveyors.

### 9.7 Cost

The following table presents estimated capital costs, O&M costs, and the estimated *present worth* of each remedial alternative. The present worth is estimated using discount rates of 3, 5, and 10 percent, and a base period of 30 years. The assumption of a 30-year project life reflects EPA Superfund guidance; it does not reflect any specific finding regarding the duration of the remedy. The costs are considered order-of-magnitude level estimates (i.e., the true project cost may be 50% higher or 30% lower than the estimated cost).

**Estimated Costs of Remedial Alternatives (millions of dollars)**

| Alternative | Short-Term Capital Costs | Annual O&M Costs[1] | Net Present Worth at 3, 5, and 10% Discount Rates (assuming 30 year lifetime) | | |
|---|---|---|---|---|---|
| | | | 3 Percent | 5 Percent | 10 Percent |
| No-Action[2] | 0.4 | less than 0.1 | 1 | 0.9 | 0.8 |
| 1 | 47 | 3.5 to 5.0 | 116-145 | 101-124 | 80-94 |
| 2 | 65 | 5.9 to 7.8 | 182-217 | 156-184 | 121-138 |
| 3[3] | 65 | 5.9 to 7.8 | 182-217 | 156-184 | 121-138 |
| 4[3] | 65 | 5.9 to 7.8 | 182-217 | 156-184 | 121-138 |

[1]A range of O&M costs is provided to account for the range of potential purveyor reimbursement rates for treated water from $25 to $75/acre-foot.
[2]The No-action alternative costs include only those costs associated with the no-action monitoring program. Additional long-term financial impacts of this alternative have not been estimated.
[3]Actual project costs for Alternatives 3 and 4 would be greater than indicated due to requirements associated with the involvement of Metropolitan. It is assumed that Metropolitan would pay for any costs resulting from water supply or other requirements that are not necessary for attainment of remedial objectives (*enhancement costs*), making the net project cost to EPA or PRPs the same as for Alternative 2.

### 9.8 State Acceptance.

In a letter dated August 12, 1993, the State of California (Cal-EPA Department of Toxic Substances Control) concurred with EPA's *proposed* remedy for the Baldwin Park OU. In a second letter from Margaret Felts, Deputy Director, Site Mitigation

Program, Department of Toxic Substances Control, the State of California concurred with EPA's *selected* remedy.

### 9.9 Public Acceptance.

In addition to the State, twenty-five individuals and organizations submitted over 400 comments on EPA's Remedial Investigation, Feasibility Study, and Proposed Plan for the Baldwin Park OU. These comments, and EPA's responses, are presented in the Part III of this ROD (the *Responsiveness Summary*). Most commenters submitted between one and ten comments. One commentor, a recipient of General Notice of Liability for the Baldwin Park OU, submitted approximately 250 comments.

Several comments expressed support for EPA's proposed remedy; others did not. Most commented upon were two aspects of the Alternatives: the size of the project (i.e., the amount or rate of contaminated groundwater extracted from the aquifer); and the disposition of the treated water. EPA's Proposed Plan calls for extraction of approximately 19,000 gpm of contaminated groundwater from two Subareas, as in Alternative 1. Several individuals and two water agencies recommended that EPA select the larger project included in Alternatives 2, 3, and 4 (extraction of approximately 29,000 gpm of contaminated groundwater from three Subareas). Several businesses and business organizations recommended that EPA select a smaller project.

Several individuals, local organizations, and water agencies also recommended that EPA select Metropolitan as the recipient of the treated water (a component of Alternatives 3 and 4), often on the assumption that doing so would increase the extent or decrease the cost of the clean up.

## 10. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

This section discusses Applicable or Relevant and Appropriate Requirements (ARARs) for the Baldwin Park OU. Under Section 121(d)(1) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (collectively, CERCLA), 42 U.S.C. Section 9621(d), remedial actions must attain a level or standard of control of hazardous substances which complies with ARARs of Federal environmental laws and more stringent State environmental and facility siting laws. Only State requirements that are more stringent than Federal ARARs, are legally enforceable and consistently enforced, and identified in a timely manner may be ARARs. The California

Department of Toxic Substance Control ("DTSC") is the lead State agency for CERCLA matters. In accord with a directive by Margaret C. Felts, Deputy Director Site Mitigation Program, EPA has communicated with DTSC with regards to ARARs and has relied on DTSC for identification of State ARARs.

Pursuant to Section 121(d) of CERCLA, the on-site portion of a remedial action selected for a Superfund site must comply with all ARARs. Any portion of a remedial action which takes place off-site must comply with all laws legally applicable at the time the off-site activity occurs, both administrative and substantive.

An ARAR may be either "applicable," or "relevant and appropriate," but not both. According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300), "applicable" and "relevant and appropriate" are defined as follows:

- *Applicable requirements* are those cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a State in a timely manner and that are more stringent than Federal requirements may be applicable. "Applicability" implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement.

- *Relevant and appropriate requirements* are those cleanup standards, standard of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those State standards that are identified in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

Requirements are also classified as *chemical-specific*, *location-specific*, or *action-specific*.

- *Chemical-specific* ARARs are health- or risk-based concentration limits, numerical values, or methodologies for various environmental media (i.e., groundwater, surface water, air, and soil) that are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards.

- *Location-specific* requirements set restrictions on certain types of activities based on site characteristics. Federal and State location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

- *Action-specific* requirements are technology- or activity-based requirements which are triggered by the type of remedial activity. Examples are Resource, Conservation and Recovery Act (RCRA) regulations for waste treatment, storage or disposal.

Neither CERCLA nor the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (400 C.F.R. Part 300) provides across-the-board standards for determining whether a particular remedy will result in an adequate cleanup at a particular site. Rather, the process recognizes that each site will have unique characteristics that must be evaluated and compared to those requirements that apply under the given circumstances. Therefore, ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

The following section outlines the ARARs that apply to this site.

## 10.1 Chemical-Specific ARARs

### 10.1.1 Federal Drinking Water Standards

<u>Section 1412 of the Safe Drinking Water Act (SDWA), 42 U.S.C. Section 300g-1, "National Water Regulations"; National Primary Drinking Water Regulations, 40 CFR Part 141.</u>

EPA has established Maximum Contaminant Levels (MCLs) (40 CFR Part 141) under the Safe Drinking Water Act (SDWA) to protect public health from contaminants that may be found in drinking water sources. These requirements are applicable at the tap for water provided directly to 25 or more people or which will be supplied to 15 or more service connections. The MCLs are applicable to any water that would be served as drinking water. Under NCP Section 300.430(f)(5), remedial actions must generally attain MCLs and non-zero Maximum Contaminant Level Goals (MCLGs) for remedial actions where the groundwater is a current or potential source of drinking water.

The groundwater at the Baldwin Park OU is an existing and potential source of drinking water. However, since the Baldwin Park OU remedial action is an interim action, chemical-specific cleanup requirements for the aquifer such as attaining MCLs and non-zero MCLGs, which would be ARARs for a final remedy, are not ARARs for this interim action. (See NCP, 55 Fed. Reg. 8755.) Nevertheless, EPA has determined that for the treatment plant effluent from the Baldwin Park OU, the Federal Primary and any Secondary Maximum Contaminant Levels (MCLs) for VOCs and any more stringent State of California Primary MCLs for VOCs are relevant and appropriate and must be attained regardless of the end use or discharge method for the treated water. In addition, treated water that is discharged to surface water shall meet National Pollutant Discharge Elimination System (NPDES) discharge requirements.

For treated water which will be put into a public water supply, all legal requirements for drinking water in existence at the time that the water is served will have to be met because EPA considers serving of the water to the public (at the tap) to be off-site. Complying with all applicable requirements for drinking water at the tap will also require attainment of the MCL for nitrate prior to serving the water to the public. Since these are not ARARs, these requirements are not "frozen" or fixed as of the date of the ROD. Rather, they can change over time as new laws and regulations applicable to drinking water change. See NCP, 55 Fed. Reg. 8758 (March 8, 1990).

### 10.1.2 State Drinking Water Standards

<u>California Safe Drinking Water Act, Health and Safety Code, Division 5, Part 1, Chapter 7, section 4010 et seq., California Domestic Water Quality Monitoring regulations, CCR Title 22, Division 4, Chapter 15, section 64401 et seq.</u>

California has also established drinking water standards for sources of public drinking water, under the California Safe

Drinking Water Act of 1976, Health and Safety Code Sections 4010.1(b) and 4026(c). California has promulgated primary MCLs for VOCs. Several of the State MCLs are more stringent than Federal MCLs. In these cases, EPA has determined that the more stringent State MCLs for VOCs are relevant and appropriate for the treatment plant effluent from the Baldwin Park OU interim remedy. VOCs for which there are more stringent State standards include: benzene; carbon tetrachloride; chlorobenzene; 1,2-dibromoethane; 1,2-dichloroethane (1,2-DCA); 1,1-dichloroethene (1,1-DCE); cis-1,2-DCE; trans-1,2-DCE; vinyl chloride; and xylenes. There are also some chemicals where State MCLs exist but there are no Federal MCLs. EPA has determined that these State MCLs are relevant and appropriate for the treated water prior to discharge or delivery to the water purveyor. VOCs for which there are no Federal MCLs but for which State MCLs exist are: 1,1-DCA; trichloroflouromethane (Freon 11); and 1,1,2-trichloro-1,2,2-triflouroethane (Freon 113). The Federal and State Primary MCLs for these compounds are listed in Table ROD-1.

Water served as drinking water is required to meet MCLs at the tap, not MCLGs. However, EPA does retain the authority to require changes in the remedy if necessary to protect human health and the environment, including changes to previously selected ARARs. See, 40 CFR Sections 300.430(f)(1)(ii)(B)(1) and 300.430(f)(5)(iii)(C). If EPA receives new information indicating the remedy is not protective of public health and the environment, EPA would review the remedy and make any changes necessary to ensure protectiveness.

### 10.2 Location-Specific ARARs

No location-specific ARARs were identified for the Baldwin Park OU.

### 10.3 Action-Specific ARARs

#### 10.3.1 Clean Air Act, 42 U.S.C. section 7401 et seq.

<u>Rules and Regulations of the South Coast Air Quality Management District</u>

The Baldwin Park OU remedy may include *air stripping*, triggering action-specific ARARs with respect to air quality.

The Clean Air Act regulates air emissions to protect human health and the environment, and is the enabling statute for air quality programs and standards. The substantive requirements of programs provided under the Clean Air Act are implemented primarily through Air Pollution Control Districts. The South

Coast Air Quality Management District (SCAQMD) regulates air quality in the San Gabriel Valley.

The SCAQMD has adopted rules that limit air emissions of identified toxics and contaminants. The SCAQMD Regulation XIV, comprising Rule 1401, on new source review of carcinogenic air contaminants, is applicable for the Baldwin Park OU. SCAQMD Rule 1401 requires that best available control technology (BACT) be employed for new stationary operating equipment, so the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of ten in one million ($1 \times 10^{-5}$). EPA has determined that Rule 1401 is applicable for the Baldwin Park OU because compounds such as PCE and TCE are present in groundwater, and release of these compounds to the atmosphere exceeding SCAQMD requirements unless controls are implemented.

The substantive portions of SCAQMD Regulation XIII, comprising Rules 1301 through 1313, on new source review are also ARARs for the Baldwin Park OU.

The SCAQMD also has rules to limit the visible emissions from a point source (Rule 401), to prohibit discharge of material that is odorous or causes injury, nuisance or annoyance to the public (Rule 402), and to limit downwind particulate concentrations (Rule 403). EPA has determined that these rules are also ARARs for the Baldwin Park OU interim remedy.

### 10.3.2 Water Quality Standards for Discharges of Treated Water to Surface Waters or Land

State Standards

For any discharge to land, including recharge at a spreading basin, or discharge to surface water, that occurs on-site, the discharged water must meet all action-specific ARARs for such discharge. The ARAR applicable to the discharged water is:

- The Los Angeles Regional Water Quality Control Board's Water Quality Control Plan for the Los Angeles River Basin (the "Basin Plan"), which incorporates State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California." Resolution No. 68-16 requires maintenance of existing State water quality unless it is demonstrated that a change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other State policies.

State Standards - Discharges to Land

In order to comply with the Basin Plan, any treated groundwater that is discharged to land will be treated to concentrations below Federal MCLs or State MCLs for VOCs, whichever is more stringent. In addition, any nitrate concentrations in the water to be recharged will have to be similar to or lower than the levels of these substances in the portion of the aquifer where the recharge will occur. The quality, quantity, and duration of the discharge will be considered with respect to the existing water quality.

State Standards - Discharges to Surface Water
CERCLA Section 104(b) Activities

During the time period of RD/RA activities at the Baldwin Park OU, additional CERCLA section 104(b) activities will be taking place. During these additional CERCLA section 104(b) activities, EPA anticipates that there may be temporary discharges of treated water to the San Gabriel River and its tributaries (collectively the San Gabriel River). The ARAR for any treated water that is generated and discharged to the San Gabriel River as part of a CERCLA section 104(b) activity would be the NPDES program, which is implemented by the Regional Board. In establishing effluent limitations for such discharges, the Regional Board considers the Basin Plan, which incorporates Resolution 68-16, and the best available technology economically achievable (BAT). See, Cal. Water Code section 13263.

Since the Regional Board did not identify specific substantive discharge requirements or technology standards for discharges resulting from CERCLA section 104(b) activities, EPA has reviewed the Basin Plan and considered BAT and has made certain determinations for the discharge of water generated by CERCLA section 104(b) activities to the San Gabriel River. In order to comply with this ARAR, any treated groundwater that would be discharged pursuant to CERCLA section 104(b) activities to the San Gabriel River would be treated to meet Federal MCLs or State MCLs for VOCs, whichever is more stringent.

The treated water may also contain nitrate. The Basin Plan states that the level of nitrate shall not exceed 36 mg/l (as $NO_3$) in water designated for use as domestic or municipal supply. According to the Basin Plan, the San Gabriel River is designated for municipal or domestic water supply. Therefore, 36 mg/l nitrate would be an ARAR for CERCLA section 104(b) activities resulting in discharges associated with the OU.

EPA has stated that "studies and investigations undertaken pursuant to CERCLA section 104(b), such as activities conducted

during RI/FS, are considered removal actions." (55 Fed. Reg. 8756) It is EPA's policy that removal actions "will comply with ARARs to the extent practicable, considering the exigencies of the circumstances." (55 Fed. Reg. 8756).

Some CERCLA section 104(b) activities that will occur during the time of RD/RA are temporary high flow, high volume discharges (e.g., discharges resulting from spinner logging/depth specific sampling of water supply wells and aquifer testing). EPA has considered BAT for these CERCLA section 104(b) activities. For CERCLA section 104(b) activities that result in temporary high flow, high volume discharges, EPA evaluated four options for meeting the primary Federal and State MCLs for VOCs and nitrate: (i) direct discharge to an existing drinking water distribution system; (ii) on-site storage, then disposal at a RCRA-approved hazardous waste facility; (iii) discharge into a sanitary sewer for treatment at a wastewater treatment plant; and (iv) on-site treatment, then discharge into flood control channels.

For reasons similar to those faced and addressed during previous spinner logging/depth specific sampling, EPA reached the conclusion that compliance with ARARs was not practicable considering the exigencies of the circumstances for CERCLA 104(b) activities resulting in temporary high flow, high volume discharges of water. EPA has determined that for CERCLA 104(b) activities <u>not</u> resulting in temporary high flow, high volume, discharges of water compliance with ARARs <u>is</u> practicable considering the exigencies of the circumstances.

<u>State Standards - Discharge to Surface Water RD/RA Activities</u>

RD/RA activities may also include the discharge of treated water to surface waters. Unlike the CERCLA section 104(b) activities, the RD/RA activities shall be undertaken in compliance with ARARs unless a waiver is attained. Because no ARAR waivers are contemplated for the RD/RA for the Baldwin Park OU, all RD/RA activities shall be undertaken in compliance with ARARs.

As noted above, the ARAR for any treated water that is discharged to surface waters is the NPDES Program which is implemented by the Regional Board. In establishing effluent limitations for such discharges, the Regional Board considers the Basin Plan, which incorporates Resolution 68-16, the Inland Surface Water Plan and Temperature Plan for Surface Waters, and the best available technology economically achievable (BAT). <u>See,</u> Cal. Water Code section 13263.

Since the Regional Board did not identify specific substantive discharge requirements or technology standards for such discharges, EPA has reviewed the Basin Plan (with related documents) and considered BAT and has made certain determinations for the RD/RA discharges to surface waters. In order to comply with this ARAR, any groundwater that will be discharged to surface waters on-site must be treated to meet primary Federal MCLs or State MCLs for VOCs, whichever is more stringent.

The treated water will also contain nitrate. The Basin Plan states that the level of nitrate shall not exceed 36 mg/l in water designated for use as domestic or municipal supply. According to the Basin Plan, the San Gabriel River is designated for municipal or domestic water supply. Therefore, the 36 mg/l is an ARAR for the RD/RA discharges associated with the OU.

### 10.3.3 California Hazardous Waste Control Act

RCRA, passed by Congress in 1976 and amended by the Hazardous and Solid Waste Amendments of 1984, contains several provisions that are ARARs for the Baldwin Park OU. The State of California has been authorized to enforce its own hazardous waste regulations (California Hazardous Waste Control Act) in lieu of the Federal RCRA Program administered by the EPA. Therefore, State regulations in the California Code of Regulations (CCR), Title 22, Division 4.5, Environmental Health Standards for the management of Hazardous Wastes (hereinafter the State HWCA Regulations), are now cited as ARARs instead of the Federal RCRA Regulations. State regulations under Federally authorized programs are considered Federal requirements, i.e., Federal ARARs.

The contaminated groundwater is not a listed RCRA waste. However, the contaminants are sufficiently similar to RCRA wastes that EPA has determined that portions of the State's HWCA Regulations are relevant and appropriate.

An air stripper or GAC contactor would qualify as a RCRA miscellaneous unit if the contaminated water constitutes RCRA hazardous waste. EPA has determined that the substantive requirements for miscellaneous units set forth in Sections 66264.601 -.603 and related substantive closure requirements set forth in 66264.111-.115 are relevant and appropriate for the air stripper or GAC contactor. The miscellaneous unit and related closure requirements are relevant and appropriate because the water is similar to RCRA hazardous waste, the air stripper or GAC contactor appear to qualify as a miscellaneous unit, and the air stripper or GAC contactor should be designed, operated, maintained and closed in a manner that will ensure the protection of human health or the environment.

The land disposal restrictions (LDR), 22 CCR Section 66268 are relevant and appropriate to discharges of contaminated or treated groundwater to land, including the discharge of treated water to spreading basins. The remedial alternatives presented do not include land disposal of untreated groundwater. Because of the uncertainty in the levels of contamination and volumes of water to be derived from monitoring and extraction wells at this site, these waters must be treated to meet Federal and State Primary MCLs for VOCs, whichever is more stringent, prior to discharge to land. By meeting the Federal and State MCLs for VOCs before discharge, the remedy will satisfy the RCRA LDRs.

The container storage requirements in 22 CCR Sections 66264.170 -.178 are relevant and appropriate for the storage of contaminated groundwater over 90 days.

On-site storage or disposal of the spent carbon from the treatment system for more than ninety (90) days could trigger the State HWCA requirements for storage and disposal if the spent carbon contains sufficient quantities of hazardous constituents that cause the spent carbon to be classified as a characteristic hazardous waste. If the spent carbon is determined to be a hazardous waste under HWCA (Sections 66261 and 66262), the requirements for handling such waste set forth in Sections 66262 and 66268 are applicable.

## 10.4 Additional Matters

### 10.4.1 California Water Well Standards

Substantive standards for construction of public water supply wells have been published by the State as the California Water Well Standards. While these standards have not been specifically promulgated as an enforceable regulation and are therefore not ARARs, all groundwater facilities designed, located and constructed to produce drinking water must be constructed in accordance with these standards. Since the remedy involves delivery of the treated water to the public supply system, EPA has determined that the action shall comply with substantive Water Well Standards for construction of water supply wells, such as sealing the upper annular space to prevent surface contaminants from entering the water supply. Wells constructed solely for treatment and reinjection with no delivery to the public supply system would not be subject to these water well construction standards.

### 10.4.2 OSHA Requirements

Requirements of nonenvironmental laws, such as California OSHA regulations (8 CCR 5192) are not considered as ARARs and all

such requirements applicable at the time of the activity would have to be satisfied.

## 11. THE SELECTED REMEDY

The remedial objectives of the Baldwin Park OU are to prevent future increases in, and begin to reduce, concentrations of trichloroethene, tetrachloroethene, carbon tetrachloride, and other VOCs in groundwater in the Baldwin Park area (hereafter referred to as contaminants or contaminated groundwater) by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection, and by removing contaminants from the aquifer.

An additional objective of this remedy is to collect and analyze groundwater quality, groundwater flow, and other data during operation of the remedy to determine final *in situ* clean up standards for the Baldwin Park area. Among the critical decisions to be made are the extent to which, and the timeframe in which, to address lower levels of contamination which may remain in the aquifer after construction and initial operation of the remedy. The final ROD will include *in situ* restoration standards, which may differ for different portions of the OU area, and may call for additional remedial actions in the area. EPA expects that this interim remedy will provide the basis for the final remedy for the Baldwin Park area.

At a minimum, EPA will formally evaluate the performance of the remedy every five years.

EPA's selected remedy includes the extraction rates and locations included in Alternative 1 and the option of distributing treated water to local purveyors (as described in Alternative 1) or to Metropolitan (as described in Alternatives 3 and 4). These components of the remedy are identical to the Proposed Plan. The extraction, treatment, water use, and monitoring components of the remedy are described further below. Also noted are project details that may change during the remedial design and construction processes (e.g., number and type of monitoring wells).

### 11.1 Extraction Locations

The selected remedy shall include extraction of contaminated groundwater at the downgradient end of two broad areas of

contamination to limit contaminant migration and remove contaminant mass. The two areas are:

- **The Lower Area:** the portion of the aquifer in the vicinity of the San Bernardino Freeway (I-10), east of the San Gabriel River and west of Azusa Avenue (Highway 39), where concentrations of contaminants listed in Table ROD-1 or other VOCs are approximately 10 times Federal or State drinking water standards, and where downgradient portions of the aquifer are significantly less contaminated, between ND (non-detectable) and two times drinking water standards. Extraction wells shall be located to maximize protection of downgradient water supply wells. The areas are described by ranges of concentrations because actual concentrations vary month to month and year to year. *Approximate* boundaries of this area are shown in Figure ROD-10 as the Lower Area.

- **The Upper Area:** the portion of the aquifer north of Arrow Highway, immediately east of the Santa Fe Dam, containing a significant mass of *non-aqueous phase contamination* or other known or suspected surface or subsurface sources of contaminants listed in Table ROD-1 or other VOCs that are acting as continuing sources of dissolved-phase groundwater contamination. Available data indicate the presence of sources of contamination upgradient of wells W10WOMW1, V10VCMW1, V10VCMW2, OSCOMW2-5, Aerojet MW3-4, and W11AZW-03 and -09. Concentrations of PCE or TCE at most of these wells have exceeded 200 times drinking water standards. If additional investigation work indicates the presence of additional sources, the pumping configuration should be modified to the extent feasible to capture the additional sources. *Approximate* boundaries of this area are shown in Figure ROD-10 as the Upper Area.

EPA's analyses indicate that its remedial objectives can be efficiently met by extracting contaminated groundwater from the upper 400 - 500 feet of the aquifer; from three wells in the lower area and two wells in the upper area. Figure ROD-13 shows approximate extraction locations as well locations 13, 10, 5, 6, and 4. EPA recognizes that other pumping configurations, increasing the number of extraction wells but reducing rates, or decreasing the number of wells but increasing rates, may be equally efficient. If supplemental analyses demonstrate that alternative pumping configurations are equally efficient, they may be substituted for EPA's recommended locations. The phrase *pumping configuration* refers to precise extraction locations and rates within the upper and lower areas of contamination.

EPA believes that it is premature to select the number of wells or make a final decision on extraction locations at this

time. Final decisions on extraction locations, and final decisions on whether existing wells in the vicinity of EPA's selected locations will satisfy these requirements, will be made during remedial design.

### 11.2 Extraction Rates

The selected remedy shall include extraction of contaminated groundwater at locations and rates sufficient to *capture* or *contain* particles (representing contaminants dissolved in the groundwater) moving from the upper and lower areas of contamination. Extraction shall result in *capture zones* that include the two subareas during all anticipated recharge conditions.[1] The *capture zones* shall also include all significant depth intervals where contaminant concentrations exceed MCLs for contaminants listed in Table ROD-1 or for other VOCs. The extraction system may be designed to allow contaminated groundwater to temporarily move past the extraction locations during periods of high recharge at the Santa Fe Spreading Grounds or elsewhere if the system can *recapture*, during subsequent periods of lower recharge, any contaminated groundwater that has moved beyond the extraction locations.

EPA's analyses indicate that its remedial objectives will be efficiently met by extracting 19,000 gpm of contaminated groundwater. EPA's analyses indicate that approximately 10,500 gpm of groundwater must be extracted more or less continuously in the lower area; approximately 8,500 gpm of groundwater must be extracted in the upper area. EPA's analyses indicate that these rates will intercept and capture contaminated groundwater during recharge and pumping conditions similar to those occurring between October 1977 and June 1990. During recharge conditions similar to the exceptionally rainy spring of 1983, contaminated groundwater may temporarily move beyond the extraction locations, but, in particle tracking simulations, appears to be subsequently recaptured.

If supplemental data and analyses justify modifications to EPA assumptions about the extent of contamination, hydraulic conductivity, regional flow gradients (which vary significantly depending on the amount and timing of precipitation and artificial recharge) or other factors that influence groundwater flow and contaminant transport, EPA will consider revised rates. EPA will also consider seasonally-variable rates that meet the requirements of this Section.

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[1]The amount and timing of precipitation and artificial recharge vary month to month and year to year, as do the resulting regional flow gradients.

Extraction shall occur as continuously as feasible. Feasibility may be temporarily limited by insufficient capacity to accept or distribute treated water by the recipient of the treated water, resulting from low customer demand (e.g., during rainy winter days) or competition for use of recharge areas.

### 11.3 Treatment

The extracted contaminated groundwater shall be treated to remove contaminants listed in Table ROD-1 and other VOCs by either or both of two proven treatment technologies: liquid-phase granular activated carbon (LGAC) filtration and *air stripping*. The treated groundwater exiting the treatment facilities shall meet Federal and State primary MCLs for contaminants listed in Table ROD-1 and for other VOCs. In addition, the treated groundwater shall meet proposed Federal secondary MCLs for ethylbenzene and toluene. If *air stripping* is used, offgas controls (e.g., *vapor phase granular activated carbon*) shall be used to reduce air emissions in accordance with ARARs promulgated by the South Coast Air Quality Management District. EPA believes that if properly designed, these proven treatment technologies (LGAC and *air stripping*) are equally effective at removing VOCs for most mixes of contaminants. One technology may be used at one location and the other at a different location, or both technologies may be used in a *treatment train* at a single location.

Existing treatment facilities (e.g., planned treatment at Valley County Water District's Big Dalton well) may be incorporated into the remedy if, during remedial design, agreements can be reached for their use and they meet other requirements of this Record of Decision. The San Gabriel Basin Water Quality Authority (the project's sponsor) expects construction to be completed in late 1994. One or more new treatment facilities shall be constructed to provide the remaining treatment capacity.

An Advanced Oxidation Process may be used for pretreatment in combination with LGAC treatment if proven to be effective and economical during design phase testing and analysis. The VOC treatment technology or combination of technologies which best meet the objectives of the remedy for the Baldwin Park OU will be determined during the remedial design phase, when more detailed and up to date information will be available to assess effectiveness and cost. Final decisions on the locations of the treatment facilities will also be made during remedial design.

### 11.4 Water Distribution and Use

The selected remedy shall include pipelines, pump stations, and other conveyance facilities needed to transport the treated groundwater to one or more delivery locations. If treated water is supplied to one or more water purveyors, the delivery location or locations shall be at a pipeline, storage reservoir, or other portion of the purveyors' distribution systems. The purveyors would be responsible for distributing the water to their residential and business customers through their existing distribution systems. The selected remedy may also include improvements to the recipient's existing distribution system if the improvements are needed to allow the recipient to accept treated groundwater at extraction rates required by Section 11.2 of this ROD.

EPA's preference is that treated water be delivered to water purveyors. The advantages of supplying water to purveyors, rather than recharge, are: reduced pumping costs; the lower risk of inadequate distribution during and after rainy months; and purveyors downgradient of Subarea 3 could reduce extraction at existing water supply wells located outside of the highly contaminated areas that may be pulling contaminated groundwater into less contaminated areas or depths.

Initial discussions with water purveyors indicate that purveyors in best position to accept treated water are San Gabriel Valley Water Company, Suburban Water Systems, Covina Irrigating Company (CIC), the cities of Azusa and Glendora, and Metropolitan. CIC and Metropolitan are wholesalers of water that would in turn supply retail water companies; the other four companies supply businesses and residents directly. CIC's potential customers include the City of Covina, the City of West Covina, Suburban Water Systems, and others. Metropolitan's customers include a large number of water agencies both within and outside of the San Gabriel Valley.

EPA would actively support supplying treated water to Metropolitan if it would decrease the cost of the project and reduce institutional barriers. Supplying water to Metropolitan would provide water users throughout Southern California with a new source of water during peak demand periods, and probably benefit from Metropolitan expertise in building and operating large water supply projects. If Metropolitan receives treated water, they would probably play a significant role in the design, construction, and/or operation of the remedy to ensure that the project meets their water supply requirements. Metropolitan has reportedly budgeted $25 million for a *conjunctive use* project in the San Gabriel Basin.

EPA believes that it is premature to specify any one or a combination of recipients of the treated water. The final decision will be made after completion of the ROD depending on the outcome of additional negotiations with potential recipients of the treated water to identify recipients that can be supplied at least cost with the fewest institutional obstacles. Arrangements must be made with recipients to address EPA and purveyor financial obligations (see footnote, page 60); responsibility for design, construction, operation, and maintenance; timing and dependability of the supplied water; water rights issues; and other issues.

The potential for funding through the Reclamation Projects Authorization and Adjustment Act of 1992 (P.L. 102-575) will also be considered. The Act authorizes Federal funding of up to 25% for "the design, planning and construction of a conjunctive-use facility designed to improve the water quality in the San Gabriel groundwater basin and allow the utilization of the basin as a water storage facility."

If water purveyors can accept water for most, but not all, of the year, excess water shall be delivered to a location or locations from which it can flow into spreading basins and flood control channels operated by the Los Angeles County Department of Public Works for recharge into the aquifer. If agreements cannot be reached with San Gabriel Basin water purveyors, water shall be recharged year-round. If recharge is necessary, recharge location(s) will be determined during remedial design. If treated water is recharged, the State anti-degradation requirement is an additional ARAR that may influence the level of treatment. If treated water is recharged, the remedy may include activities to maintain or improve the infiltration capacity of the spreading grounds, or to acquire or develop new recharge facilities. If treated water is discharged to a surface water, the discharge shall meet NPDES requirements.

### 11.5 Monitoring Program

The remedy shall include the installation and sampling of groundwater monitoring wells, the sampling of existing monitoring wells, measurement of groundwater elevations at monitoring and production wells, and the measurement of other aquifer properties to:

- Verify or refine the boundaries of upper and lower areas to help determine final pumping configurations.
- Verify or refine the efficiency of EPA's recommended pumping configurations.

- Verify or revise contaminant influent concentration estimates that will be used in the design of the OU treatment facilities.

- Provide an early warning network so that changes in the groundwater flow regime or contaminant concentrations that may require modifications in extraction rates, well locations, or treatment methods are identified in time to institute the necessary facility and operational changes.

- Evaluate the presence and approximate location of non-aqueous phase contamination or other subsurface sources of groundwater contamination to supplement site assessments of individual facilities or properties.

- Evaluate the effectiveness of the remedy in satisfying the remedial objectives of limiting the vertical and lateral migration of contaminated groundwater and removing contaminant mass in and downgradient of the upper and lower areas. The evaluation may include plotting and interpretation of temporal trends in water quality, analysis of changes in groundwater flow induced by the extraction wells, and computer simulations of groundwater flow, including the estimation and evaluation of *capture zones*.

- Help determine the need for additional remedial actions in the Baldwin Park area and the nature of the final remedy (e.g., the extent to which and timeframe in which aquifer restoration is feasible). Satisfying this objective may include lab or field testing to estimate parameters that govern sorption, biogical degradation, or other processes that affect contaminant transport in the aquifer (e.g., concentrations of total organic carbon, dissolved oxygen or other gases, nutrients, indigenous microbial populations).

Satisfying one or more of the monitoring objectives may also require ancillary data, including information on pumping and recharge rates and volumes, lithology, measurements of hydraulic conductivity, and measurements of other aquifer properties. These data are needed to allow for accurate determinations of the direction and magnitude of horizontal and vertical flow in the vicinity of the remedial action; discern significant temporal variation in flow gradients; and simulate the effects of recharge and pumping on groundwater flow. These data are also needed to refine the understanding of the geology in the Baldwin Park area, including the occurrence and extent of highly permeable or fine-grained deposits which could affect groundwater flow paths.

Groundwater monitoring shall begin during the time of remedial design to provide data necessary to complete the final

design and to establish pre-implementation, *baseline* conditions. Initially, collection and analysis of groundwater quality samples shall occur no less frequently than bimonthly for VOCs and quarterly for other parameters (except for less frequent depth-specific sampling of extraction wells). Initially, measurement of water levels shall occur no less frequently than monthly. Monitoring frequency may decrease if EPA determines that conditions warrant such a decrease. Frequency may vary by parameter. Water quality parameters to be quantified will include VOCs, semivolatile organic compounds, general minerals, nitrate ($NO_3$), radon, and physical parameters required for treatment purposes (e.g., color, turbidity, and odor).

EPA's preliminary recommendations, which rely as much as possible on existing wells, are to include the following numbers and types of wells in the monitoring program:

- Water quality and water level data at twenty-four existing inactive and active production wells, including two existing wells that may be used as extraction wells. Some of these wells are currently sampled as part of the Title 22 monitoring program, but it may be necessary to increase the number and frequency of parameters analyzed;

- Water quality and water level data at five existing *standard* monitoring wells and one existing MP monitoring well, which include the Baldwin Park Key Well and the U.S. Environmental Protection Agency's deep multiple port (MP) monitoring well (MW5-1). Also, continued sampling of selected facility site assessment wells. Although most site assessment wells penetrate a relatively small portion of the saturated zone, their location upgradient of likely extraction well clusters make selected wells favorable monitoring points for assessing future water quality at the clusters;

- Water quality and water level data at two new MP monitoring wells (or equivalent conventional well clusters);

- Water quality and water level data at two new two-well monitoring well clusters (These wells were added in response to public comments on the FS and Proposed Plan - See Part III of this ROD.);

- Water quality and water level data at eight new three-well monitoring well clusters (One three-well cluster was added in response to public comments on the FS and Proposed Plan - see Part III of this ROD.);

- Three new piezometer clusters, each containing three wells (one set near each extraction well in Subarea 3) to provide more detailed data on water level changes near the extraction wells and evaluate the effective capture zone of the extraction wells; and

- Wellhead water quality data, depth-specific water quality data, spinner logging, and water level data at or adjacent to the five new extraction wells[2] - to evaluate the effectiveness of contaminant removal.

Locations and construction information on existing production and monitoring wells are shown in Table ROD-7 and Figure ROD-14. The purpose and location of the new wells are described in Table ROD-8 and Figure ROD-14. The depth and number of sampling zones are based, in part, on estimates of the vertical extent of groundwater contamination.

Additional monitoring wells or piezometers shall be installed to replace existing wells if significant vertical gradients complicate the interpretation of water level data collected from production wells; or if existing wells currently planned for inclusion in the program are abandoned.

Locations shown in Figure ROD-14 may be revised, or locations added or eliminated, if extraction locations change, if EPA's interpretation of the lateral or vertical extent of contamination changes, if influent concentrations to the treatment facilities vary unexpectedly (requiring installing additional wells to evaluate the magnitude and cause of the observed deviation); if source investigations identify previously unknown sources requiring characterization; or if individual facility or property owners install new wells that should be included in the monitoring program.

The remedy shall also include sampling of influent and effluent water quality, into and exiting the treatment facilities, and other collection and analysis of interpretive data needed to meet the monitoring objectives outlined in this section. EPA also recommends one-time geophysical logging of new-well pilot holes and aquifer testing at new wells to provide information on aquifer parameters and characteristics.

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[2] A cost-effective means of obtaining this data is to install a permanent access pipe in at least one well at each extraction well cluster. This allows for spinner logging and collection of depth-specific water samples during operation.

## 11.6 Project Costs

The following two tables present estimates of the capital costs, and operation and maintenance costs, for the remedy. The estimated construction cost subtotal, which includes the extraction, treatment, conveyance, and monitoring hardware, is $25 million[3]. An additional $22 million is added to account for engineering design, construction services, legal and administrative costs, contingencies, and land acquisition. The majority of the estimated construction costs of the remedy (more than 75%) are associated with the treatment and conveyance components. The majority of the estimated operating costs of the remedy is for the purchase of electricity and carbon.

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[3] This estimate does not include the costs of the three monitoring well clusters added to the remedy in response to public comments. The estimated capital cost of the three wells is less than $0.4 million; the estimated operating cost is less than $0.1 million.

| **Capital Costs Estimates for the Selected Remedy, Baldwin Park OU** | **Millions of Dollars** |
|---|---|
| Extraction System: New Groundwater Extraction Wells and Monitoring Wells | 4.1[3] |
| Treatment System for VOC Removal | 10.7 |
| Conveyance System: Pipelines, Pump Stations, and Other Conveyance System Hardware | 8.5 |
| Other Construction Costs | 1.6 |
| "Bid and Scope" Contingencies (estimated at 35% of extraction, treatment, conveyance, and other construction costs) | 8.8 |
| Construction Services (estimated at 10% of extraction, treatment, conveyance, other construction, and contingency costs) | 3.4 |
| Land Acquisition | 1.5 |
| Engineering Design, Legal, and Administrative Costs (estimated at 22% of extraction, treatment, conveyance, other construction, contingency, and land acquisition costs) | 8.5 |
| TOTAL CAPITAL COSTS: | 47.1[3] |

| **Operation and Maintenance Cost Estimate for the Selected Remedy, Baldwin Park OU** | **Annual Costs (millions of dollars)** |
|---|---|
| Electrical Costs for Extraction Wells | 1.5 |
| Electrical Costs for Pump Stations | 0.7 |
| Electrical Costs for Treatment System | 0.4 |
| Carbon Replacement | 0.9 |
| Other Treatment Plant Costs | 0.8 |
| Monitoring Well Sampling | 0.7[3] |
| Maintenance (estimated as 2% of capital cost estimate) | 0.7 |
| *Purveyor Reimbursement Costs (estimated at $50/acre-foot)*[4] | *- 1.5* |
| TOTAL OPERATION AND MAINTENANCE COSTS: | 4.2[3] |

The net present value of the remedy, assuming 30 years of operation, a discount rate of 7%, and purveyor reimbursement of $50/acre-foot, is $99.7 million[3].

Three major assumptions made in developing the cost estimates are described below.

> **Availability of Existing Wells:** The cost estimate assumes that two inactive existing water supply wells in the OU area, owned by local purveyors, can be used as part of the remedy. If additional existing wells are used, costs would decrease slightly. If, instead, new wells must be constructed, capital costs would increase slightly.

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[4] EPA expects that water purveyors that accepted and distributed treated water would contribute to project operating costs to offset any savings resulting from not using other sources of water. These *avoided costs* range from $30 per acre-foot for purveyors that pump clean groundwater to more than $300 per acre-foot for purchases of imported water. One acre-foot equals 325,829 gallons.

**Estimated Contaminant Concentrations:** If actual contaminant concentrations differ from the estimated concentrations, or if new contaminants are detected, operating costs will change. If the deviations are large, capital modifications may be necessary. The largest impact would be if increasing nitrate ($NO_3$) concentrations in the groundwater make installation of $NO_3$ treatment necessary. The cost of $NO_3$ treatment is not included because of limitations in EPA's ability to predict the timing and magnitude of future increases in $NO_3$ concentration in groundwater, and uncertainty about $NO_3$ treatment requirements of the recipients of the treated water.

**Availability of Existing Treatment Facilities:** The cost estimate assumes that new treatment facilities, with a capacity of 19,000 gpm, must be built. One or more planned or existing treatment facilities may be available and offset the need for new treatment capacity, reducing the capital costs of new treatment facilities.

## 12. STATUTORY DETERMINATIONS

As required under Section 121 of CERCLA, the selected interim remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the interim remedial action, and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment to reduce toxicity, mobility, and volume as a principal element.

### 12.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by limiting further downgradient and vertical migration of contaminated groundwater and removing significant contaminant mass from the aquifer. The remedy will reduce potential risks by decreasing the likelihood and magnitude of future exposure to contaminated groundwater. Contaminant concentrations in the groundwater in the areas to be addressed by the remedy are currently tens to thousands of times acceptable levels. The selected treatment technologies are technically feasible and proven effective at meeting ARARs for VOCs in the treated groundwater and air. Implementation of the remedy will not pose unacceptable short-term risks. In addition, no adverse cross-media impacts are expected.

### 12.2 Compliance with ARARs

The selected remedy shall comply with all ARARs, which are listed in Section 10 of this ROD. No ARARs waivers are expected to be needed. Because the selected remedy is an interim remedy, it may not achieve final cleanup levels for the groundwater and no chemical-specific ARARs for aquifer cleanup are included. In Alternatives 1-4, chemical-specific ARARs for the treated water from the VOC treatment plant are Federal MCLs and more stringent State MCLs for VOCs.

### 12.3 Cost-Effectiveness and Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA believes that the selected remedy is cost-effective and utilizes permanent solutions and treatment technologies to the maximum extent practicable *for an interim remedy*. The selected remedy will reduce the mobility of the contaminants in two critical portions of the aquifer and will permanently reduce the volume of contamination by limiting the spread of the contamination and removing contaminant mass. The likelihood that the remedy will operate for as many years as needed will be increased if, as recommended, the treated water becomes a dependable source of potable water. If the treated groundwater becomes a dependable source of potable water, it would provide an incentive for recipients of the treated water to support the project's continued operation. The remedy calls for the construction of conveyance systems and negotiation of agreements needed to supply treated water to water purveyors for distribution to their customers.

Extraction of contaminated groundwater in a third portion of the aquifer would increase the effectiveness of the remedy and reduce the mobility and volume of contaminants by further limiting migration within the area of contamination and removing additional contaminant mass. Costs would increase, however, by approximately 50%. (The area of contamination addressed in the Baldwin Park OU is large, making it infeasible to limit migration throughout the entire area of contamination. Any realistic remedy must select the area or areas of contamination that would benefit most from additional protection.) EPA does not believe that the incremental benefits of groundwater extraction in a third subarea warrant the additional costs at present, given that the selected remedy is an interim remedy. Adding a third area may also decrease the implementability of the remedy due to the need to distribute 50% more treated water, possibly delaying implementation of the project. Implementability issues include the need to reach agreements with additional parties that would receive treated water from an OU, resolution of water rights

issues, and acquisition of additional property and/or easements for the construction of extraction wells, treatment facilities, and conveyance facilities.

EPA evaluated comments from the State, which concurred with EPA's proposed remedy, and comments from the community, which are mixed in their recommendations. The community offered comments on a variety of topics, including the size of the remedy and the disposition of the treated water. Some commenters recommended a larger remedy; others recommended a smaller remedy. The more than 400 public comments received during the public comment period, along with EPA's responses, are presented in Part III of this ROD.

The most significant factors in the selection of the remedy are the interim status of the remedy, uncertainty about the cost-effectiveness of the alternatives not selected, and implementability. The Superfund evaluation criteria that were the most important in selecting the remedy were long-term effectiveness; reduction of toxicity, mobility, or volume; implementability; and cost.

### 12.4 Preference for Treatment as a Principal Element

This interim remedy will use treatment (*air stripping* and/or LGAC) to address the principal threat posed by the site: exposure to contaminated groundwater. Future actions may be needed, however, to completely reduce the threat to acceptable levels.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, at least once every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

## 13. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan was released for public comment in May 1993. The Proposed Plan called for groundwater extraction and treatment in the upper and lower areas (as identified in Alternative 1). The Proposed Plan differed from the description of Alternative 1 in the FS in one aspect: it identified local water purveyors <u>and</u> Metropolitan as potential recipients of the treated water. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

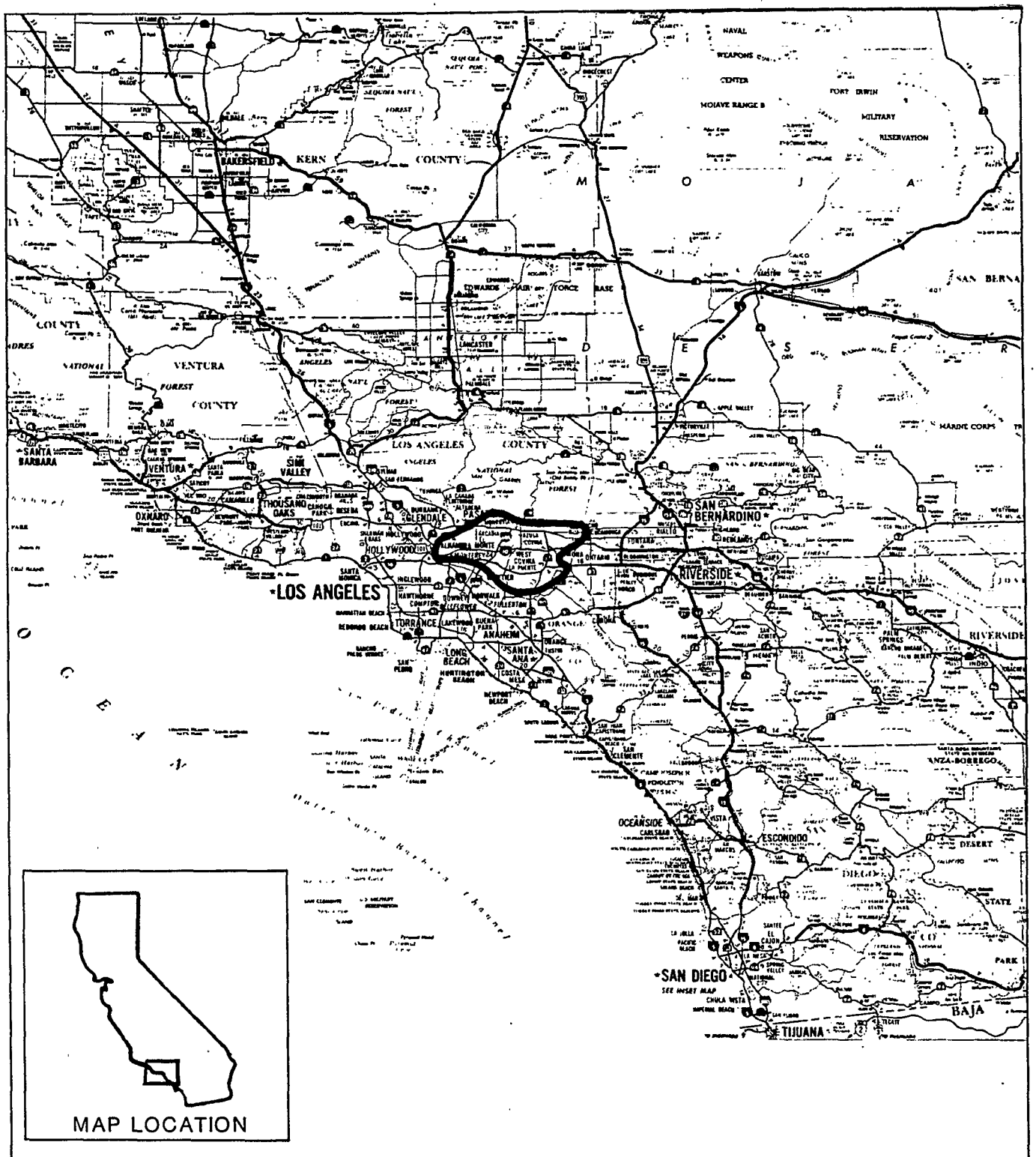
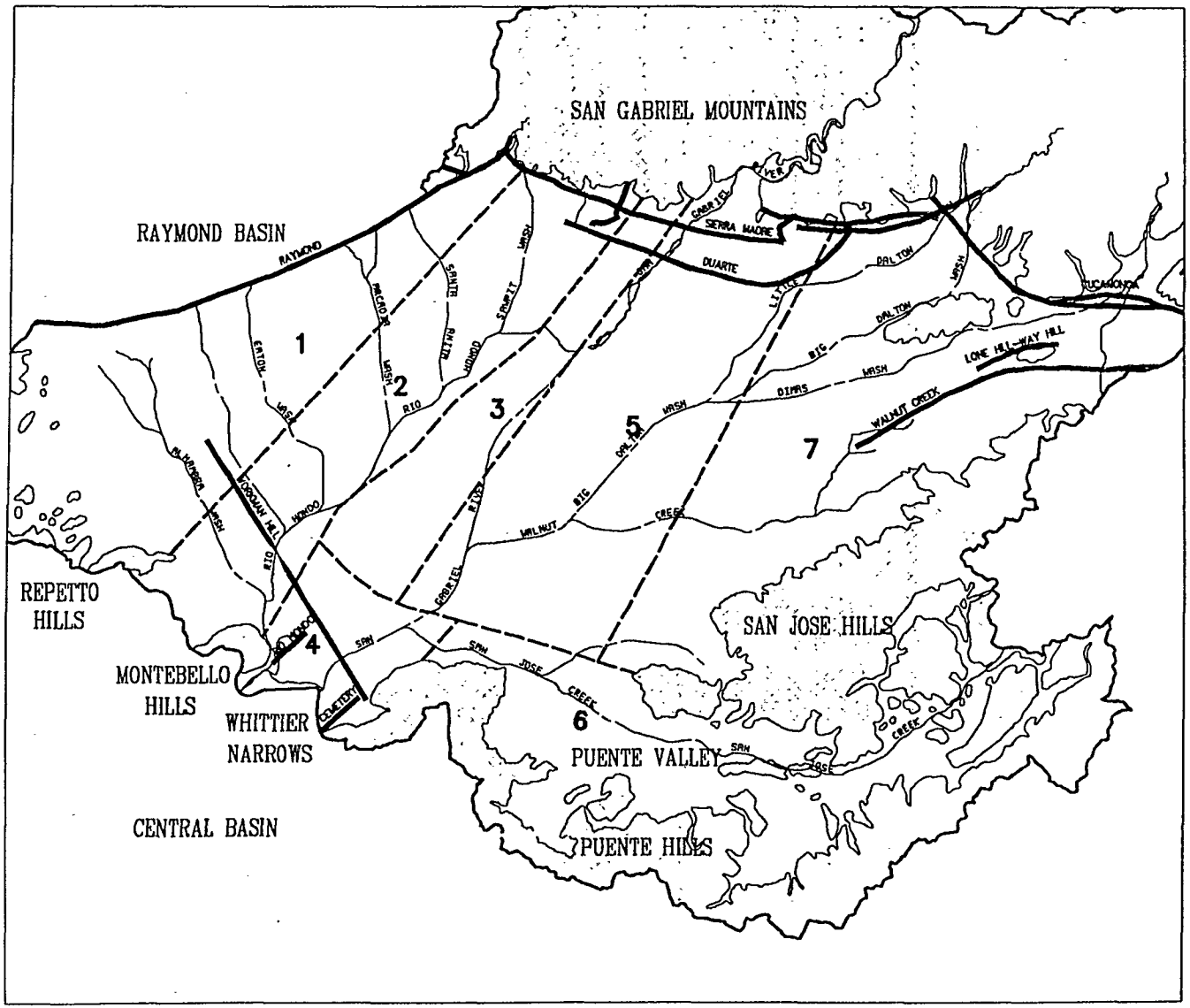



FIGURE ROD-1
LOCATION OF SAN GABRIEL BASIN
BALDWIN PARK OPERABLE UNIT

SAN GABRIEL BASIN




LEGEND:

- BEDROCK OUTCROP
- HYDROLOGIC BOUNDARY
- ALLUVIAL AQUIFER BOUNDARY
- RI AREAS
- STREAMS
- MAJOR FAULTS

N

0 1 2 3 4 5

MILES

FIGURE ROD-2

HYDROGEOLOGIC FEATURES IN THE SAN GABRIEL BASIN

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin

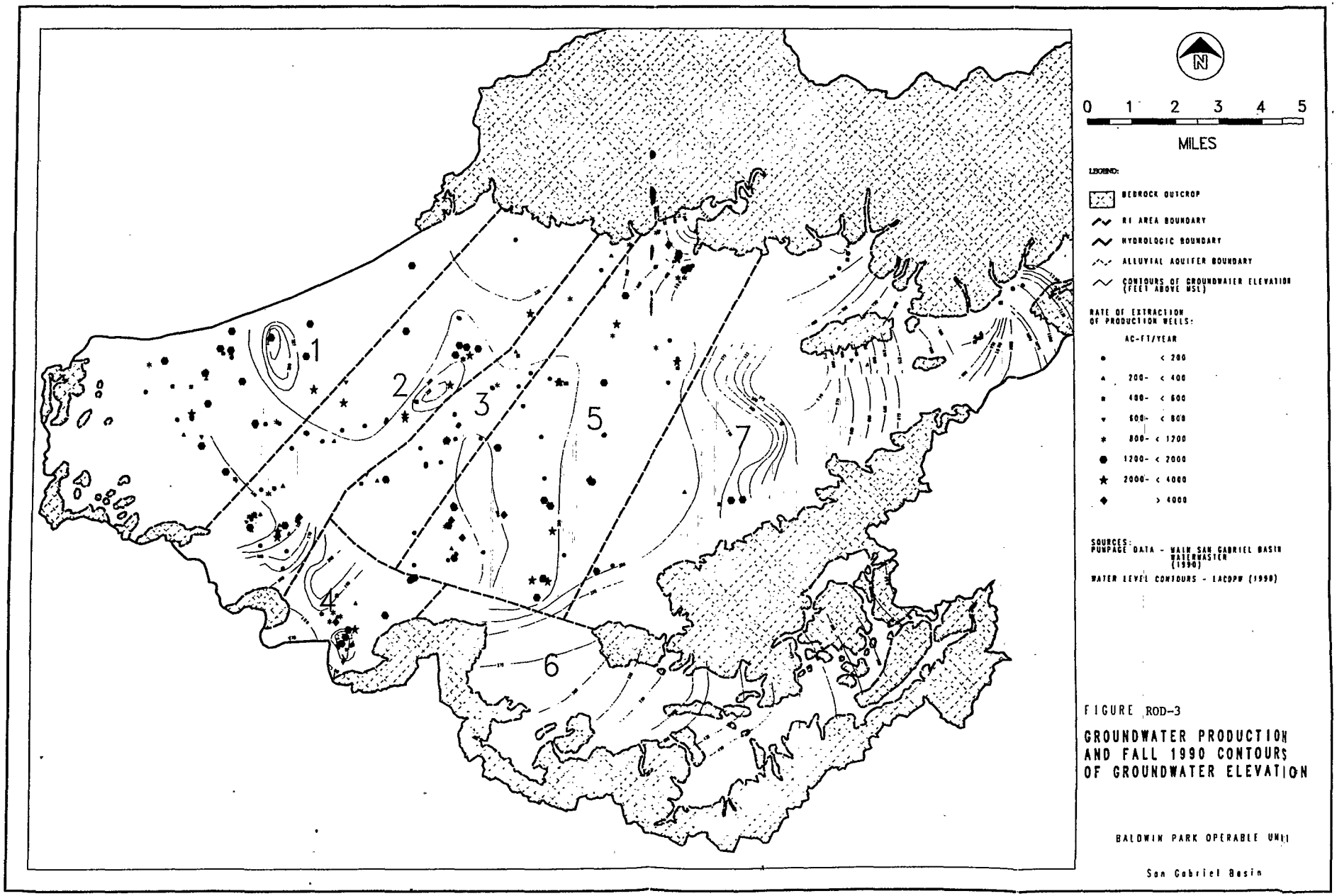



FIGURE ROD-3

GROUNDWATER PRODUCTION AND FALL 1990 CONTOURS OF GROUNDWATER ELEVATION

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin

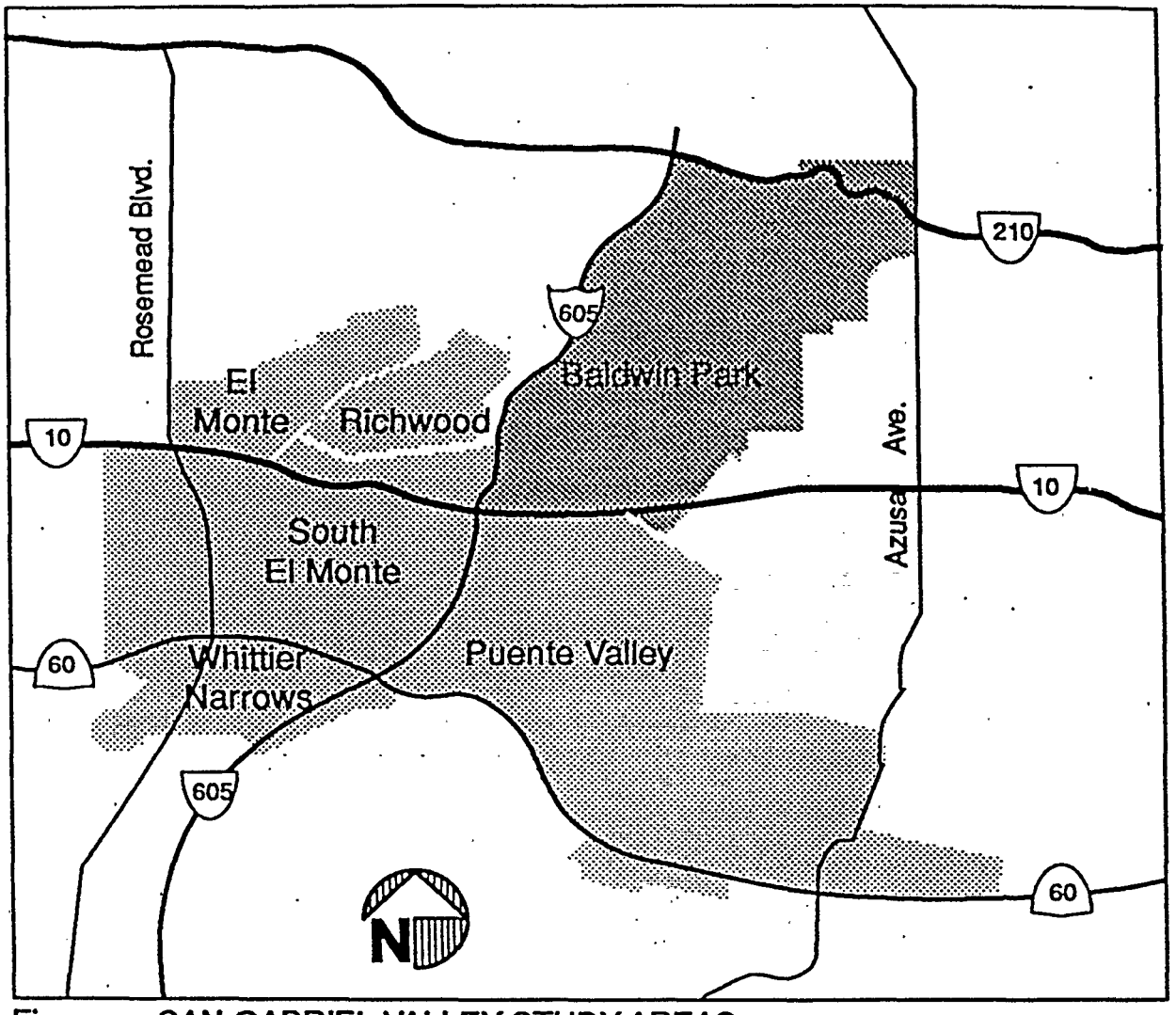
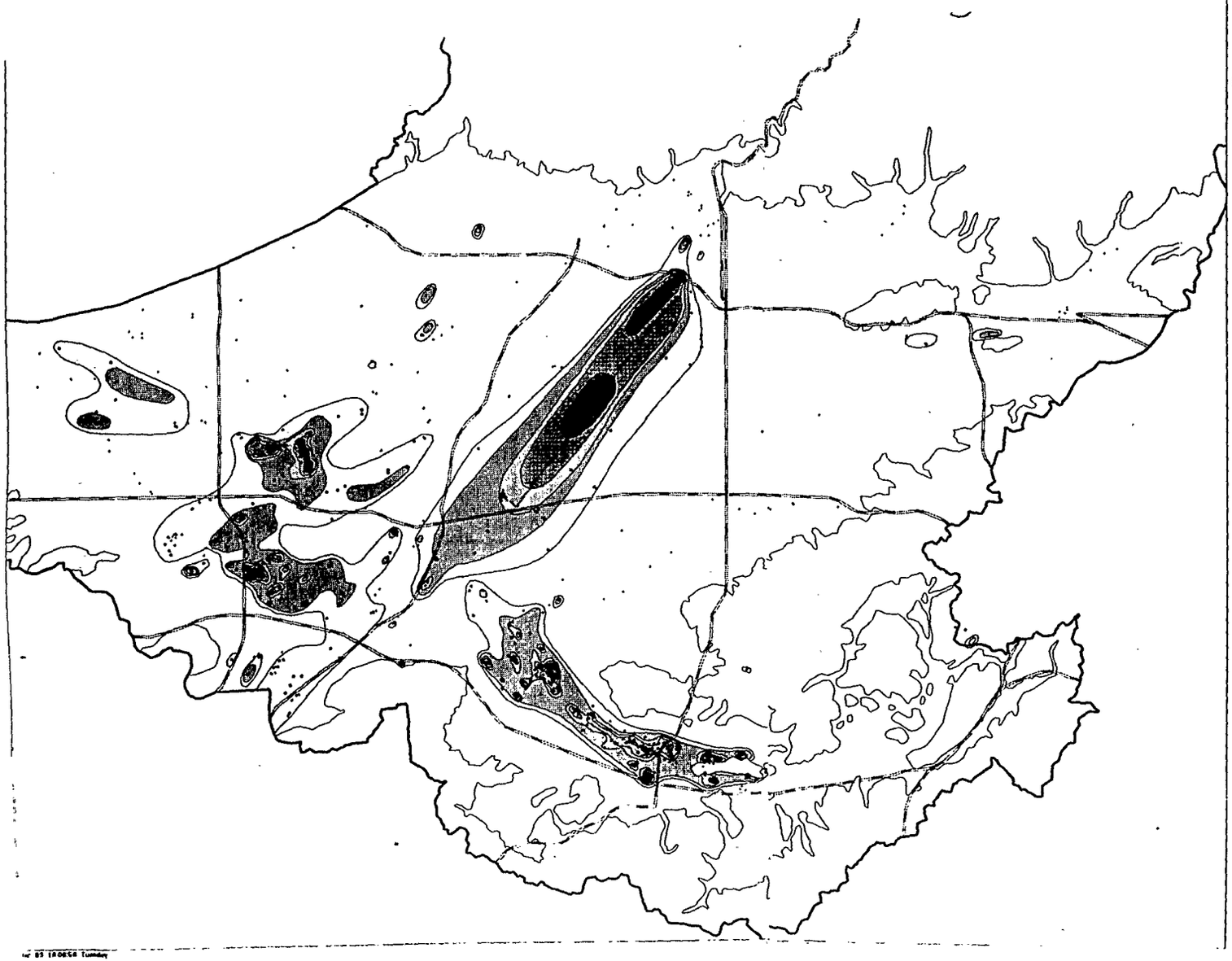



Figure SAN GABRIEL VALLEY STUDY AREAS
ROD-4



N

0 1 2 3 4 5

MILES

LEGEND:

- BEDROCK
- VOC CONTAMINATION POTENTIALLY EXCEEDING 1000X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM 100X TO < 1000X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM 20X TO < 100X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM 10X TO < 20X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM MCLS TO < 10X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM LABORATORY DETECTION LIMITS TO < MCLS
- HYDROLOGIC BOUNDARY
- BASIN BOUNDARY
- MAJOR TRANSPORTATION
- WELL ABOVE NON-DETECT
- NON-DETECT WELL
- WELL SAMPLED MORE THAN 1 YEAR PRIOR TO DATE OF MAP INTERPRETATION (10/10/93).

Location of Cross-section

THE AREAS OF CONTAMINATION SHOWN REPRESENT SIMPLIFIED APPROXIMATIONS BASED ON THE LAST AVAILABLE CONCENTRATION (THROUGH SEPTEMBER 1993) OF ANY VOC. DATA POINTS MORE THAN FIVE YEARS OLD WERE NOT CONSIDERED.

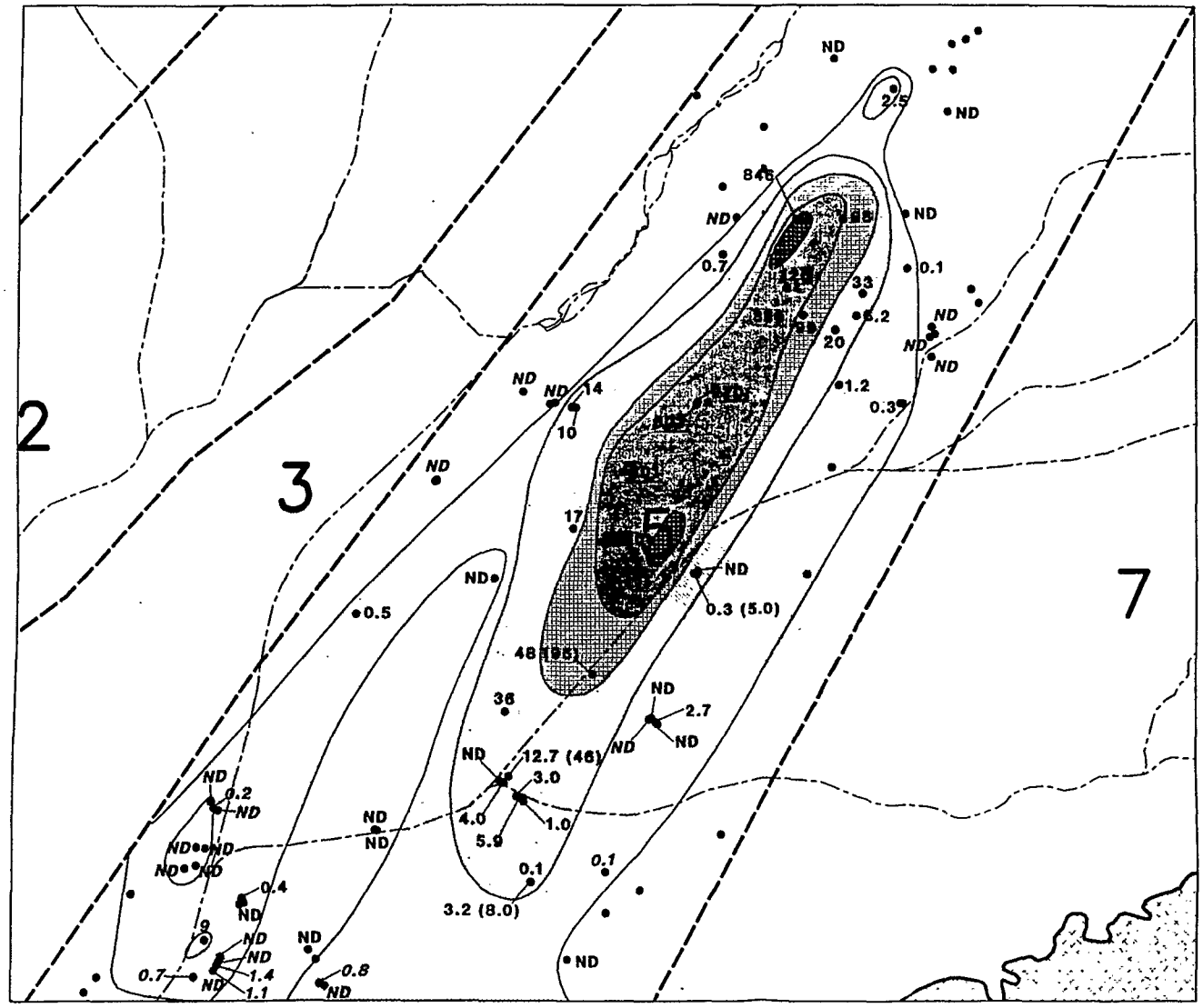
BECAUSE CONTAMINANT CONCENTRATIONS VARY WITH TIME, A WELL MAY AT TIMES PRODUCE WATER WITH DIFFERENT CONTAMINANT LEVELS THAN THOSE INDICATED. DIFFERENCES COULD ALSO BE CAUSED BY VERTICAL VARIATIONS IN CONTAMINATION (THE FIGURE IS A TWO-DIMENSIONAL DEPICTION OF CONTAMINATION THAT ACTUALLY VARIES WITH DEPTH).

THE FIGURE SHOWS ONLY REGIONAL VARIABILITY IN CONTAMINATION. IN MUCH OF THE BASIN, DISTANCES BETWEEN DATA POINTS ARE IN THE 1,000'S OF FEET. THUS, THERE IS SIGNIFICANT UNCERTAINTY IN THE TRUE LOCATIONS OF THE CONCENTRATION CONTOURS

**1993 VOC COMPOSITE**
**LAST AVAILABLE SAMPLE**
**THROUGH 10/10/93**

(Samples older than 5 years not evaluated.)

FIGURE ROD-5




LEGEND:

- ALLUVIAL AQUIFER
- RI AREAS
- STREAMS
- CONTAMINATION ZONE BOUNDARY
- TCE CONTAMINATION POTENTIALLY EXCEEDING 1000X MCLS
- TCE CONTAMINATION POTENTIALLY RANGING FROM 100X TO 1000X MCLS
- TCE CONTAMINATION POTENTIALLY RANGING FROM 20X TO 100X MCLS
- TCE CONTAMINATION POTENTIALLY RANGING FROM 10X TO 20X MCLS
- TCE CONTAMINATION POTENTIALLY RANGING FROM MCLS TO 10X MCLS
- TCE CONTAMINATION POTENTIALLY RANGING FROM LABORATORY DETECTION LIMITS TO MCLS (MCL = 5 ug/l)
- BEDROCK OUTCROP
- ● WELLS WITH WATER QUALITY DATA
- **97.5** AVERAGE TCE VALUE, INSIDE DATE RANGE (ug/l)
- *1.4* LAST TCE VALUE, OUTSIDE DATE RANGE (ug/l)
- **(46)** MAXIMUM DEPTH-SPECIFIC TCE VALUE (ug/l)

THE AREAS OF CONTAMINATION SHOWN REPRESENT SIMPLIFIED APPROXIMATIONS BASED ON THE AVERAGE CONCENTRATION OF THE VOC DETECTED BETWEEN JUNE 1980 AND AUGUST 1991 OR THE LAST SAMPLE IF NONE EXISTS IN THIS PERIOD. BECAUSE OF THE LONG TIME PERIOD, A WELL MAY AT TIMES PRODUCE WATER WITH DIFFERENT CONTAMINANT LEVELS THAN THOSE INDICATED. DIFFERENCES COULD ALSO BE CAUSED BY THE VERTICAL VARIABILITY IN CONTAMINATION (THE FIGURE IS A TWO-DIMENSIONAL DEPICTION OF CONTAMINATION THAT ACTUALLY VARIES WITH DEPTH.)

THE FIGURE SHOWS ONLY REGIONAL VARIABILITY IN CONTAMINATION. IN MUCH OF RI AREA 5, DISTANCES BETWEEN DATA POINTS ARE IN THE 1,000'S OF FEET. THUS, THERE IS SIGNIFICANT UNCERTAINITY IN THE TRUE LOCATIONS OF THE CONCENTRATION CONTOURS.

N

0 0.5 1 2

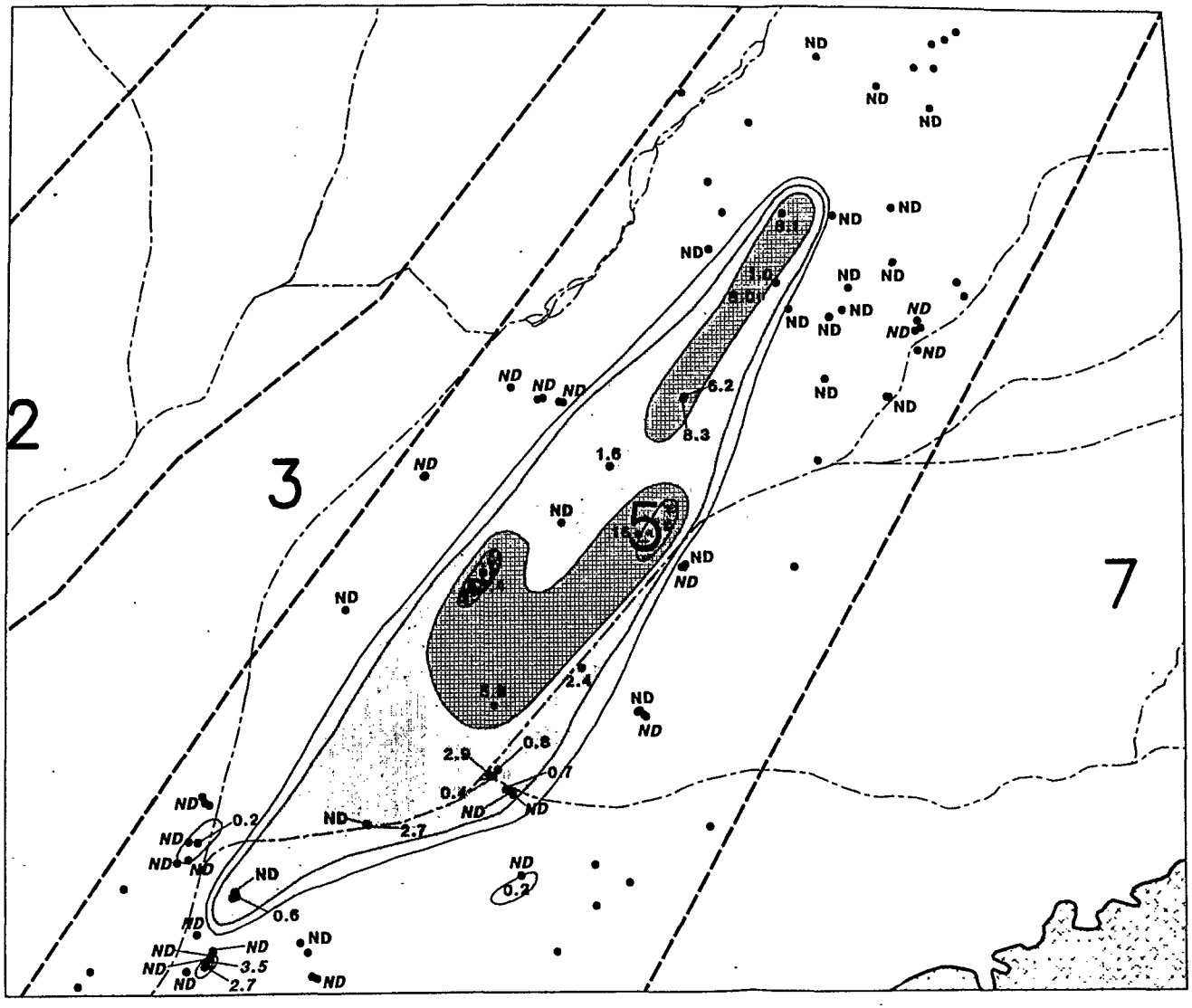
MILES

FIGURE ROD-6

BALDWIN PARK OPERABLE UNIT

ESTIMATED EXTENT OF TCE CONTAMINATION IN THE OU AREA

San Gabriel Basin




LEGEND:

- ALLUVIAL AQUIFER
- RI AREAS
- STREAMS
- CONTAMINATION ZONE BOUNDARY
- CTC CONTAMINATION POTENTIALLY EXCEEDING 1000X MCLS
- CTC CONTAMINATION POTENTIALLY RANGING FROM 100X TO 1000X MCLS
- CTC CONTAMINATION POTENTIALLY RANGING FROM 20X TO 100X MCLS
- CTC CONTAMINATION POTENTIALLY RANGING FROM 10X TO 20X MCLS
- CTC CONTAMINATION POTENTIALLY RANGING FROM MCLS TO 10X MCLS
- CTC CONTAMINATION POTENTIALLY RANGING FROM LABORATORY DETECTION LIMITS TO MCLS (MCL = 0.5 ug/l)
- BEDROCK OUTCROP
- WELLS WITH WATER QUALITY DATA
- 6.2 AVERAGE CTC VALUE, INSIDE DATE RANGE (ug/l)
- *3.5* LAST CTC VALUE, OUTSIDE DATE RANGE (ug/l)

THE AREAS OF CONTAMINATION SHOWN REPRESENT SIMPLIFIED APPROXIMATIONS BASED ON THE AVERAGE CONCENTRATION OF THE VOC DETECTED BETWEEN JUNE 1990 AND AUGUST 1991 OR THE LAST SAMPLE IF NONE EXISTS IN THIS PERIOD. BECAUSE OF THE LONG TIME PERIOD, A WELL MAY AT TIMES PRODUCE WATER WITH DIFFERENT CONTAMINANT LEVELS THAN THOSE INDICATED. DIFFERENCES COULD ALSO BE CAUSED BY THE VERTICAL VARIABILITY IN CONTAMINATION (THE FIGURE IS A TWO-DIMENSIONAL DEPICTION OF CONTAMINATION THAT ACTUALLY VARIES WITH DEPTH.)

THE FIGURE SHOWS ONLY REGIONAL VARIABILITY IN CONTAMINATION. IN MUCH OF RI AREA 5, DISTANCES BETWEEN DATA POINTS ARE IN THE 1,000'S OF FEET. THUS, THERE IS SIGNIFICANT UNCERTAINTY IN THE TRUE LOCATIONS OF THE CONCENTRATION CONTOURS.

N

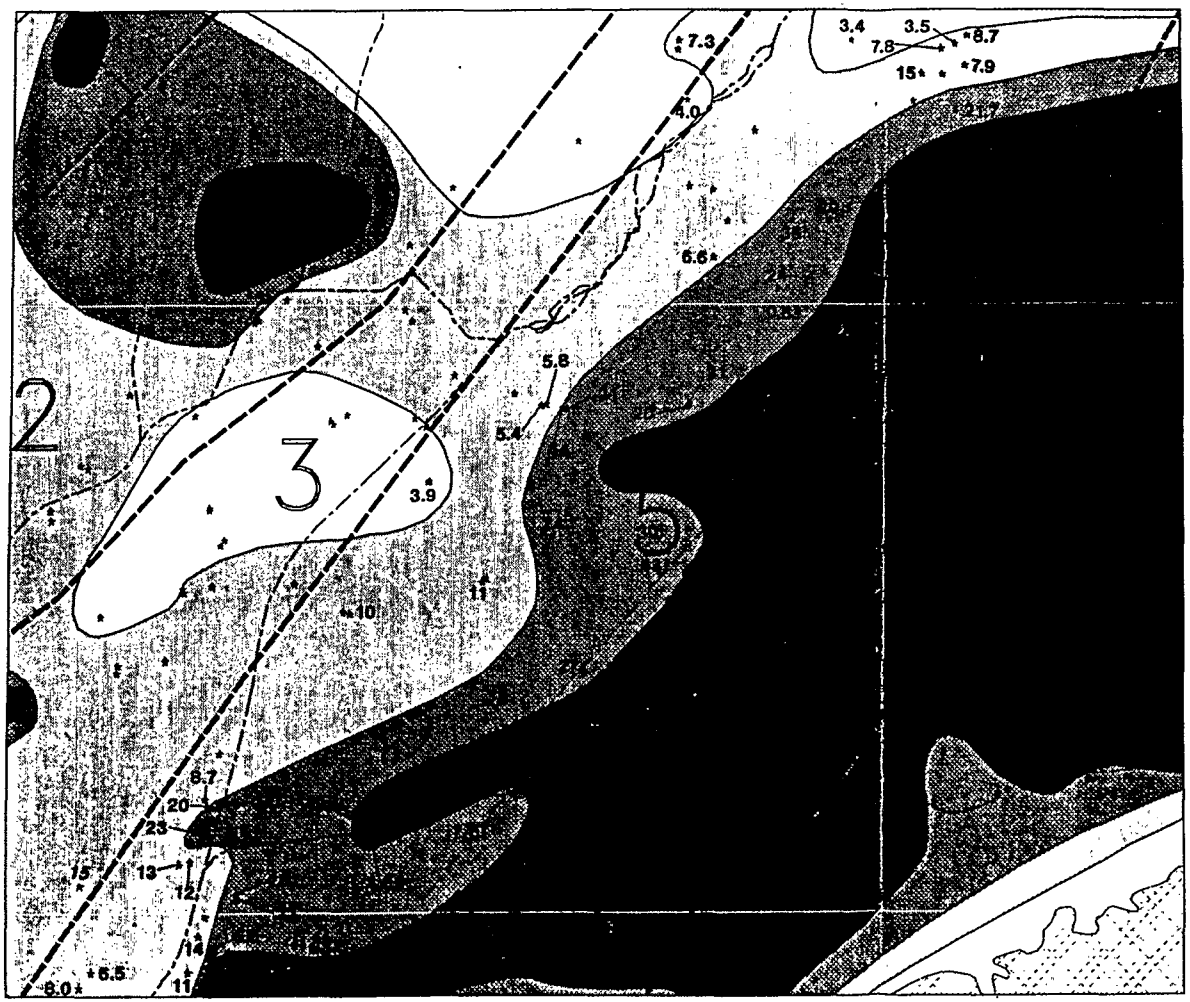
0 0.5 1 2
MILES

FIGURE ROD-7

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin

ESTIMATED EXTENT OF CTC CONTAMINATION IN THE OU AREA




LEGEND:

- BEDROCK OUTCROP
- HYDROLOGIC BOUNDARY
- ALLUVIAL AQUIFER BOUNDARY
- STREAMS
- RI AREA BOUNDARY
- WELLS
- NO3 CONTAMINATION POTENTIALLY EXCEEDING 90 PPM
- NO3 CONTAMINATION POTENTIALLY EXCEEDING 45 PPM
- NO3 CONTAMINATION POTENTIALLY EXCEEDING 20 PPM
- NO3 CONTAMINATION POTENTIALLY EXCEEDING 5 PPM
- NO3 CONTAMINATION POTENTIALLY EXCEEDING LABORATORY DETECTION LIMITS

51 MAXIMUM NO3 VALUE, INSIDE DATE RANGE

55 MAXIMUM NO3 VALUE, OUTSIDE DATE RANGE

THE AREAS OF CONTAMINATION SHOWN REPRESENT SIMPLIFIED APPROXIMATIONS BASED ON THE MAXIMUM CONCENTRATION OF NO3 DETECTED BETWEEN JULY 1986 AND JUNE 1991 OR THE LAST SAMPLE IF NONE EXISTS IN THIS PERIOD. BECAUSE OF THE LONG TIME PERIOD, A WELL MAY AT TIMES PRODUCE WATER WITH DIFFERENT NITRATE LEVELS THAN THOSE INDICATED. DIFFERENCES COULD ALSO BE CAUSED BY THE VERTICAL VARIABILITY IN CONTAMINATION (THE FIGURE IS A TWO-DIMENSIONAL DEPICTION OF CONTAMINATION THAT ACTUALLY VARIES WITH DEPTH.)

THE FIGURE SHOWS ONLY REGIONAL VARIABILITY IN CONTAMINATION. IN MUCH OF THE BASIN, DISTANCES BETWEEN DATA POINTS ARE IN THE 1,000'S OF FEET. THUS, THERE IS SIGNIFICANT UNCERTAINTY IN THE TRUE LOCATIONS OF THE CONCENTRATION CONTOURS.

N

0 0.5 1 2

MILES

FIGURE ROD-8

ESTIMATED EXTENT OF NITRATE CONTAMINATION IN THE OU AREA

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin

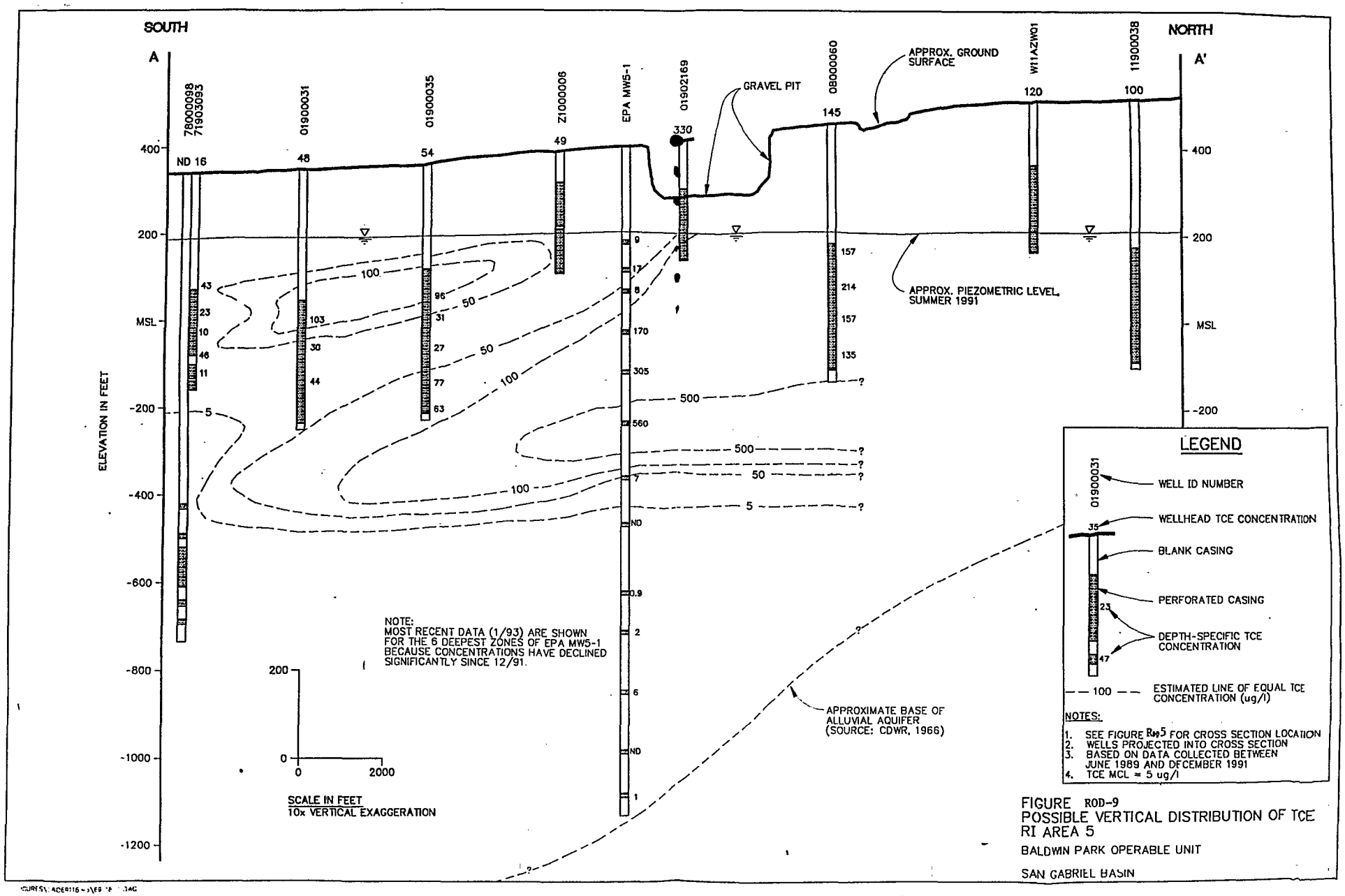



FIGURE ROD-9
POSSIBLE VERTICAL DISTRIBUTION OF TCE
RI AREA 5
BALDWIN PARK OPERABLE UNIT
SAN GABRIEL BASIN

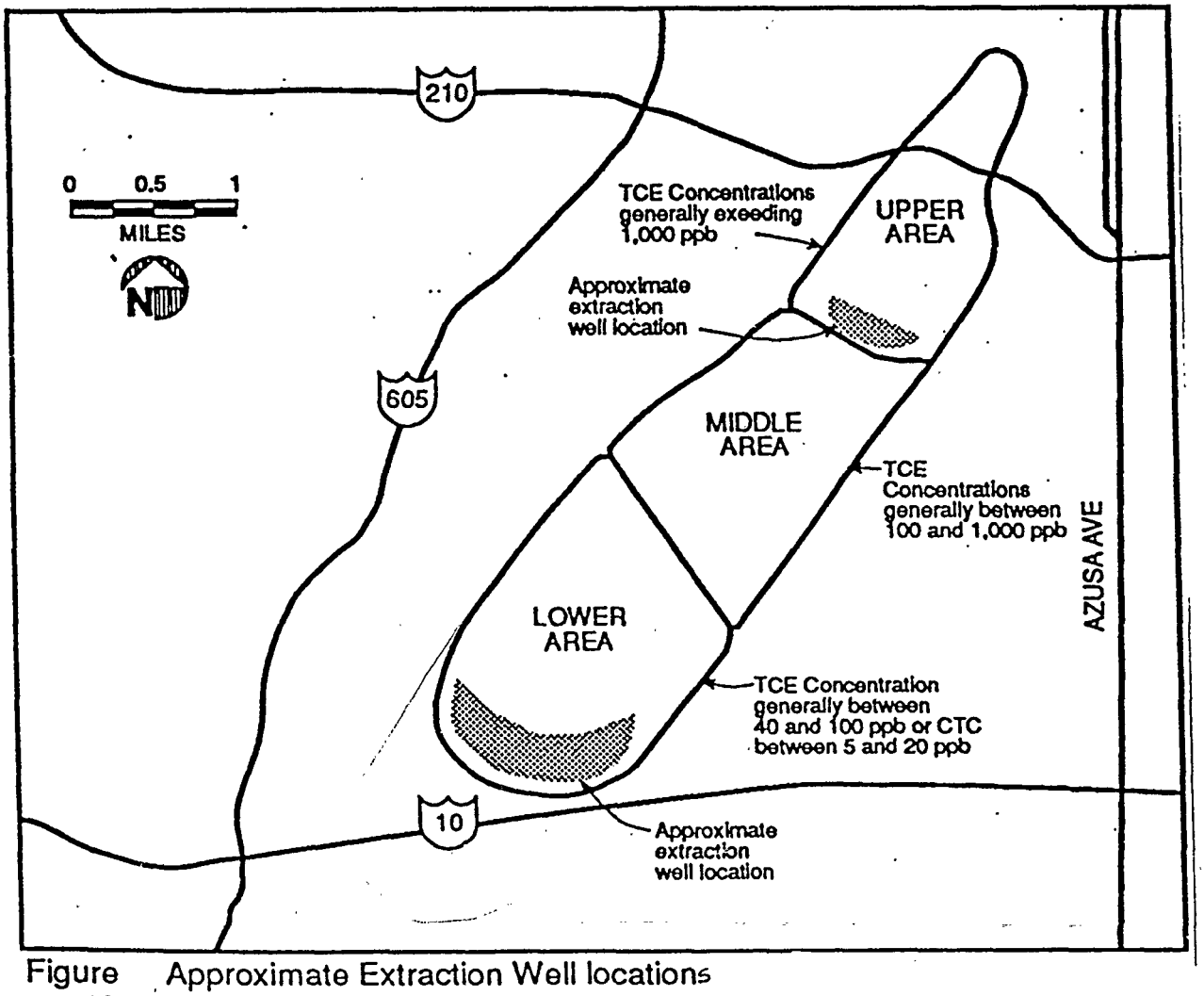
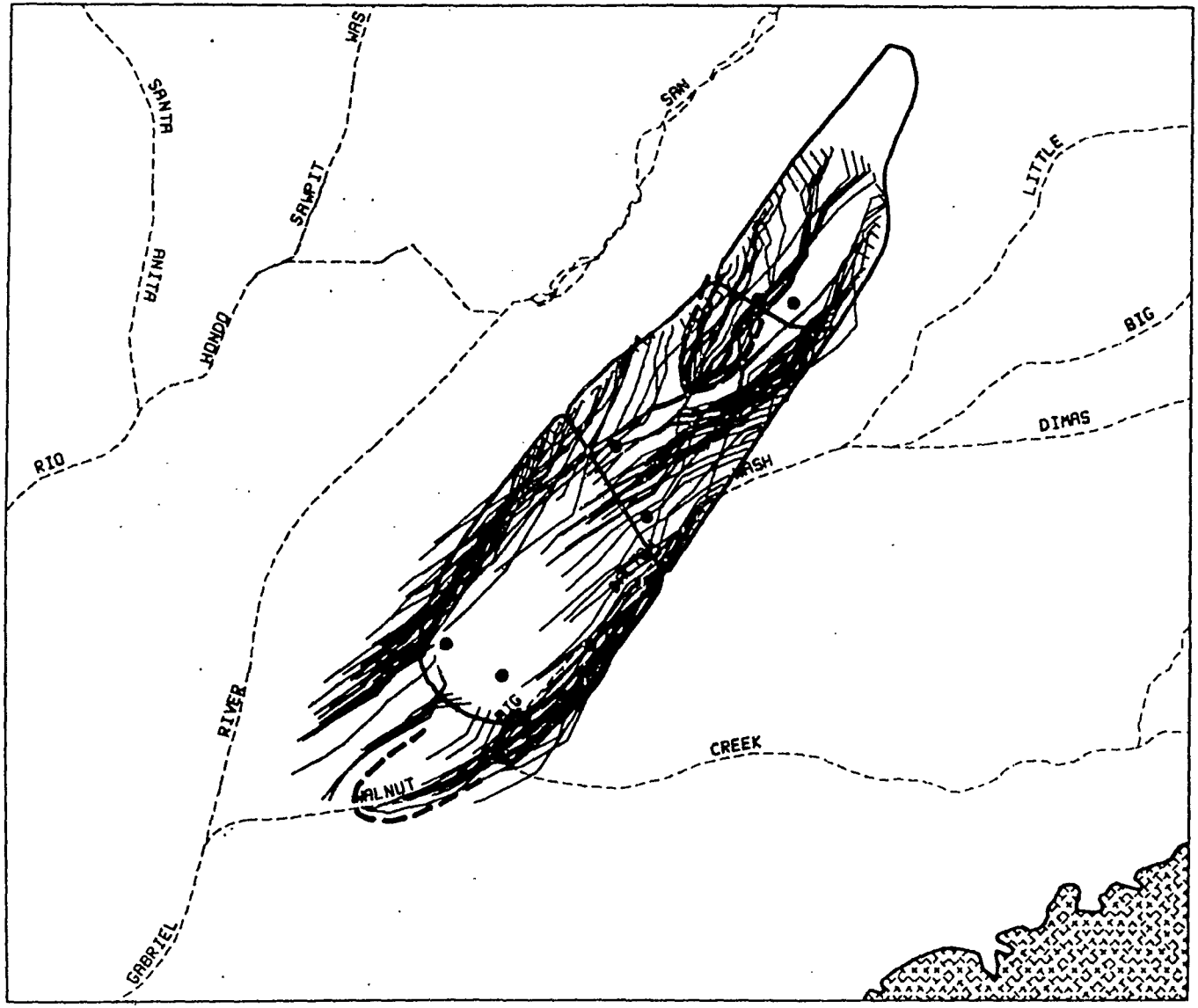
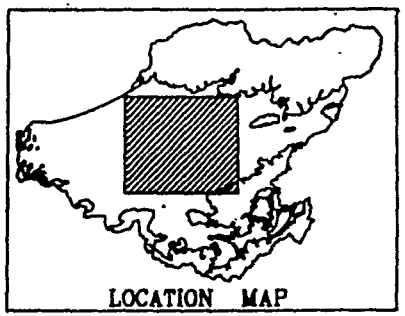



Figure Approximate Extraction Well locations

ROD-10




LEGEND:

- PROPOSED EXTRACTION WELL LOCATION
- SURFACE DRAINAGE
- PARTICLE TRACK
- CONTAMINATION SUBAREA BOUNDARY
- APPROXIMATE LIMIT OF EXISTING WELL CAPTURE ZONE
- BEDROCK OUTCROP

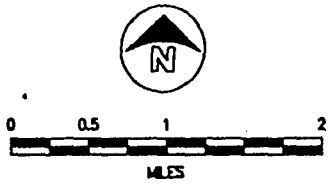
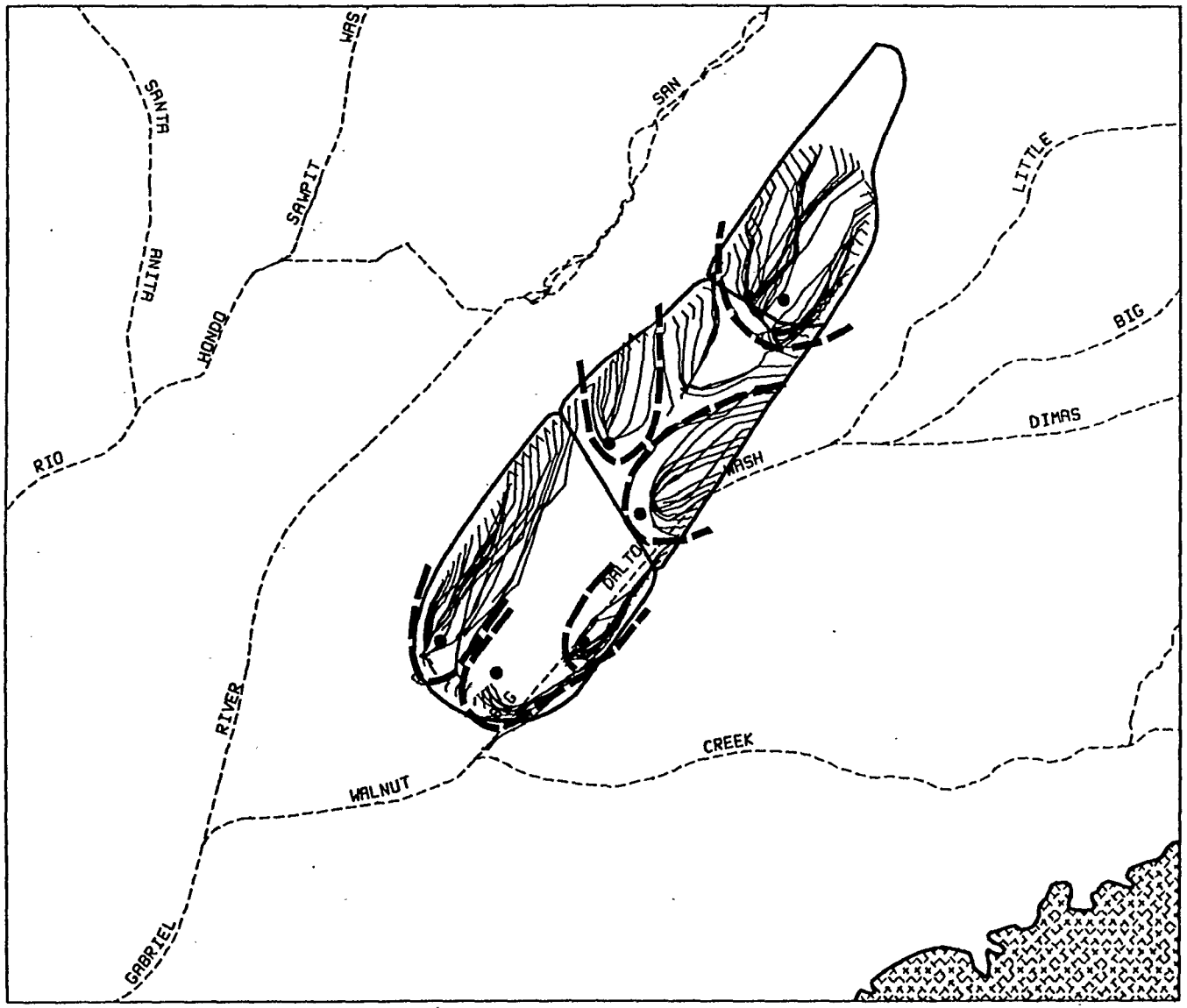


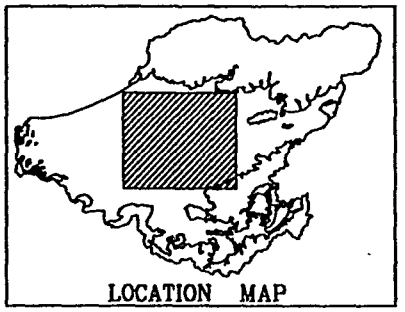

FIGURE RDO-11

PARTICLE TRACKING RESULTS - BASE CASE
(NO-ACTION ALTERNATIVE)

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin




LEGEND:

- PROPOSED EXTRACTION WELL LOCATION
- SURFACE DRAINAGE
- PARTICLE TRACK
- CONTAMINATION SUBAREA BOUNDARY
- APPROXIMATE LIMIT OF OU EXTRACTION WELL CAPTURE ZONE
- BEDROCK OUTCROP

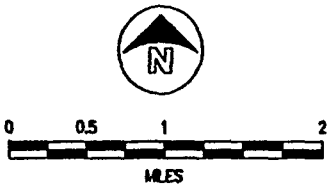
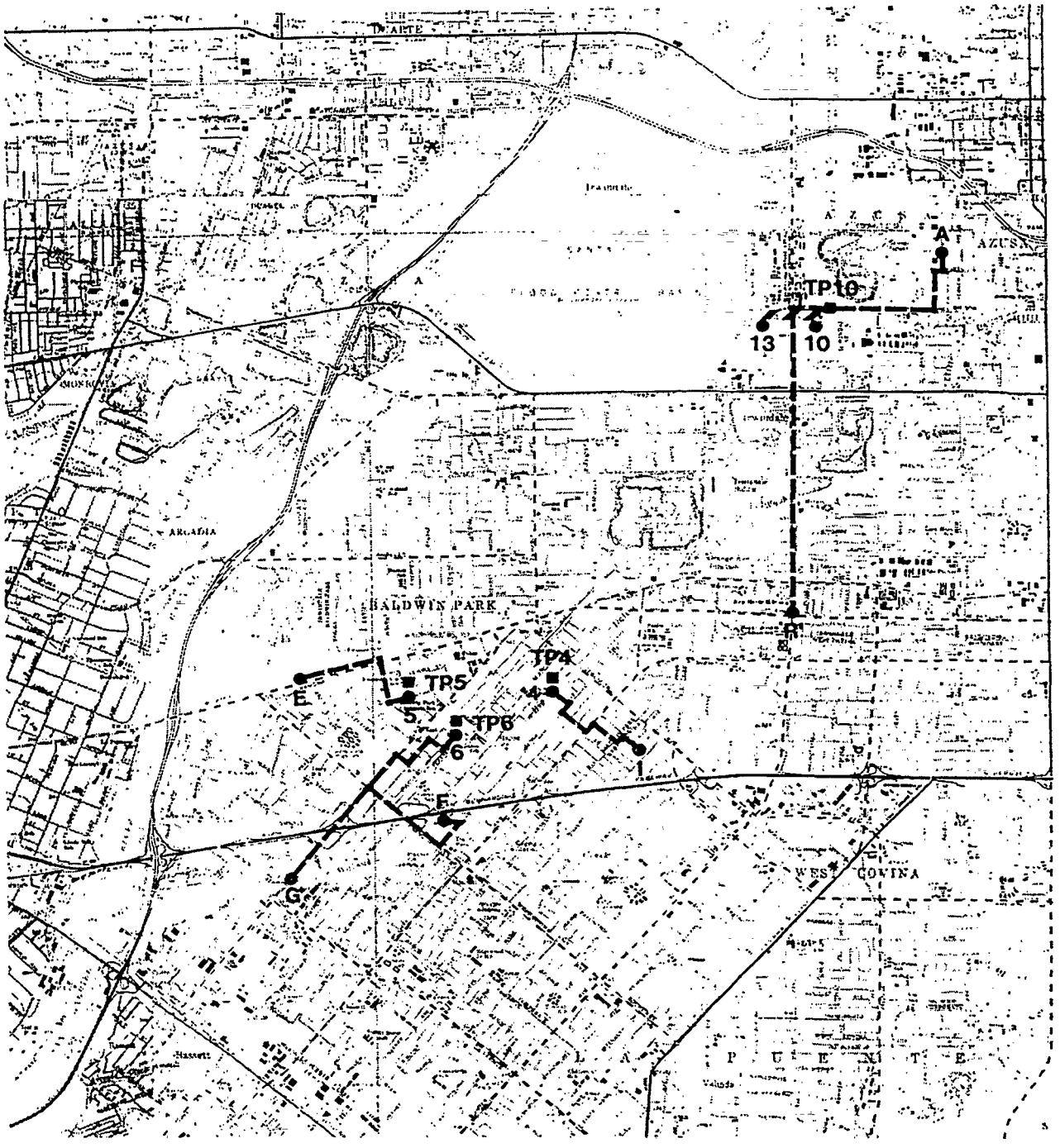



FIGURE ROD-12

PARTICLE TRACKING RESULTS - 29,000 GPM (MODIFIED) SCENARIO

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin




LEGEND

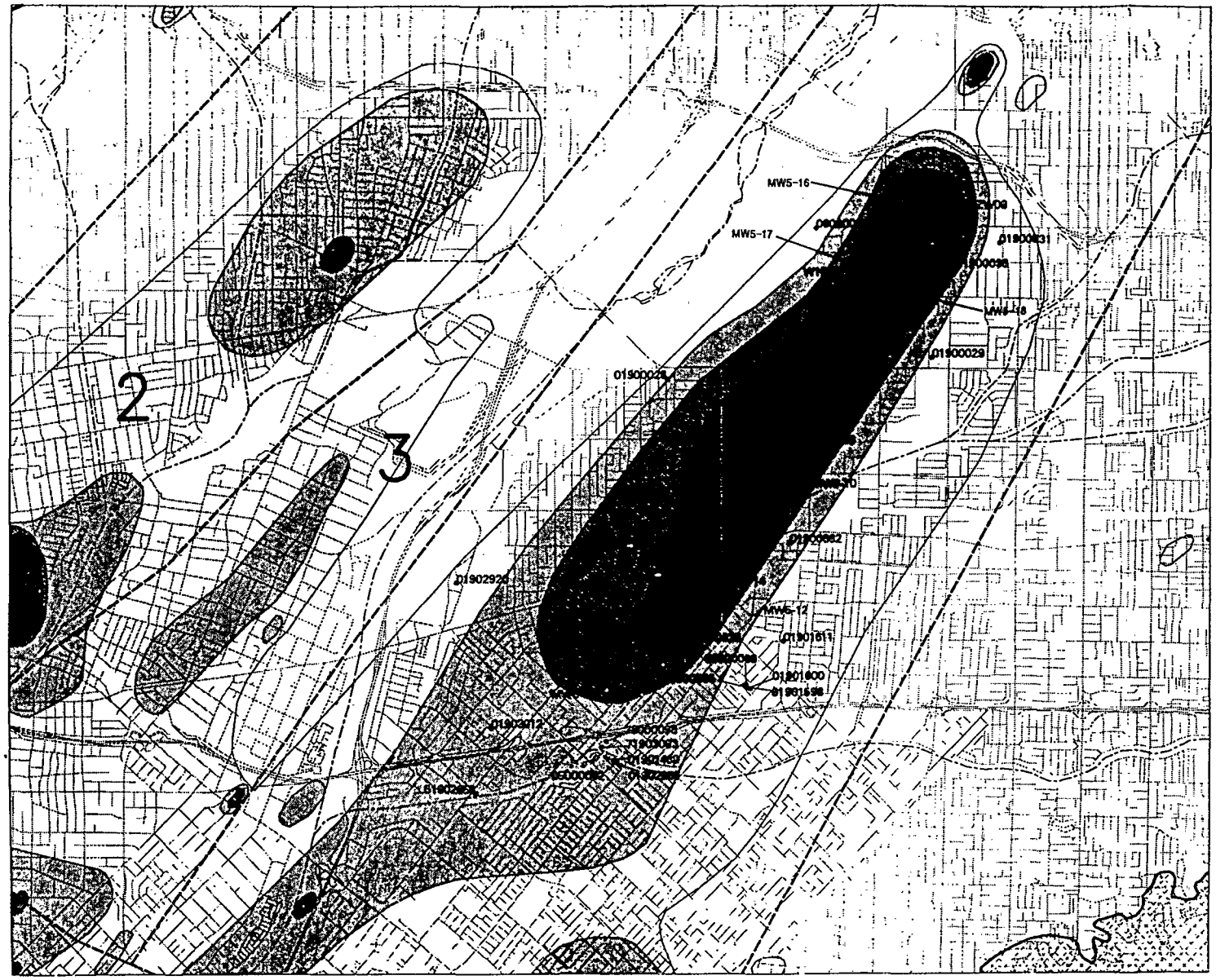
- RAW WATER PIPELINE
- TREATED WATER PIPELINE
- E PURVEYOR CONNECTION POINT
- 4 EXTRACTION WELL CLUSTER
- TP4 TREATMENT PLANT LOCATION

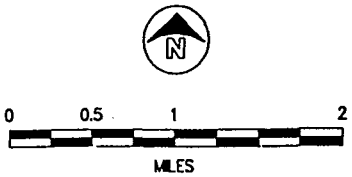
N

0 2500 5000

SCALE IN FEET

FIGURE ROD-13




LEGEND:

- BEDROCK OUTCROP
- ROADS
- ALLUVIAL AQUIFER
- RI AREAS
- STREAMS
- CONTAMINATION ZONE BOUNDARY
- EXISTING WELL INCLUDED IN MONITORING PROGRAM
- PROPOSED NEW WELL INCLUDED IN MONITORING PROGRAM
- VOC CONTAMINATION POTENTIALLY EXCEEDING 1000X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM 100X TO < 1000X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM 20X TO < 100X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM 10X TO < 20X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM MCLS TO < 10X MCLS
- VOC CONTAMINATION POTENTIALLY RANGING FROM LABORATORY DETECTION LIMITS TO < MCLS

NOTE - WELLS MW5-8, MW5-9 AND MW5-10 ARE NOT INCLUDED IN THE ALTERNATIVE 1 MONITORING PROGRAM.

THE AREAS OF CONTAMINATION SHOWN REPRESENT SIMPLIFIED APPROXIMATIONS BASED ON THE MAXIMUM CONCENTRATION OF ANY VOC DETECTED BETWEEN JUNE 1990 AND AUGUST 1991 OR THE LAST SAMPLE IF MORE EXISTS IN THIS TIME PERIOD. BECAUSE OF THE LONG TIME PERIOD, A WELL MAY AT TIMES PRODUCE WATER WITH DIFFERENT CONTAMINANT LEVELS THAN THOSE INDICATED. DIFFERENCES COULD ALSO BE CAUSED BY THE VERTICAL VARIABILITY IN CONTAMINATION (THE FIGURE IS A TWO-DIMENSIONAL DEPICTION OF CONTAMINATION THAT ACTUALLY VARIES WITH DEPTH).

THE FIGURE SHOWS ONLY REGIONAL VARIABILITY IN CONTAMINATION. IN MUCH OF THE BASIN, DISTANCES BETWEEN DATA POINTS ARE IN THE 1,000's OF FEET. THUS, THERE IS SIGNIFICANT UNCERTAINTY IN THE TRUE LOCATIONS OF THE CONCENTRATION CONTOURS.

FIGURE ROD-14

**GROUNDWATER MONITORING PROGRAM**

BALDWIN PARK OPERABLE UNIT

San Gabriel Basin

SCO89118.R6

**Table ROD-1 Partial List of Contaminants Detected in Groundwater in the Baldwin Park area**

| Contaminant |
| --- |
| Trichloroethylene (TCE) |
| 1,1-Dichloroethane (1,1-DCA) |
| 1,1-Dichloroethene (1,1-DCE) |
| cis-1,2-Dichloroethene |
| trans-1,2-Dichloroethene |
| 1,2-Dichloroethane (1,2-DCA) |
| Acetone |
| Methylene Chloride |
| Vinyl Chloride |
| Trichlorofluoromethane (TCFM) |
| Tetrachloroethene (PCE) |
| Carbon Tetrachloride (CTC) |
| 1,1,1-Trichloroethane (1,1,1-TCA) |
| Benzene |
| Toluene |
| Bromodichloromethane (BDCM) |
| Chloroform |
| Chlorobenzene |
| 1,1,1,2-Tetrachloroethane |
| 1,2,3-Trichloropropane |
| Freon 113 |
| 1,2-Dibromoethane |

**Table ROD-2**
**Chemicals of Potential Concern in Groundwater**

| Chemical | #Detect/ #Sampled[1] | Concentration[2] (μg/l) | | | |
|---|---|---|---|---|---|
| | | Arithmetic Mean | Standard Deviation | Upper 95th Percentile | Maximum Contaminant Level[3] |
| 1,1,1-Trichloroethane | 6/28 | 2.1 | 4.6 | 3.9 | 200 |
| 1,1-Dichloroethane | 7/28 | 0.7 | 0.5 | 0.8 | 5 |
| 1,1-Dichloroethene | 8/28 | 3.5 | 9.5 | 7.1 | 6 |
| 1,2-Dichloroethane | 11/28 | 2.0 | 3.1 | 3.2 | 0.5 |
| Acetone | 2/28 | 4.9 | 13.9 | 10.3 | -- |
| Benzene | 2/28 | 0.5 | 0.06 | 0.5 | 1 |
| Carbon Disulfide | 2/28 | 0.6 | 0.2 | 0.6 | -- |
| Carbon Tetrachloride | 11/28 | 1.8 | 2.8 | 2.9 | 0.5 |
| Chloroform | 13/28 | 2.2 | 3.1 | 3.4 | 100 |
| cis-1,2-Dichloroethene | 8/20 | 6.7 | 15.7 | 14.0 | 6 |
| Ethylbenzene | 1/28 | 0.5 | 0.003 | 0.5 | 680 |
| Methylene Chloride | 1/28 | 0.5 | 0.02 | 0.5 | 5 |
| Tetrachloroethene | 21/28 | 12.7 | 30.5 | 24.6 | 5 |
| Toluene | 2/28 | 0.5 | 0.07 | 0.5 | 1000 |
| trans-1,2-Dichloroethene | 3/8 | 0.6 | 0.2 | 0.8 | 10 |
| Trichloroethylene | 22/28 | 55.1 | 107.8 | 96.9 | 5 |
| Xylene | 1/28 | 0.5 | 0.01 | 0.5 | 1750 |

[1]Duplicate samples are averaged before summary statistics are calculated.
[2]Data taken from BPOU FS Includes all wells except V10AMMW1.
[3]State or federal Maximum Contaminant Level (MCL), whichever is lower.

Note:
-- Indicates no available MCL.

Table ROD-3
Dose-Response Variables for Chemicals of Concern

| Chemical | Systemic Toxicity (mg/kg/day) | | | | | Carcinogenic Potency (mg/kg/day)$^{-1}$ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Organ Affected | Oral RfD | Source | Inhalation RfD | Source | Tumor Site | Oral Slope Factor | Weight of Evidence[1] | Source | Inhalation Slope Factor | Weight of Evidence[1] | Source |
| 1,1,1-Trichloroethane | Liver | 0.09 | HEAST | 0.3 | HEAST | -- | -- | D | IRIS | -- | D | IRIS |
| 1,1-Dichloroethane | Liver | 0.1 | HEAST | 0.1 | HEAST | Mammary, Liver | -- | C | IRIS | -- | C | HEAST |
| 1,1-Dichloroethene | Liver | 0.0009 | EPA | -- | IRIS | Kidney, Adrenal | -- | C | EPA | -- | C | EPA |
| 1,2-Dichloroethane | -- | -- | IRIS | -- | IRIS | Stomach, Mammary, Liver | 0.091 | B2 | IRIS | 0.091 | B2 | IRIS |
| Acetone | Liver, Kidney | 0.1 | IRIS | -- | IRIS | -- | -- | D | IRIS | -- | D | IRIS |
| Benzene | -- | -- | IRIS | -- | IRIS | Blood | 0.029 | A | IRIS | 0.029 | A | IRIS |
| Carbon Disulfide | Fetal Toxicity/Malformation | 0.1 | IRIS | 0.003 | HEAST | -- | -- | -- | IRIS | -- | -- | IRIS |
| Carbon Tetrachloride | Liver | 0.0007 | IRIS | -- | IRIS | Liver | 0.13 | B2 | IRIS | 0.13 | B2 | IRIS |
| Chloroform | Liver | 0.01 | IRIS | -- | IRIS | Liver, Kidney | 0.0061 | B2 | IRIS | 0.081 | B2 | IRIS |
| cis-1,2-Dichloroethene | Blood | 0.01 | HEAST | -- | IRIS | -- | -- | D | IRIS | -- | D | IRIS |
| Ethylbenzene | Liver, Kidney | 0.1 | IRIS | 0.3 | IRIS | -- | -- | D | IRIS | -- | D | IRIS |
| Methylene Chloride | Liver | 0.06 | IRIS | 0.9 | HEAST | Lung, Liver | 0.0075 | B2 | IRIS | 0.0016 | B2 | IRIS |
| Tetrachloroethene | Liver | 0.01 | IRIS | -- | IRIS | Liver, Leukemia | 0.051 | B2 | HEAST | 0.002 | B2 | HEAST |
| Toluene | CNS, Eyes, Nose, Liver, Kidney | 0.2 | IRIS | 0.6 | HEAST | -- | -- | D | IRIS | -- | D | IRIS |
| trans-1,2-Dichloroethene | Blood | 0.02 | IRIS | -- | IRIS | -- | -- | -- | IRIS | -- | -- | IRIS |
| Trichloroethylene | -- | 0.006 | ECAO | -- | IRIS | Lung, Liver | 0.011 | B2 | HEAST | 0.017 | B2 | HEAST |
| Xylene | Liver, Nose, Throat, CNS, Fetotoxicity | 2 | IRIS | 0.09 | HEAST | -- | -- | D | IRIS | -- | D | IRIS |

HEAST = Health Effects Assessment Summary Tables, EPA, 1991h.
IRIS = Integrated Risk Information System, EPA, 1992f.
EPA = 1,1-Dichloroethene is evaluated according to a modified-RfD approach: Group C carcinogens which exhibit weak evidence of carcinogenicity are compared to the oral RfD/10, EPA, 1990f.
ECAO = Environmental Criteria and Assessment Office, EPA, 1992e.
-- = Information not available.
CNS = Central Nervous System.

[1]Weight of Evidence Groups: A is Human Carcinogen; B is Probable Human Carcinogen (B1-limited evidence of carcinogenicity in humans, B2-sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans); C is Possible Human Carcinogen; D is Not Classifiable as to Human Carcinogenicity.

**Table ROD-4**
**Estimated Excess Lifetime Cancer Risk from Domestic Use of Groundwater**

| Chemical | Average Exposure | | Reasonable Maximum Exposure | |
|---|---|---|---|---|
| | Ingestion | Inhalation | Ingestion | Inhalation |
| 1,1,1-Trichloroethane | -- | -- | -- | -- |
| 1,1-Dichloroethane | -- | -- | -- | -- |
| 1,1-Dichloroethene | -- | -- | -- | -- |
| 1,2-Dichloroethane | $6 \times 10^{-7}$ | $6 \times 10^{-7}$ | $3 \times 10^{-6}$ | $3 \times 10^{-6}$ |
| Acetone | -- | -- | -- | -- |
| Benzene | $5 \times 10^{-8}$ | $5 \times 10^{-8}$ | $2 \times 10^{-7}$ | $2 \times 10^{-7}$ |
| Carbon Disulfide | -- | -- | -- | -- |
| Carbon Tetrachloride | $8 \times 10^{-7}$ | $8 \times 10^{-7}$ | $4 \times 10^{-6}$ | $4 \times 10^{-6}$ |
| Chloroform | $5 \times 10^{-8}$ | $6 \times 10^{-7}$ | $2 \times 10^{-7}$ | $3 \times 10^{-6}$ |
| cis-1,2-Dichloroethene | -- | -- | -- | -- |
| Ethylbenzene | -- | -- | -- | -- |
| Methylene Chloride | $1 \times 10^{-8}$ | $3 \times 10^{-9}$ | $4 \times 10^{-8}$ | $9 \times 10^{-9}$ |
| Tetrachloroethene | $2 \times 10^{-6}$ | $9 \times 10^{-8}$ | $1 \times 10^{-5}$ | $6 \times 10^{-7}$ |
| Toluene | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | -- | -- | -- | -- |
| Trichloroethylene | $2 \times 10^{-6}$ | $3 \times 10^{-6}$ | $1 \times 10^{-5}$ | $2 \times 10^{-5}$ |
| Xylene | -- | -- | -- | -- |
| **Total Risk** | **$6 \times 10^{-6}$** | **$6 \times 10^{-6}$** | **$4 \times 10^{-5}$** | **$3 \times 10^{-5}$** |

**Table ROD-5**
**Estimated Noncancer Hazard Quotients from Domestic Use of Groundwater**

| Chemical | Average Exposure | | Reasonable Maximum Exposure | |
|---|---|---|---|---|
| | Ingestion | Inhalation | Ingestion | Inhalation |
| 1,1,1-Trichloroethane | 0.0006 | 0.0002 | 0.001 | 0.0004 |
| 1,1-Dichloroethane | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
| 1,1-Dichloroethene | 0.1 | 0.1 | 0.2 | 0.2 |
| 1,2-Dichloroethane | -- | -- | -- | -- |
| Acetone | 0.001 | 0.001 | 0.003 | 0.003 |
| Benzene | -- | -- | -- | -- |
| Carbon Disulfide | 0.0002 | 0.005 | 0.0002 | 0.005 |
| Carbon Tetrachloride | 0.07 | 0.07 | 0.1 | 0.1 |
| Chloroform | 0.006 | 0.006 | 0.009 | 0.009 |
| cis-1,2-Dichloroethene | 0.02 | 0.02 | 0.04 | 0.04 |
| Ethylbenzene | 0.0001 | 0.00005 | 0.0001 | 0.00005 |
| Methylene Chloride | 0.0002 | 0.00002 | 0.0002 | 0.00002 |
| Tetrachloroethene | 0.03 | 0.03 | 0.07 | 0.07 |
| Toluene | 0.00007 | 0.00002 | 0.00007 | 0.00002 |
| trans-1,2-Dichloroethene | 0.0008 | 0.0008 | 0.001 | 0.001 |
| Trichloroethylene | 0.3 | 0.3 | 0.4 | 0.4 |
| Xylene | 0.000007 | 0.0002 | 0.000007 | 0.0002 |
| **Total Hazard Index** | **0.5** | **0.5** | **0.9** | **0.9** |

| Table ROD-6<br>Uncertainties Associated With Risk Estimations | | |
|---|---|---|
| **Uncertainty Factor** | **Effects of Uncertainty** | **Comment** |
| **I. Exposure Assessment** | | |
| Exposure assumptions | May over- or underestimate risk | Assumptions regarding media intake, population characteristics (e.g., body weight, life span, etc.), and exposure patterns may not characterize actual exposures. |
| Concentrations are assumed to be constant | May over- or underestimate risk | Does not account for environmental fate, transport, or transfer, which may reduce chemical concentration. Does not account for future degradation to potentially more toxic chemicals (e.g., PCE and TCE to vinyl chloride). |
| Contaminant loss during sampling | May underestimate risk | May underestimate VOCs present. |
| Estimating inhalation exposures for released VOCs from tap water | May over- or underestimate risk | Several variables affect the degree of exposure, including water temperature, etc. |
| Extent of sampling effort | May over- or underestimate risk | Sampling may not accurately characterize the medium being evaluated. |
| Chemical analysis procedures | May over- or underestimate risk | Systematic or random errors may occur during chemical analysis. |
| Intake | May underestimate risk | Assumes all intake of contaminants is from the exposure medium being evaluated (no relative source contribution). |
| **II. Toxicity Assessment** | | |
| Cancer slope factor | May overestimate risk | Slope factors are upper 95th percent confidence limits derived from a linearized model. Considered unlikely to underestimate risk, especially for low doses. |
| Toxicity values derived from animal studies for carcinogenic and noncarcinogenic effects | May over- or underestimate risk | Extrapolation from animal to humans may induce error because of differences in absorption, pharmacokinetics, target organs, enzymes, and population variability. |
| Toxicity values derived primarily from high doses, most exposures are at low doses | May over- or underestimate risk | Assumes linear dose response relationship at low doses. Possibility that some thresholds do exist. |
| Toxicity Values | May over- or underestimate risk | Not all values known with the same degree of certainty. May change as new evidence becomes available. |
| Toxicity values derived from homogeneous animal populations | May over- or underestimate risk | Human population may have a wide range of sensitivities to a chemical. |

Table ROD-7
Groundwater Monitoring Program-Existing Wells



| Well Number | Total Depth (ft) | Perforated Intervals (ft) | | | | | | | | Quarterly Sampling Through Other Programs | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | | |
| 11900038 | 630 | 350-614 | | | | | | | | x | Active |
| 01900028 | 600 | 250-580 | | | | | | | | x | Active |
| 01900831 | 500 | 252-474 | | | | | | | | | Inactive |
| 01900029 | 615 | 264-582 | | | | | | | | | Inactive |
| 01900882 | 500 | 199-252 | 280-485 | | | | | | | | Inactive |
| 01902920 | 500 | 238-314 | 366-384 | | | | | | | | Active |
| 01903012 | NA | NA | | | | | | | | | Inactive, capped |
| 78000098 | 1,078 | 760-769 | 824-836 | 855-938 | 942-952 | 980-992 | 1,024-1,032 | | | x | Active |
| 01900031[1] | 600 | 300-585 | | | | | | | | | Active |
| 01900035[1] | 600 | 254-587 | | | | | | | | | Inactive |
| 01902169[1] | 280 | 120-280 | | | | | | | | | Inactive |
| 71903093 | 506 | 272-421 | 440-466 | 477-497 | | | | | | | Inactive, capped |
| 08000039 | 622 | 540-582 | 594-602 | | | | | | | | Inactive |
| 08000060 | 600 | 300-600 | | | | | | | | x | Active |
| 51902858 | 500 | 174-214 | 240-264 | 312-346 | 390-474 | | | | | x | Active |
| 01901460 | 947 | 600-947 | | | | | | | | x | Active |
| 01902859 | 400 | 155-179 | 185-203 | 210-323 | 355-390 | | | | | x | Active |
| 08000062 | 743 | 550-743 | | | | | | | | x | Active |
| 01901611 | 240 | 120-152 | 235-240 | 204-220 | | | | | | | Inactive |

**Table ROD-7**
**Groundwater Monitoring Program-Existing Wells**



| Well Number | Total Depth (ft) | Perforated Intervals (ft) | | | | | | | | Quarterly Sampling Through Other Programs | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | | |
| 08000095 | NA | NA | | | | | | | | x | Active |
| 08000069 | 846 | 566-642 | 679-695 | 787-825 | | | | | | x | Active |
| 01901600 | 300 | NA | | | | | | | | | Inactive |
| 01901598 | 400 | 120-349 | | | | | | | | x | Active |
| 08000070 | 451 | 290-435 | | | | | | | | | Active |
| MW5-01[2] | 1,521[3] | 216-226 | 287-297 | 335-345 | 430-440 | 523-533 | 640-650 | 765-775 | 875-885 | | Monitoring well |
| Z1000006 | 300 | 75-175 | 180-195 | 200-300 | | | | | | | Monitoring well |
| W10NCMW1 | NA | NA | | | | | | | | x | Site assess. well |
| W11AZW01 | 354 | 148-354 | | | | | | | | x | Site assess. well |
| W11AZW03 | 385 | 180-385 | | | | | | | | x | Site assess. well |
| W11AZW09 | NA | NA | | | | | | | | x | Site assess. well |

NA-Information not available.
[1]Proposed extraction well.
[2]EPAW5101-EPAW5113.
[3]Other perforated intervals= 1,030-1,040; 1,123-1,133; 1,256-1,266; 1,387-1,397; 1,496-1,505 feet.

Table ROD-8 (page 1 of 2)
**Groundwater Monitoring Program- New Wells**
**(Proposed Plan Alternative)**

| Well No. | Total Depth (ft) | Perforated Intervals (ft)[1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | Monitoring Well Purpose |
| MW5-02 | 1,800[2] | 200-210 | 300-310 | 400-410 | 500-510 | 600-610 | 700-710 | 800-810 | Monitoring for most of the aquifer downgradient of Subarea 3 to fill a data gap for remedial design and to monitor remedial effectiveness |
| MW5-03 | 1,200[3] | 300-310 | 400-410 | 500-510 | 600-610 | 700-710 | 800-810 | 900-910 | Monitoring across the entire aquifer downgradient of Subarea 1 to fill a data gap for remedial design and to monitor remedial effectiveness |
| MW5-04P (3) | 250 | 180-240 | | | | | | | Three piezometers located around Cluster 4 to evaluate remedial effectiveness of extraction, not needed for remedial design |
| MW5-05[4] | 600 | 190-200 | 390-400 | 580-590 | | | | | Monitoring at Cluster 5 to provide contaminant data for remedial design prior to installation of the extraction well |
| MW-05P (3) | 250 | 180-240 | | | | | | | Three piezometers located around Cluster 5 to evaluate remedial effectiveness of extraction, not needed for remedial design |
| MW5-06P (3) | 250 | 180-240 | | | | | | | Three piezometers located around Cluster 6 to evaluate remedial effectiveness of extraction, not need for remedial design |
| MW5-07 | 600 | 190-200 | 390-400 | 580-590 | | | | | Fill data gap for remedial design and provide upgradient early warning monitoring for Cluster 5 during implementation |
| MW5-11[4] | 700 | 290-300 | 490-500 | 680-690 | | | | | Monitoring at Cluster 13 to provide contaminant data for remedial design prior to installation of the extraction well |
| MW5-12 | 650 | 250-260 | 450-460 | 630-640 | | | | | Upgradient early warning monitoring for Cluster 4 during implementation, not needed for remedial design |
| MW5-13 | 700 | 340-350 | 510-520 | 680-690 | | | | | Fill data gap for remedial design and provide upgradient early warning monitoring for Clusters 10 and 13 during implementation |
| MW5-14 | 650 | 250-260 | 450-460 | 630-640 | | | | | Fill data gap for remedial design and provide upgradient early warning monitoring for Cluster 4 during implementation |
| MW5-15 | 700 | 190-200 | 450-460 | 680-690 | | | | | Fill data gap for remedial design and provide upgradient early warning monitoring for Cluster 6 during implementation |
| MW5-16 | 600 | 340-350 | 460-470 | 590-600 | | | | | Provide additonal data on vertical distribution of contamination at location of known shallow contamination |

Table (page 2 of 2)
**Groundwater Monitoring Program- New Wells**
**(Proposed Plan Alternative)**

| Well No. | Total Depth (ft) | Perforated Intervals (ft)[1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | Monitoring Well Purpose |
| MW5-17 | 700 | 500-510 | 680-690 | | | | | | Provide additional data on the lateral and vertical extent of contamination away from facilities in Subarea 1 |
| MW5-18[4] | 600 | 450-460 | 580-590 | | | | | | Monitoring at Cluster 10 to provide deeper contaminant data for remedial design prior to installation of the extraction wells |

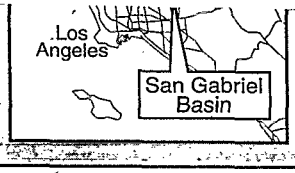
[1]Subject to revision/change.
[2]MP monitoring well- other perforated intervals= 1,000-1,010; 1,200-1,210; 1,400-1,410; 1,600-1,610; 1,780-1790
[3]MP monitoring well- other perforated intervals= 1,000-1,010; 1,100-1,110; 1,180-1,190
[4]To be located at corresponding extraction well cluster site.

To reduce photocopying costs, Part III of the Baldwin Park Operable Unit Record of Decision has not been included. Part III consists of the "Responsiveness Summary for Public Comments on the Baldwin Park Operable Unit." It is 219 pages long. To view or obtain a copy, visit the West Covina Public Library at (626) 962-3541 or contact Wayne Praskins, EPA Project Manager, at (415) 744-2256.

76150

Attachment 3

# San Gabriel Valley Superfund Sites / Baldwin Park Operable Unit




U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • May 1999

# EPA Updates Cleanup Plan for the Azusa-Irwindale-Baldwin Park Area

*Los Angeles County, California*

The United States Environmental Protection Agency (EPA) is updating the Superfund cleanup plan for the Baldwin Park area of the San Gabriel Valley in response to the discovery, in 1997 and 1998, of several new pollutants in the groundwater. The EPA adopted the cleanup plan in 1994, after extensive public comment. The newly discovered chemicals include perchlorate, N-nitrosodimethylamine (NDMA), and 1,4-dioxane. Perchlorate is used in solid rocket fuel; NDMA has been found in liquid rocket fuel; and 1,4-dioxane has been used as a stabilizer in chlorinated solvents. Discharges of these chemicals to the ground are believed to have stopped many years ago, but a significant amount of contamination has reached the groundwater basin and requires cleanup. In addition to perchlorate, NDMA, and 1,4-dioxane, groundwater in the Baldwin Park area is contaminated with perchloroethylene (PCE), trichloroethene (TCE), and other chlorinated solvents. Chlorinated solvents are sometimes referred to as *volatile organic compounds* or VOCs.

The discovery of perchlorate, NDMA, and 1,4-dioxane will change the cleanup project, known as the Baldwin Park Operable Unit (OU), in three ways:

1) Additional treatment processes must be used to reduce perchlorate, NDMA, and 1,4-dioxane concentrations in the groundwater to safe levels. The technologies typically used to remove chlorinated solvents from water (air stripping and carbon adsorption) will not effectively remove perchlorate, NDMA, or 1,4-dioxane. Final decisions on treatment processes will be made during remedial design, later this year or early next year.

2) More of the treated groundwater is expected to be used locally, to replace water supplies lost when perchlorate and NDMA forced local water companies to shut down some groundwater wells. Previously, local agencies were advocating the export of most of the treated groundwater to communities outside of the San Gabriel Valley.

3) Some of the groundwater extraction wells will be located further south than previously planned to prevent the spread of perchlorate and NDMA, as well as VOCs, to clean portions of the groundwater basin.

*Cont'd. on pg. 2*

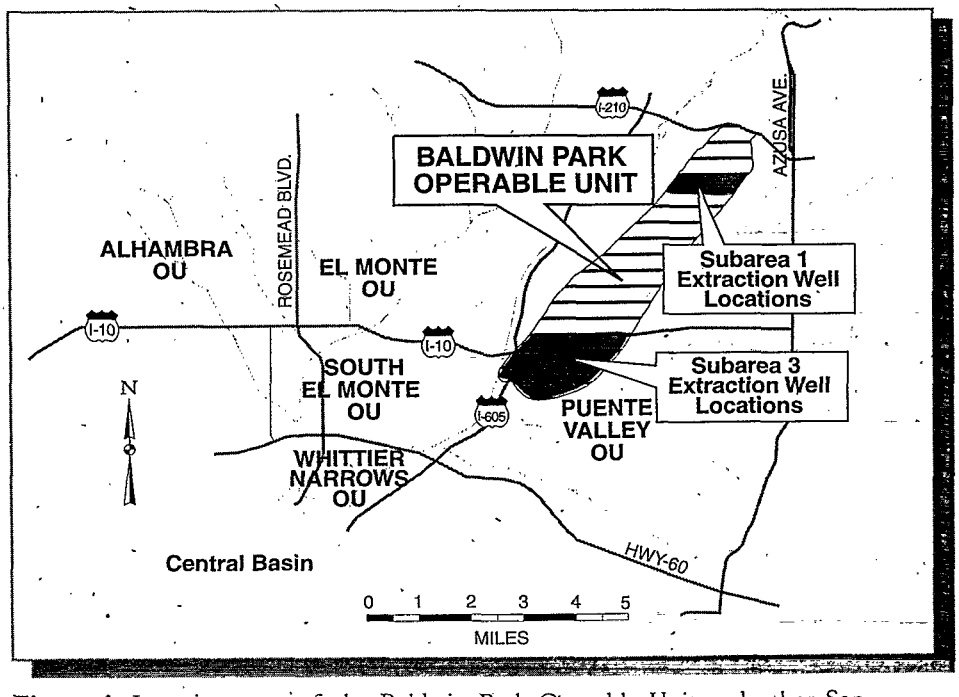



**Figure 1:** Location map of the Baldwin Park Operable Unit and other San Gabriel Valley Superfund Site Projects

These changes have delayed construction of the cleanup facilities by about two years while tests of perchlorate treatment technologies and changes to the groundwater extraction plan are completed. The treatment studies and updated extraction plan are almost complete. The changes will significantly increase the cost of cleanup, as described below.

If and when significant changes are needed in a Superfund cleanup plan, the EPA informs the community through an Explanation of Significant Differences. This fact sheet is intended to fulfill that requirement. We welcome comments on new aspects of the cleanup highlighted in this fact sheet and on other issues raised by the discovery of perchlorate, NDMA, and 1,4-dioxane in the Baldwin Park area. We will, if appropriate, make additional changes in the cleanup plan in response to comments. EPA previously requested and considered comments on other aspects of the cleanup in 1993. The State of California, through its Department of Toxic Substances Control, supports the changes described in this fact sheet.

The remainder of the fact sheet provides a brief history of the Baldwin Park cleanup, summarizes the 1994 cleanup plan, and describes the changes to the 1994 plan in more detail.

# The Baldwin Park Cleanup: A Brief History

## 1994: EPA Adopts Cleanup Plan

On March 31, 1994, the EPA adopted a cleanup plan for the Azusa-Irwindale-Baldwin Park area known as the *Baldwin Park Operable Unit Record of Decision*. The plan addresses a several-mile-long area of groundwater contamination in the San Gabriel Valley. The contamination results from the use and improper handling and disposal of carbon tetrachloride (CTC), PCE, TCE, and other chemicals. These chemicals were used in large quantities at industrial facilities in Azusa and surrounding areas as early as the 1940s, and by hundreds of businesses in the 1960s, 1970s and 1980s for degreasing, metal cleaning, and other purposes. The chemicals were probably released to the ground by a combination of onsite disposal, careless handling, leaking tanks and pipes, and other means.

The groundwater contamination was discovered in 1979. In 1984, the EPA added four portions of the San Gabriel Valley to the national Superfund list. The Baldwin Park area is officially known as the *San Gabriel Valley Area 2* Superfund site. Subsequent investigation by the EPA and others revealed the tremendous extent of groundwater contamination. During the past 15 years, more than one-quarter of the approximately 366 water supply wells in the San Gabriel Valley have been found to be contaminated. In response to the contamination, water companies have shut down contaminated wells, installed new treatment facilities, and taken other steps to ensure that they can continue to supply water meeting State and Federal drinking water standards.

The EPA's 1994 cleanup plan calls for the extraction and treatment of contaminated groundwater from two broad subareas of contamination. The northernmost of the two subareas is termed *Subarea 1*. Subarea 1 includes most of the known sources of the groundwater contamination, where contaminant concentrations in groundwater are hundreds of times drinking water standards. The southernmost subarea is termed *Subarea 3*, where contaminant concentrations are lower but still

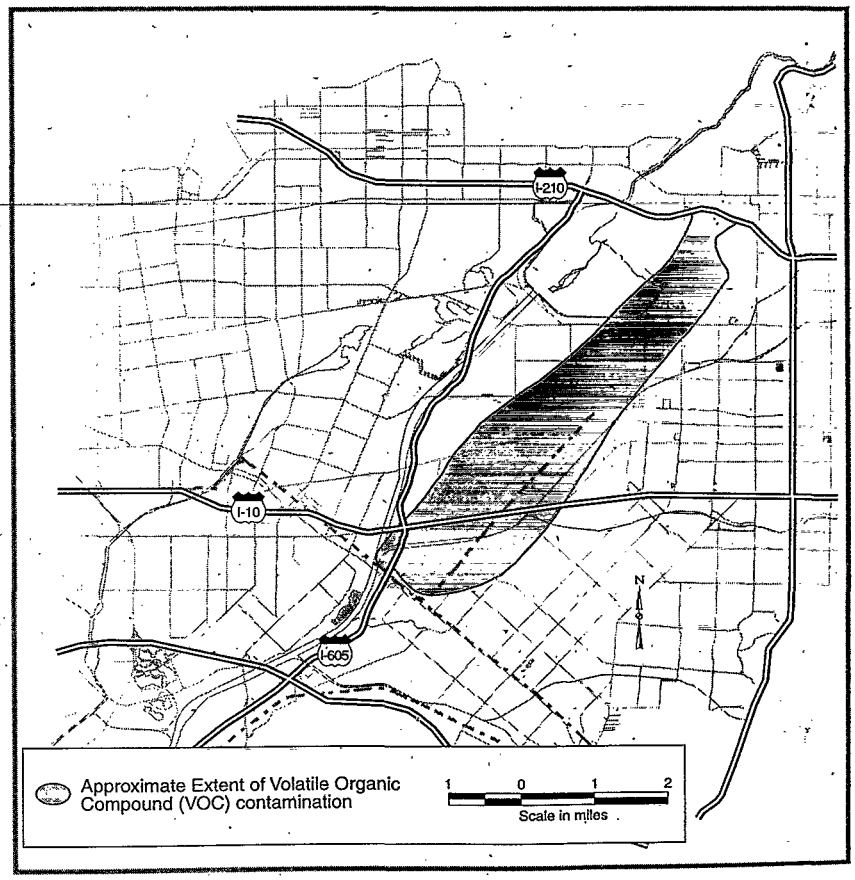



**Figure 2:** Approximate extent of VOC contamination in groundwater in the Azusa-Irwindale-Baldwin Park area.

exceed drinking water standards (see Figure 1).

The goals of the 1994 cleanup plan are to limit the movement of contaminated groundwater to clean or less contaminated areas and depths, remove a significant mass of contamination from the groundwater, and provide the data necessary to determine final clean up standards for the area. The plan calls for the construction and operation of groundwater extraction wells, treatment facilities, and conveyance facilities capable of pumping and treating approximately 19,000 gallons per minute of contaminated groundwater. The plan recommends the use of existing water supply wells, treatment systems, and pipelines to the extent possible, and the construction of new facilities where needed. Final decisions on extraction rates and locations were to be made during remedial design. In 1994, the EPA estimated the cost of the cleanup at $47 million in capital costs and $4 million/year for operation and maintenance. EPA's revised cost estimate is $85 million in capital costs and $10 million/year for operation and maintenance

### 1995 - 1997: Potentially Responsible Parties (PRPs) Complete Pre-Design Work

In January 1995, the EPA began to name the companies responsible for the groundwater contamination. To date, the EPA has named 19 companies and property owners as Potentially Responsible Parties, also known as PRPs. In late 1995, a majority of these companies organized themselves into a group named the Baldwin Park Operable Unit Steering Committee. From 1995 to early 1997, the Steering Committee funded more than $2 million of *pre-design* work needed as part of the cleanup. The Steering Committee installed and sampled a network of eight deep groundwater monitoring wells to improve our understanding of the extent of contamination and developed a detailed groundwater extraction plan. During this period, negotia-

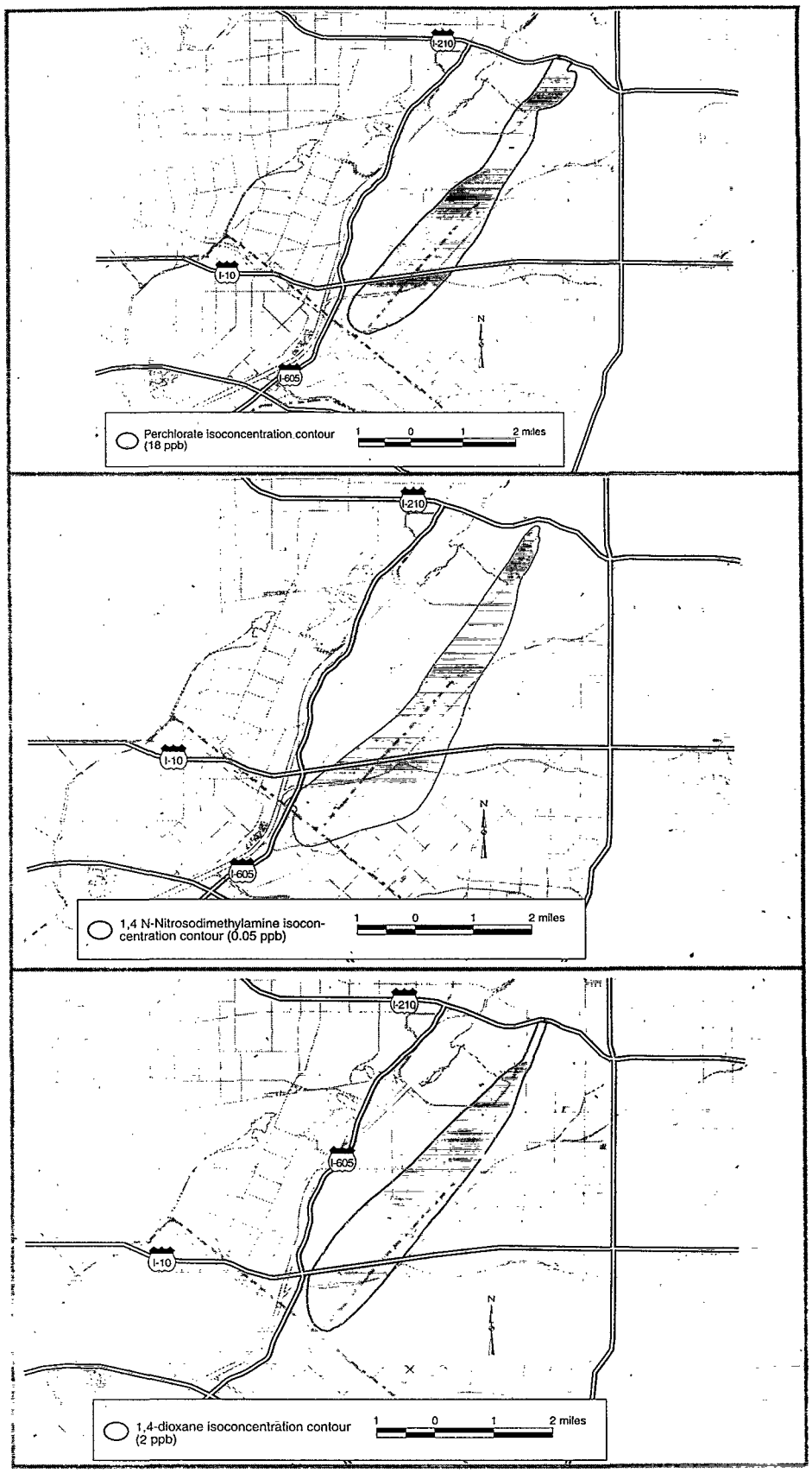



**Figure 3:** Approximate extent of perchlorate, NDMA and 1,4-dioxane contamination in groundwater

tions with water agencies continued, and a tentative water distribution and use plan was developed which called for delivery of the treated groundwater to the Metropolitan Water District of Southern California. The plan, labeled the *Consensus Plan*, called for export of the treated groundwater to areas now dependent on more expensive and less dependable imported water, in order to reduce the region's dependence on imported water supplies and raise revenue through sales of the treated water.

## 1997 - 1999: Discovery of Perchlorate Extends Negotiations and Triggers Need for Additional Pre-Design Work

In May 1997, the EPA sent *Special Notice* letters to 19 PRPs to begin formal EPA-PRP negotiations. The EPA's purpose in initiating the negotiations was to obtain a binding commitment from the PRPs to carry out the Baldwin Park cleanup plan (i.e., to design, construct, and operate the groundwater extraction, treatment, and delivery facilities). The negotiations were expected to conclude in late 1997, but the discovery in June 1997 of perchlorate at levels above 18 parts per billion (ppb) in groundwater forced an extension in the negotiations. At that time, no one knew the extent of perchlorate contamination in the Baldwin Park area and little was known about the cost, effectiveness, and reliability of possible treatment methods.

The discovery of perchlorate occurred soon after the California Department of Health Services developed an improved analytical method capable of detecting perchlorate at concentrations as low as 4 ppb in groundwater. The EPA had attempted to determine whether perchlorate was present in the groundwater in the mid 1980s, but the analytical methods available at the time were not capable of determining with certainty whether perchlorate was present. NDMA and 1,4-dioxane were discovered in the Baldwin Park area in 1998.

The highest concentrations of perchlorate, NDMA, and 1,4-dioxane are found in the groundwater in Azusa, in Subarea 1. Maximum concentrations of perchlorate and NDMA are more than 100 times the State drinking water action levels of 18 and 0.002 ppb respectively. The maximum concentration of 1,4-dioxane is more than 20 times the State drinking water action level of 3 ppb. Up to six miles downgradient of the industrial source area in Azusa, at the likely groundwater extraction locations in Subarea 3, perchlorate and NDMA concentrations remain above State action levels. The concentration of 1,4-dioxane in this area has, to date, been below the State action level. Figure 3 depicts the approximate extent of perchlorate, NDMA and 1,4-dioxane contamination in groundwater in the Baldwin Park OU.

In response to the discovery of perchlorate, the EPA extended its formal negotiations with the PRPs until July 1999. In exchange for the extension, the Steering Committee agreed to immediately proceed to complete additional pre-design work. The additional work included completion of a pilot-scale study of one perchlorate-removal technology (biological treatment); support for studies of a second perchlorate-removal technology (ion exchange); installation of four additional groundwater monitoring wells to help define the extent of perchlorate, NDMA, and 1,4-dioxane contamination; and revisions to the groundwater extraction plan. The ion exchange studies have been funded largely by the Main San Gabriel Basin Watermaster.

The treatment studies have successfully demonstrated that both technologies can remove perchlorate from groundwater down to non-detectable levels. Pilot-scale studies were not needed for NDMA or 1,4-dioxane removal, because experience at other sites has demonstrated that NDMA and 1,4-dioxane can be removed down to non-detectable levels using commercially-available treatment systems. See page 6 for a more detailed description of perchlorate, NDMA, and 1,4-dioxane treatment technologies. The additional treatment technologies needed to remove the new contaminants are responsible for most of the increase in the estimated cost of the cleanup.

At the same time that the treatment studies have been underway, the EPA, the PRPs, and local water agencies have continued efforts to determine the best use of the treated groundwater. Although no final decisions have been made, there has been a renewed interest in recent months in using the treated groundwater *within* the San Gabriel Basin, rather than exporting the water out of the Basin. This change in interest resulted in part because perchlorate and NDMA have forced water companies to shut down several water supply wells in the San Gabriel Basin, prompting water companies to look for additional supplies of clean water to replace the lost production. Ultimately, it is likely that much of the treated water will be used locally, but some may still be exported outside of the San Gabriel Basin. Since late 1998, discussions have been underway between the EPA, the PRPs, the Main San Gabriel Basin Watermaster, and affected water companies. The Watermaster and the affected water companies are interested in taking responsibility for building and operating some or all of the Baldwin Park cleanup facilities.

There are also multiple efforts underway to reduce the PRPs' share of the cleanup costs by securing other sources of funding. A Federal grant provided through the U. S. Bureau of Reclamation has paid for more than $1 million in pre-design costs and is expected to provide additional money for

## Table 1. Comparison of Cleanup Plans - Most Aspects of the 1994 Plan Have Not Changed

| | ORIGINAL CLEANUP PLAN | UPDATED CLEANUP PLAN |
|---|---|---|
| **Remedial Objectives** | Limit further migration of contaminated groundwater, begin to remove contamination from the groundwater, and provide data necessary to determine final clean up standards | Same |
| **Groundwater Extraction Areas** | Extract groundwater from two broad areas of contamination (Subareas 1 and 3) | Same, except Subarea 3 is extended further south |
| **Groundwater Extraction Rates** | Extract contaminated groundwater at rates needed to meet remedial objectives. Determine final rates during remedial design. Initial estimate was 19,000 gpm | Same. Revised estimate is 20,000-21,000 gpm |
| **Groundwater Treatment Technologies** | Use air stripping, carbon treatment, and/or oxidation technologies to remove VOCs from the groundwater. Select technologies during remedial design | Use same technologies to remove VOCs. Also use ion exchange or biological treatment to remove perchlorate, UV light to remove NDMA, and UV oxidation to remove 1,4-dioxane. Select technologies during remedial design |
| **Groundwater Treatment Standards** | Design treatment systems to reduce contaminant concentrations to below MCLs | Reduce contaminant concentrations to below MCLs and reduce perchlorate, NDMA, and 1,4-dioxane concentrations to below State action levels |
| **Use of Treated Groundwater** | Supply to water companies for distribution, and/or recharge into the groundwater basin. Make final decision during remedial design | Same |
| **Project Costs** | Estimated capital costs of $47 million; estimated operation and maintenance costs of $4 million/year | Estimated capital costs increase to $85 million; estimated operation and maintenance costs increase to $10 million/year |

design and construction costs (up to 25% of the project's capital costs). In March 1999, three of the San Gabriel Valley's U.S. Congressional Representatives cosponsored the San Gabriel Basin Drinking Water Initiative, which would, if it became law, provide up to $75 million in additional Federal funding for groundwater cleanup in the Baldwin Park area and other contaminated areas in the San Gabriel Valley and an additional $25 million for research on perchlorate treatment technologies.

*The cleanup plan remains protective of human health and the environment and will continue to meet all applicable or relevant and appropriate requirements identified in the 1994 Record of Decision, as required by CERCLA Section 121(d).*

### Schedule

- **Spring 1999** - Design of treatment facilities at the La Puente Valley County Water District (LPVCWD) wellfield
- **Summer 1999** - Construction of treatment facilities at the LPVCWD wellfield
- **July 1999** - Deadline for Potentially Responsible Parties to submit a *Good Faith Offer* committing to design, construct, and operate the Baldwin Park cleanup facilities
- **Fall 1999** - Deadline for negotiation of Consent Decree
- **Late 1999-2001** - Design of remaining Baldwin Park cleanup facilities
- **2001-2003** - Construction of remaining Baldwin Park cleanup facilities

# Treatment Options

## Perchlorate

Since 1997, when perchlorate was discovered in the San Gabriel Valley groundwater basin, much progress has been made in developing treatment methods capable of removing perchlorate from the groundwater. Most of the attention has been directed at two technologies: biological treatment and ion exchange.

In the biological treatment process, microbes destroy perchlorate by converting the perchlorate ion to oxygen and chloride. Oxygen and chloride are present at low levels in all drinking water. Nutrients must be added to sustain the microbes. The Steering Committee has completed a six month pilot-scale study of an anaerobic biological process, demonstrating the reduction of perchlorate from approximately 75 ppb to below detectable levels. The same process is being used in a recently-constructed full-scale treatment system at the Aerojet Superfund Site in Northern California. A similar process has also been used at a Utah facility to treat non-potable wastewaters resulting from the manufacture and maintenance of rocket motors.

Biological treatment methods are capable of producing potable water, but additional testing must be completed to determine whether a biological process can reliably and cost-effectively remove perchlorate and produce drinking quality water. The necessary tests are planned for later this year, when a 300-500 gallon per minute biological treatment system should be in operation. The treatment system is expected to include a biological reactor, followed by a *biologically-active multimedia filter* and granular activated carbon (GAC) *polishing treatment* (see Figure 4). The system will also include ultraviolet light treatment for removal of NDMA and VOCs. Biological treatment methods are new to many water utilities, but *biologically active* filters have been used in drinking water treatment for decades to help remove particles and biodegradable organic matter.

The second of the two perchlorate-removal technologies receiving the most attention is ion exchange, in which the perchlorate ion is replaced by chloride, a chemically similar but non-toxic ion. Ion exchange processes have been used in homes and businesses for *softening* hard water for decades. Bench- and pilot-scale studies have demonstrated that ion exchange systems can reliably reduce perchlorate concentrations in San Gabriel Valley groundwater from approximately 75 ppb to below detectable levels. The studies have also provided valuable information on resin selection and regeneration, brine volume, and cost that will guide the design and operation of full scale systems. By summer 1999, a 2500 gallon per minute ion exchange system is expected to go online, producing potable water for use in the San Gabriel Valley.

The principal disadvantage of ion exchange systems is that they produce a concentrated brine that requires disposal and/or further treatment. Research is underway to try to identify methods of reducing the volume of perchlorate-contaminated brines to reduce the high cost of disposal.

## What are Perchlorate, NDMA, and 1,4-Dioxane?

*Perchlorate* is a highly soluble inorganic molecule made of chlorine and oxygen. Its chemical formula is $ClO_4^-$. In solid form, as ammonium perchlorate, it is highly explosive. At low concentrations in water, as is found in the San Gabriel groundwater basin, perchlorate is unreactive and persistent. Ammonium perchlorate and potassium perchlorate were used at two facilities in Azusa in the 1940s in the testing of solid fuel rockets and the manufacture of photoflares. Ammonium perchlorate is still in use today - in the solid fuel rockets that launch the space shuttle, in some missiles and fireworks, and other applications.

*NDMA* (N-nitrosodimethylamine) is a highly soluble organic chemical that was used, until about 1976, in the production of the liquid rocket fuel 1,1-dimethylhydrazine (also known as unsymmetrical dimethylhydrazine [UDMH]). NDMA has reportedly been present as an impurity in UDMH, and may be formed as a result of the chemical breakdown of UDMH. NDMA has been detected at trace levels in some manufactured products and foods, and can reportedly be produced as a byproduct of a number of chemical reactions. Its chemical structure is $(CH_3)_2N\text{-}N{=}O$. Hydrazine-containing fuels were used in Azusa as early as the 1940s.

The chemical *1,4-dioxane* is a highly soluble compound used as a stabilizer in chlorinated solvents, particularly 1,1,1-trichloroethane. Its chemical formula is $C_4H_8O_2$. It belongs to a class of organic compounds known as ethers. It is a different chemical than the similar-sounding dioxins. Chlorinated solvents likely to have contained 1,4-dioxane, including 1,1,1-trichloroethane, have been used in Azusa and Baldwin Park for many years.

An added benefit of both biological treatment and ion exchange processes is that they would also remove much of the nitrate from the water. The groundwater in some parts of the San Gabriel Valley is unusable because of high levels of nitrate. The nitrate is believed to result from past agricultural practices in the Valley.

Two other technologies have also been demonstrated to be capable of removing perchlorate from water, but probably at higher cost. Reverse osmosis and nanofiltration were tested by researchers at the Metropolitan Water District of Southern California and shown to be effective in removing perchlorate, but they are likely to be much more expensive to operate than ion exchange processes or biological treatment. Liquid phase granular activated carbon (GAC) also removes perchlorate, but only for a limited period of time before regeneration or replacement of the carbon is required. Frequent carbon replacement would make relying solely on GAC for perchlorate removal very expensive. Perchlorate cannot be removed from water by conventional filtration, sedimentation, or air stripping technologies.

### NDMA and 1,4-Dioxane Treatment

NDMA can be removed from groundwater by ultraviolet (UV) light treatment. In a UV treatment system, the water passes though a tank containing high-intensity ultraviolet lamps. The NDMA molecules absorb the light energy and are broken down into smaller nontoxic molecules. The chemical 1,4-dioxane can also be removed by UV light treatment, in combination with an oxidant such as hydrogen peroxide. UV treatment systems have been successfully built and operated to remove both chemicals from water in locations throughout the United States.

## Treatment Levels

The treatment technologies used at the Baldwin Park Operable Unit will have to be capable of effectively and reliably removing VOCs, perchlorate, NDMA, and 1,4-dioxane from the groundwater. If any of the treated groundwater is to be used as drinking water, the treatment technologies must reduce the concentrations of all contaminants to below Federal and State drinking water standards in existence at the time that the water is served. These standards, known as Maximum Contaminant Levels (MCLs), must be met at the tap. There are MCLs for some but not all of the chemicals present in the groundwater in the Baldwin Park area.

Safe levels for some chemicals that lack MCLs are specified by *action levels* developed by the California Department of Health Services (DHS). There are action levels for perchlorate (at 18 ppb); NDMA (at 0.002 ppb); and 1,4-dioxane (at 3 ppb). Although not an enforceable standard, an action level is the concentration of a contaminant in drinking water that DHS has determined, based on available scientific information, provides an adequate margin of safety to prevent potential risks to human health. California Health & Safety Code Section 116455 requires that the operator of a public water system notify local government authorities when a drinking water well exceeds an action level. In addition, DHS recommends that drinking water systems provide public notification if action levels are exceeded, unless the wells in question are taken out of service. Public water systems virtually always shut down wells if action levels are exceeded.

Accordingly, in any water to be served as drinking water, the concentrations of perchlorate, NDMA, and 1,4-dioxane will be reduced to below action levels in existence at the time the water is served.

EPA's cleanup plan also allows some or all of the treated water to be recharged back into the groundwater basin instead of being delivered as drinking water. As discussed

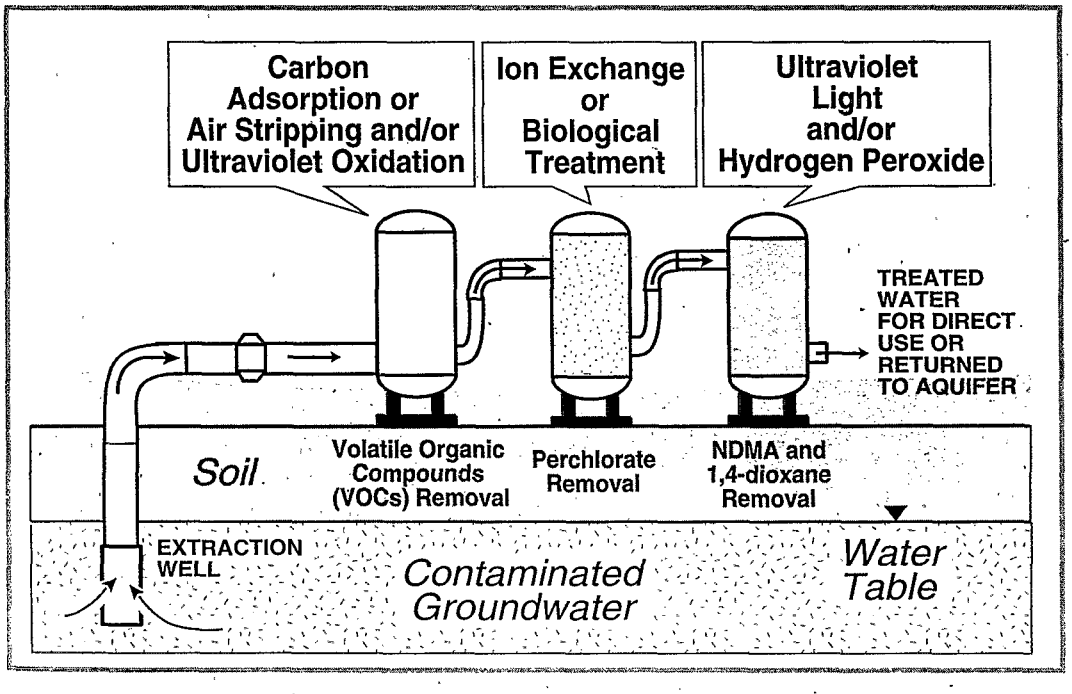



**Figure 4:** Groundwater treatment technologies

in greater detail in the Record of Decision, any water that is to be recharged must comply with the pertinent water quality objectives in the Los Angeles Regional Water Quality Control Board Basin Plan. In addition, State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," is applicable to any recharge of treated groundwater into the aquifer. Resolution No. 68-16 requires maintenance of existing State water quality unless it is demonstrated that a change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other State policies. In light of these requirements, any groundwater recharged into the aquifer will be treated to levels below action levels for perchlorate, NDMA, and 1,4-dioxane.

The treatment levels discussed above apply to the groundwater after it is pumped above ground. Neither the 1994 cleanup plan nor this update establish cleanup levels in situ (i.e., in the aquifer). EPA will propose in situ cleanup levels in a future action.

## Final Selection of Treatment Technologies

The EPA believes that a final decision to select treatment technologies for the Baldwin Park Operable Unit should be deferred until later this year or early next year. That way, the results of continuing treatment studies in the San Gabriel Valley and elsewhere can be incorporated into the decision. By the end of 1999, it is likely that full scale ion exchange and biological treatment systems will be operating in the San Gabriel Valley, providing additional cost and performance data to guide the selection of treatment technologies.

*EPA is issuing this Explanation of Significant Differences in part to satisfy its public participation responsibilities under CERCLA Section 117(c) and NCP Section 300.435(c)(2)(I).*

## Table 2. Status of the Five San Gabriel Valley Superfund Projects

| U.S. EPA PROJECT | LOCATION | STATUS | UPCOMING ACTIONS |
|---|---|---|---|
| Baldwin Park Operable Unit (OU) | Portions of the cities of Azusa, Irwindale, Baldwin Park, and West Covina | Regional investigation completed; cleanup plan adopted; 19 PRPs identified; pre-design work completed. | See remainder of fact sheet for detailed update. |
| Whittier Narrows OU | In and adjacent to the Whittier Narrows Recreation Area | New cleanup plan proposed November 1998. No PRPs named. | Record of Decision expected by mid 1999. EPA-funded pre-design activities underway. Remedial Design to be completed in 2000. |
| Puente Valley OU | Portions of the cities of Industry and La Puente | More than 70 PRPs identified; regional investigation complete; cleanup plan adopted in September 1998. | EPA-PRP Consent Decree negotiations expected to begin in late 1999. Goal is to obtain a binding commitment from the PRPs to carry out the Puente Valley cleanup plan. |
| El Monte OU | Portions of the cities of El Monte and Temple City | 20 PRPs identified; regional investigation completed; cleanup plan proposed in November 1998; seven early action monitoring wells installed | Record of Decision expected by June 1999. Formal EPA-PRP Consent Decree negotiations expected to begin later this year. |
| South El Monte OU | Portions of the cities of South El Monte, southern El Monte, and Rosemead | 50 PRPs identified; regional investigation completed | Proposed cleanup plan expected by mid-1999. |

# Who's Who?

*It's difficult to keep track of the many agencies and groups with a stake in the cleanup. Here is a quick summary of seven of the most active:*

**U.S. Environmental Protection Agency (EPA)** - The EPA is ultimately responsible for cleanup of the groundwater contamination in the Basin, through the Superfund program. The Superfund program remains one of the most effective means of resolving the nation's historical contamination problems. The Federal law that established the program (known as CERCLA) includes a prohibition against lawsuits to delay or stop cleanup; stringent liability provisions to ensure that responsible parties pay; a trust fund of government money to be used if responsible parties fail to carry out their cleanup responsibilities; numerous opportunities for public involvement; and flexibility to tailor cleanup projects to reduce costs, meet local water supply goals, and satisfy other local needs.

**Baldwin Park Operable Unit Steering Committee** - The Steering Committee consists of a majority of the companies named as Potentially Responsible Parties. As of May 1999, 14 of the 19 companies named as PRPs were members of the Steering Committee. To date, the Steering Committee has spent more than $3 million on investigation and treatment work needed for the cleanup.

**Main San Gabriel Basin Watermaster** - The Watermaster was created by a judgment of the California Superior Court to manage the San Gabriel groundwater basin under the jurisdiction of the Court. In 1991, the Watermaster's management responsibilities were expanded to further the cleanup and help preserve the basin's water resources. The Watermaster has been the primary sponsor of the ion exchange studies recently completed in the San Gabriel Valley, and is interested in taking responsibility for building and operating some or all of the Baldwin Park cleanup facilities.

**San Gabriel Basin Water Quality Authority (WQA)** - The WQA is a public agency created by State legislation to assist in the cleanup of the San Gabriel Basin. The WQA has offered a variety of ideas on how to carry out the Superfund cleanups in the San Gabriel Valley, and has funded construction of several interim cleanup projects in the Valley. The WQA has the authority to raise millions of dollars in funds through a tax on water production in the Valley.

**The California Department of Toxic Substances Control (DTSC)** - The DTSC is a State agency which has also funded wellhead treatment facilities in the San Gabriel Valley, and serves as the support agency for all of the San Gabriel Valley Superfund cleanups.

**The California Regional Water Quality Control Board** - The Regional Board is a State agency which has worked cooperatively with EPA to identify the sources of soil and groundwater contamination in the San Gabriel Valley.

**The California Department of Health Services (DHS)** - The DHS develops California MCLs and action levels, and regulates and monitors approximately 8500 public drinking water systems in California. DHS staff have participated in the recent testing of perchlorate treatment technologies in the San Gabriel Valley, and must approve any treatment systems used in the Baldwin Park cleanup to provide potable water.

## For Copies of Documents

This document will become part of the Administrative Record file for the Baldwin Park Operable Unit. To examine or obtain copies of this document or other documents related to this project, contact:

**EPA Region 9 Superfund Records Center**
95 Hawthorne Street
San Francisco, CA 94105 • (415) 536-2000

The Record Center's hours are 8:00 am to 5:00 p.m., Monday through Friday. The Superfund Records Center can make documents available for viewing in San Francisco, photocopy and mail requested documents, or create and send you a CD-ROM containing requested documents. A subset of documents related to the Baldwin Park Operable Unit is also available at:

**West Covina Public Library &**
1601 West Covina Parkway
West Covina, CA 91790
(626) 962-3541

**Rosemead Library**
8800 Valley Boulevard
Rosemead, CA 91770
(626) 573-5220

Call to check their hours. Documents available at all locations include:

**Perchlorate Treatment Studies (prepared by Harding Lawson Associates for the Baldwin Park Operable Unit Steering Committee, unless noted otherwise)**

09-29-1997 Draft Technology Screening for Treatability of Perchlorate in Groundwater, Baldwin Park OU
10-30-1998 Big Dalton Perchlorate Removal Pilot Study, prepared by Calgon Carbon Corporation for the Main San Gabriel Basin Watermaster (ion exchange)
02-12-1999 Final Phase 2 Treatability Study Workplan, Pilot Scale Groundwater Treatment System, Baldwin Park OU (biological treatment)
04-1999 Results of Bench-Scale and Pilot-Scale Studies of Ion Exchange for Perchlorate Removal, prepared by Montgomery Watson for the Main San Gabriel Basin Watermaster (ion exchange)
04-12-1999 Final Phase 1 Treatability Study Report, Perchlorate in Groundwater, Baldwin Park OU (biological treatment)

**Groundwater Monitoring and Groundwater Extraction Plan (prepared by Harding Lawson Associates for the Baldwin Park Operable Unit Steering Committee, unless noted otherwise)**

12-1996 Pre-Remedial Design Report..., Baldwin Park Operable Unit, prepared by Camp Dresser & McKee for the Baldwin Park Operable Unit Steering Committee
4-28-1998 Draft Phase 2A Well Installation and Groundwater Sampling Report...; Baldwin Park Operable Unit
1-21-1999 Draft Addendum to the Pre-Remedial Design Report, Baldwin Park Operable Unit

**Information on Physical, Chemical, and Toxicological Properties of Perchlorate, NDMA, and 1,4-dioxane**

7-1998 Action Level for N-NDMA (see DHS website: http://www.dhs.ca.gov/ps/ddwem/chemicals/ndma/ndmaindex.htm, updated 7/9/1998)
3-1999 Action Level for 1,4-dioxane (see DHS website: http://www.dhs.ca.gov/ps/ddwem/chemicals/mcl/mclindex.htm, updated 3/12/1999)
4-1999 Action Level for perchlorate (see DHS website: http://www.dhs.cahwnet.gov/org/ps/ddwem/chemicals/perchl/perchl_standards.htm, updated 4/23/1999)

**For more information about the EPA Superfund Program and EPA activities in the San Gabriel Valley, check**
- **EPA's national website: http://www.epa.gov**
- **EPA's Region 9 website: http://www.epa.gov/region09**

# Public Comments Welcomed

**We welcome comments on new aspects of the cleanup highlighted in this fact sheet, and on other issues raised by the discovery of perchlorate, NDMA, and 1,4-dioxane in the Baldwin Park area. Please send comments by July 2, 1999 to:**

Wayne Praskins, EPA Project Manager
75 Hawthorne Street (SFD-7)
San Francisco, CA 94105

phone: (415) 744-2256
fax: (415) 744-2180
Email: praskins.wayne@epa.gov

# For More Information

For general questions about the EPA Superfund program and the San Gabriel Valley Superfund Sites, you may contact the following U.S. EPA staff:

- **Puente Valley and Alhambra Operable Units**
  Penny McDaniel (415) 744-2407
- **Baldwin Park Operable Unit**
  Wayne Praskins (415) 744-2256
- **El Monte and South El Monte Operable Units**
  Bella Dizon (415) 744-2155
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**Attachment 4 to Administrative Order 2000-13**

# RD/RA STATEMENT OF WORK

# BALDWIN PARK OPERABLE UNIT

SAN GABRIEL VALLEY SUPERFUND SITES

LOS ANGELES COUNTY, CALIFORNIA

June 30, 2000

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**STATEMENT OF WORK FOR**
**REMEDIAL DESIGN AND REMEDIAL ACTION**
**ATTACHMENT 4 TO ADMINISTRATIVE ORDER 2000-13**
Baldwin Park Operable Unit
San Gabriel Valley Superfund Sites

# I. INTRODUCTION

This Statement of Work (SOW) describes activities to be performed by Respondents in order to design, construct, operate, maintain, monitor, and evaluate the remedy described in the Baldwin Park Operable (OU) Unit Record of Decision (ROD), as modified by the Explanation of Significant Differences (ESD). The ROD, which specifies an interim remedy for the site, was signed on March 31, 1994; the ESD was issued in May 1999. This SOW is Attachment 4 to Administrative Order 2000-13 ("the Order") issued by the U.S. Environmental Protection Agency ("EPA"). The definitions set forth in Section VI of the Order shall apply to this SOW unless expressly provided otherwise herein.

## A. NATURE AND EXTENT OF CONTAMINATION AT THE BALDWIN PARK OPERABLE UNIT

The Baldwin Park Operable Unit addresses an area of groundwater contamination over a mile wide, seven miles long, and more than 1,000 feet deep, extending beneath portions of the cities of Azusa, Irwindale, Baldwin Park, and West Covina in Los Angeles County, California. The groundwater contaminants include trichloroethene (TCE), tetrachloroethene (PCE), carbon tetrachloride (CTC), 1,4-dioxane, other volatile organic compounds (VOCs), perchlorate, and N-nitrosodimethylamine (NDMA).

The groundwater contamination in the Baldwin Park area has forced the closure of numerous public water supply wells, which formerly had the capacity to produce thousands of gallons per minute of potable water. Many other wells have low levels of contamination, and are at risk of having to shut down. Most of these wells are in the area described in the ROD and ESD as Subarea 3.

The affected water producers include the La Puente Valley County Water District (LPVCWD), Valley County Water District (VCWD), San Gabriel Valley Water Company (SGVWC), Suburban Water Systems , the City of Industry Waterworks System, and California Domestic Water Co. The LPVCWD was forced to shut down its three groundwater wells (its entire supply) due to VOC, perchlorate, and NDMA contamination. The SGVWC has been forced to shut down its B4 and B6 wellfields, and has detected contaminants in its B5 wellfield. Suburban Water Systems has detected VOCs and NDMA in its No. 139 and No. 140 wellfields. The City of Industry Waterworks System has detected VOCs and NDMA in its wells.

## B. SUMMARY OF BALDWIN PARK OPERABLE UNIT REMEDY

Major components of the Baldwin Park Operable Unit interim remedy include:

- groundwater extraction wells capable of pumping approximately 21,000 gallons per minute of contaminated groundwater from new and/or existing wells in the two *subareas* of contamination identified in the ROD and ESD. EPA has approved two alternative "extraction plans," each specifying a different combination of extraction rates and locations. If requested, EPA will evaluate modifications to the approved rates and locations;

- water treatment facilities needed to remove trichloroethene (TCE), tetrachloroethene (PCE), carbon tetrachloride (CTC), perchlorate, NDMA, 1,4-dioxane, and other chemicals from the groundwater in compliance with relevant performance standards;

- pipelines, pumps, and other conveyance facilities needed to transport the treated groundwater to the delivery, recharge, and/or discharge location;

- groundwater monitoring wells and piezometers to evaluate the effectiveness of the remedy and determine the nature of the final remedy.

Based upon current information, EPA believes that extraction of contaminated groundwater at the approved locations and rates is an efficient means of satisfying the BPOU Performance Standards. The capability to predict the impacts of the specified extraction rates and locations on the movement of groundwater in the Baldwin Park area is imperfect, however, despite the use of the best available analytical tools. Therefore, performance monitoring data collected in accordance with the approved Performance Standards Evaluation Plan (see Section IV.E of this SOW) shall be used to determine the extent to which the specified extraction rates and locations satisfy the Performance Standards. If performance monitoring indicates less than full compliance, Respondents may be required to supplement or modify the work to provide full compliance following the procedures described in the Order and approved Performance Standards Evaluation Plan.

## C. ROLE OF LOCAL AGENCIES AND WATER UTILITIES

EPA's BPOU Record of Decision requires that the treated water meet drinking water standards and expresses the preference that the treated groundwater be delivered to water purveyors for distribution to their residential and business customers. From 1998 though 2000, certain Respondents known as the Offering Parties negotiated with representatives of the Main San Gabriel Basin Watermaster and individual water purveyors ("the Watermaster") to supply some or all of the treated groundwater to local water purveyors forced to shut down water supply wells due to the contamination. In addition to making use of the treated water, Watermaster representatives have expressed an interest in the

design, construction, and operation of some or all of the remedy; and in incorporating existing groundwater extraction, treatment, and distribution facilities into the remedy.

The draft Conceptual Design Report and Addendum prepared by the Offering Parties (included as Attachments 5 and 6 to the Order) includes:

- a commitment to produce water of drinking water quality; and
- a design option for use of ion exchange technology for perchlorate removal.

Respondents should continue efforts to implement the water supply preference expressed in the ROD, in future remedial design decisions and through continued negotiations with the Watermaster to make the treated water available to local water producers. Although this SOW does not prescribe a role for local water agencies or water utilities, EPA encourages the Respondents to make arrangements with the Watermaster, individual water purveyors, and other local entities to make use of existing water supply infrastructure and help implement the remedy. The Respondents, however, ultimately remain responsible for compliance with this SOW.

Respondents must reach all necessary agreements and satisfy all pertinent regulatory requirements relevant to the disposition of the treated water in a timely manner to demonstrate that the planned method of disposition is feasible (see Section III for Performance Standards). In addition, Respondents should ensure that the extraction and disposition of the groundwater is consistent with the amended judgment in Upper San Gabriel Valley Municipal Water District v. City of Alhambra (Case No. 924128, California Superior Court for the County of Los Angeles), administered by the Watermaster.

D. REMEDIAL DESIGN WORK COMPLETED TO DATE

Between September 1999 and June 2000, the Offering Parties began the remedial design and submitted several remedial design deliverables. The Offering Parties submitted an initial draft Remedial Design/ Remedial Action (RD/RA) Work Plan dated October 13, 1999; a draft final Remedial Design/ Remedial Action Work Plan dated November 16, 1999; a final RD/RA Work Plan dated February 10, 2000 ("the February 10, 2000 Work Plan"); a draft Conceptual Design Report dated April 18, 2000; an Addendum to the draft Conceptual Design Report dated May 18, 2000; and a draft final Performance Standards Evaluation and Long-Term Remedy Evaluation Plan dated March 31, 2000. The draft Conceptual Design Report, Addendum to the draft Conceptual Design Report, EPA comments on the draft Conceptual Design Report and Addendum, and draft Performance Standards Evaluation and Long-Term Remedy Evaluation Plan are included as Attachments 5 - 8 to the Order. On February 15, 2000, EPA approved the February 10, 2000 Work Plan, which was prepared during Consent Decree negotiations which were ultimately unsuccessful. EPA has not, as of the date of the Order, approved the Conceptual Design Report or Performance Standards Evaluation and Long-Term Remedy Evaluation Plan. As described in this SOW, EPA is directing Respondents to revise the

draft Conceptual Design Report and Addendum, revise the draft Performance Standards Evaluation and Long-Term Remedy Evaluation Plan, and prepare a new RD/RA Work Plan which will supersede the February 10, 2000 RD/RA Work Plan.

## II. RESPONDENTS' RESPONSIBILITIES

Respondents are ordered to design, construct, and operate the remedy described in the draft conceptual design submittals dated April 18, 2000 and May 18, 2000, as modified by this Section (Section II) and by EPA comments dated June 29, 2000 . This SOW supercedes the February 10, 2000 RD/ RA Work Plan.

The draft Conceptual Design Report proposes the use of a series of treatment technologies (a "treatment train") to remove contaminants from the groundwater. The proposed technologies are biological reduction, flash mixing and flocculation/aeration, multimedia filtration, ultraviolet light and chemical oxidation (UV/OX), air stripping and offgas treatment, liquid phase granular activated carbon adsorption, and disinfection. The Addendum to the Conceptual Design Report proposes an alternative series of treatment technologies: air stripping and offgas treatment, ion exchange, ultraviolet light and chemical oxidation (UV/OX), and disinfection.

EPA requested that the Offering Parties propose an alternative treatment train because of potential delays associated with the use of the biological reduction process for removal of perchlorate from the groundwater. The alternative treatment train proposes use of ion exchange in place of biological reduction and ancillary processes. There are advantages and disadvantages to both technologies. An ion exchange process has been approved by the California Department of Health Services (CA DHS), but has the disadvantage of producing a concentrated waste brine which requires further treatment and/or disposal. A full-scale ion exchange system has been constructed for the La Puente Valley County Water District in the San Gabriel Valley, and is currently in the testing phase. The biological treatment process has the advantage of being a destructive technology (it converts the perchlorate to chloride) and is expected to be less expensive to operate than ion exchange, but it has not yet been approved by the CA DHS.

After considering the Record of Decision requirement that the treated water satisfy drinking water standards, the urgent need for additional supplies of potable water in the Baldwin Park area (see Section I.A of this SOW), and the potential for delay in permitting a system employing biological reduction, *EPA is directing Respondents to make use of a treatment train employing ion exchange rather than biological treatment in Subarea 3.* This approach will ensure that the remedy will be implemented as soon as possible, and that treated groundwater satisfying drinking water standards is available to water purveyors at the earliest possible date.

The Order defers the decision on the perchlorate treatment technology in Subarea 1 to a later stage in the design process.

## III. PERFORMANCE STANDARDS

As specified in the Order, Respondents shall meet all Performance Standards set forth in this SOW. The first Performance Standard described below (Performance Standard "A") is drawn from the remedial objectives specified in the ROD and ESD. The ROD states that the remedial objectives are to prevent future increases in, and begin to reduce, concentrations of groundwater contaminants in the Baldwin Park area by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection and by removing contamination from the aquifer. The ROD specifies extraction of contaminated groundwater at the downgradient end of two broad subareas of contamination, at locations and rates sufficient to hydraulically contain contaminated groundwater moving through each subarea during all anticipated groundwater flow conditions. The locations of the subareas are shown in the Explanation of Significant Differences, issued in May 1999, which is Attachment 3 to the Order.

The Performance Standards also include cleanup standards, standards of control, quality criteria, and other substantive requirements, criteria or limitations including all Applicable or Relevant and Appropriate Requirements (ARARs) included in the ROD.

Performance Standards relevant to this SOW include:

A. The design, installation, operation, and maintenance of groundwater extraction systems at the downgradient end of two subareas of groundwater contamination to limit further migration of contaminated groundwater into clean and less contaminated areas or depths, and to remove contaminant mass. The subareas are designated in the ROD (as modified by the ESD) as Subarea 1 (the *upper area*) and Subarea 3 (the *lower area*).

1. Subarea 1 shall include portions of the aquifer that include a majority of the known or suspected source areas and depths. Source areas and depths include locations believed, through direct measurement or indirect evidence, to contain a significant mass of soil (i.e., vadose zone) contamination, non-aqueous phase contamination, or other continuing subsurface sources of dissolved-phase groundwater contamination. At a minimum, source areas include the following 15 BPOU PRP facilities, which are located at the specified addresses: 1100 W. Hollyvale St (Aerojet General Corp.); 1120 W. Foothill Blvd (Huffy Corp.); 1704 W. First St (Oil and Solvent Process Co.); 1151 W. 5th St (Wynn Oil); 1201 W. Gladstone St (Azusa Gas Systems); 766 N. Todd Ave (Azusa Pipe and Tube Bending); 601 S. Vincent Ave (Fairchild Holding Corp.); 701 W. Foothill Blvd (The Hartwell Corporation); 717 North Coney Ave (Phaostron Instruments & Electronic Company); 237 Motor Ave (Reichhold Inc.); 968 W. Foothill Blvd (Rubber/Urethanes, Inc.); 925 W. First Street (Screwmatic, Inc.); 1004 W. 10th St (Valspar/ Mobil Oil/ Lockheed Martin); 145 S. Irwindale Ave (White and White Properties/RPM Merit/Whico); and 204 S. Motor Ave (White and White

Properties/NORAM). The approximate locations and boundaries of the 15 facilities are shown in Figure 2 (included at the end of this SOW).

2. Subarea 3 shall include significant portions of the aquifer where PCE, TCE, CTC, perchlorate, NDMA, 1,4-dioxane or other contaminants concentrations exceed Federal Maximum Contaminant Levels, California Maximum Contaminant Levels, or California action levels;

B. The installation and operation of treatment systems that are designed to reduce the concentrations of PCE, TCE, CTC, other VOCs, perchlorate, NDMA, and 1,4-dioxane in the treated groundwater to below Federal Primary and Secondary Maximum Contaminant Levels (MCLs), California Primary MCLs, and California action levels, regardless of the end use or discharge method for the treated water. This paragraph shall not apply to EPA-approved CERCLA section 104(b) activities that will result in temporary high flow, high volume discharges (e.g., discharges resulting from extraction well development, aquifer testing, sampling of selected water supply wells);

C. Compliance with all legal requirements for drinking water in existence at the time that the water is served, for any water which will be put into a public water supply;

D. Compliance with substantive portions of the National Pollutant Discharge Elimination System (NPDES) discharge requirements for any treated water discharged to surface water;

E. Compliance with the Los Angeles Regional Water Quality Control Board's Water Quality Control Plan for the Los Angeles River Basin (the "Basin Plan"), which incorporates State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," for any discharge to land, including recharge at a spreading basin or discharge to surface water;

F. The installation and operation of treatment systems needed to ensure that the nitrate concentration in any discharge to land, to a spreading basin, or to a surface water is similar to or lower than the concentration in the receiving water, except for EPA-approved CERCLA section 104(b) activities that will result in temporary high flow, high volume discharges;

G. Use of best available control technology for toxics (T-BACT) on new stationary operating equipment, so the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of ten in one million ($1 \times 10^{-5}$), as required by South Coast Air Quality Management District (SCAQMD) Rule 1401;

H. Compliance with substantive portions of SCAQMD Regulation XIII, comprising Rules 1301 through 1313, on new source review;

I. Limits in visible emissions (SCAQMD Rule 401) and particulate concentrations (SCAQMD Rule 403);

J. No discharges of material that is odorous or causes injury, nuisance or annoyance to the public (SCAQMD Rule 402);

K. Compliance with substantive requirements in 22 CCR Sections 66264.601 -.603 for *miscellaneous units,* and related substantive closure requirements in 22 CCR Sections 66264.111-.115 for air strippers or granular activated carbon (GAC) contactors;

L. Compliance with container storage requirements in 22 CCR Sections 66264.170 -.178 for the storage of contaminated groundwater over 90 days;

M. Compliance with 22 CCR Sections 66262 and 66268 and other State Hazardous Waste Control Act (HWCA) requirements for storage and disposal if the spent carbon is classified as a characteristic hazardous waste; and

N. Compliance with substantive portions of Water Well Standards for construction of water supply wells.

## IV. LIST OF DELIVERABLES AND OTHER TASKS

Respondents shall submit plans, specifications, reports, and other deliverables for EPA review and/or approval, as specified below. One copy of each final written deliverable shall be provided in an unbound format suitable for reproduction; additional copies shall be provided as stated in the Order. Information presented in color must be legible and interpretable when reproduced in non-color. If EPA requests, final written deliverables produced electronically shall also be provided in electronic format.

Respondents shall implement quality control procedures to ensure the quality of all reports and submittals to EPA. These procedures shall include but are not limited to: internal technical and editorial review; independent verification of calculations; and documentation of all reviews, problems identified, and corrective actions taken.

As described in Section XIV of the Order, EPA may approve, disapprove, or modify each deliverable. Major deliverables are described below and summarized in Section V of this SOW. EPA shall review deliverables to assess the likelihood that the remedial action will achieve the Performance Standards described in the ROD, ESD, and this SOW, but EPA review or approval of a task or deliverable shall not be construed as a guarantee as to the adequacy of such task or deliverable.

A. REMEDIAL DESIGN / REMEDIAL ACTION WORK PLAN

The Offering Parties submitted the February 10, 2000 RD/RA Work Plan for the Baldwin Park Operable Unit. This SOW supersedes the February 10, 2000 RD/RA Work Plan. Respondents shall submit a new RD/RA Work Plan ("the RD/RA Work Plan") that is consistent with this SOW. The new RD/RA Work Plan, and all updates and addenda to the Work Plan, must be reviewed and approved by EPA in accordance with Section IX of the Order. The deliverables and schedule described in this SOW assume a design-build contracting approach.

The Work Plan shall include:

1. Updated Project Description

The RD/RA Work Plan shall include an updated description of the work to be implemented by Respondents, including extraction locations; treatment technologies; disposition of the treated water (i.e., recipients, delivery locations, delivery pressures, and delivery rates); locations of major project components; existing equipment to be used as part of the remedy; and other key aspects of the project. The Work Plan shall briefly discuss the condition, anticipated longevity, and any limitations in the use of each existing facility.

2. Description of the Responsibility and Authority of All Organizations and Key Personnel Involved With The Projects.

The RD/RA Work Plan shall include a description of the responsibilities and qualifications of key personnel expected to direct or play a significant role in the Remedial Design, Remedial Action, or Operation and Maintenance, including Respondents' Project Manager, Designer, Construction Contractor, Construction Quality Assurance personnel, and Resident Engineer. The Work Plan shall define lines of authority and provide brief descriptions of duties.

3. Treatability Study.

The RD/RA Work Plan shall describe ongoing or planned treatability studies related to implementation of the BPOU.

4. Updated Schedule.

The RD/RA Work Plan shall identify the initiation and completion dates for each required design activity, construction activity, inspection, and deliverable required by the Order and this SOW, consistent with the schedule included as Section V of this SOW.

5. Contracting Strategy

The RD/RA Work Plan shall briefly describe the planned contracting strategy, including a brief description of the process for evaluation and approval of construction changes and EPA review and approval of significant changes.

6. Plans for Satisfying All Permitting Requirements and Acquiring Property, Leases, Easements, or Other Access.

The RD/RA Work Plan shall list all permits, property, leases, and easements required for implementation of the remedy; permits, property, leases, and easements acquired to date; and a schedule for submittal of permit applications and acquisition of property, leases, or easements not yet obtained.

Where normally required, permits must be obtained for all off-site activities, such as from the California Department of Health Services for domestic use of treated water. Respondents are not required to obtain permits for on-site remedial activities, but must comply with all substantive requirements, including local building codes. If permits will not be obtained for an onsite activity where a permit is normally required, Respondents shall describe all consultative or coordination activities planned to identify and satisfy the substantive requirements.

7. Third Parties Necessary for Design, Construction, or Operation of Remedy.

The RD/RA Work Plan shall describe the roles and responsibilities of Respondents, participating water purveyors and water agencies, and other parties expected to play a significant role in the design, construction, or operation of the remedy. The Work Plan shall summarize and provide copies of Memoranda of Understanding and draft or final agreements with water producers and other third parties expected to participate in implementation of the remedy. If legally-binding agreements are not in place, the Work Plan shall describe commitments made to date and planned efforts to secure necessary commitments including a schedule. If the participation of a third party is uncertain, the Work Plan shall describe alternatives to be implemented in the event that the party does not fulfill its planned role. Possible third party roles include agreeing to the use of existing equipment (e.g., groundwater extraction wells, water treatment facilities, pipelines, groundwater recharge facilities), treatment plant operation, acceptance of treated groundwater, and recharge of treated grounddwater.

8. Identification of Any Concerns about the Quantity, Quality, Completeness, or Usability of Water Quality or Other Data Upon Which the Design Will Be Based.

Respondents shall provide a description of additional data collection efforts, if any, required for completion of the Remedial Design. Respondents shall consider

whether any data are needed to verify that critical design assumptions remain valid (e.g., the areas of groundwater contamination requiring hydraulic containment). If additional data are required, Respondents shall propose a schedule for preparation of a Sampling and Analysis Plan (or Addendum) and implementation of the Plan. Laboratory results from water quality sampling required by California Department of Health Services (CA DHS) or the Los Angeles Regional Water Quality Control Board (LARWQCB) may be used during remedial design if they are of known and adequate quality.

9. A Description of Planned Community Relations Activities to Be Conducted During Remedial Design or Remedial Action.

In accordance with Section IX of the Order, Respondents shall cooperate with EPA and the State in providing information regarding the Work to the public. As requested by EPA or the State, Respondents shall participate in the preparation of such information for dissemination to the public and in public meetings which may be held or sponsored by EPA or the State to explain activities at or relating to the Site.

10. Updates to the RD/RA Work Plan and Periodic Reporting to EPA

The RD/RA Work Plan shall describe provisions for reporting progress to EPA (consistent with the schedule included in Section V of this SOW and the Performance Standard Evaluation Plan to be prepared in accordance with Section IV.E of this SOW). The RD/RA Work Plan shall also describe how the Work Plan will be revised or supplemented periodically to document changes or provide information not available at the time the Work Plan is first submitted. If any required information is omitted from the Work Plan, Respondents shall note in the Work Plan that the missing information was not available and specify when it will be submitted. Revisions or supplements shall be submitted as specified in the schedule included in Section V (i.e., after approval of the conceptual design, preliminary design, and prefinal design) and at other appropriate times.

## B. REMEDIAL DESIGN

Remedial Design activities shall include the preparation of clear and comprehensive design documents, construction plans and specifications, and other design activities needed to implement the work and satisfy Performance Standards set forth in the ROD, ESD, and this SOW. All plans and specifications shall be developed in accordance with relevant portions of the U.S. EPA's Superfund Remedial Design/Remedial Action Handbook (EPA 540/R-95/059), and in accordance with the schedule set forth in Section V of this SOW.

1. Conceptual Design

The Offering Parties submitted a draft Conceptual Design Report, and Addendum to the draft Conceptual Design Report, dated April 18, 2000 and May 18, 2000 respectively. EPA provided comments on these two reports on June 29, 2000. Respondents shall respond to EPA's comments and provide a revised Conceptual Design Report as specified in the schedule included in Section V of this SOW.

2. Preliminary Design

Respondents shall submit a Preliminary Design in accordance with the approved schedule. It is assumed that the design-build contractor hired by Respondents will prepare the Preliminary Design and subsequent design submittals. Unless modified by EPA, the Preliminary Design submittal shall include or address, at a minimum, the following:

a. Any changes to the design basis or design criteria submitted as part of the Conceptual Design;

b. Plans, drawings, sketches, and specifications of groundwater extraction, treatment, conveyance, and monitoring systems;

c. Any updates to the schedule for design, construction and operation of the Remedial Action;

d. An updated list of substantive requirements satisfied; permits or regulatory agency approvals obtained; MOUs developed; access or use agreements, easements, or properties acquired; copies of permits, approvals, and agreements not previously supplied to EPA; and activities and schedules for obtaining outstanding items required before start of construction (e.g., for use of existing facilities or disposition of the treated water).

3. Intermediate Design

Respondents shall not be required to submit an Intermediate Design, but may seek EPA review of design concepts or documents if desired.

4. Prefinal/Final Design

Respondents shall submit the Prefinal Design when the design effort is complete in accordance with the approved schedule. The Prefinal Design shall fully address all comments made on the Preliminary Design Report (and during the Intermediate Design review, if it occurs) and, if not previously addressed, be accompanied by a

memorandum indicating how the comments were incorporated into the Prefinal Design. The Prefinal Design documents shall be certified by a Professional Engineer registered in the State of California.

The Prefinal Design shall serve as the Final Design if EPA has no further comments and provides its approval. The Prefinal Design submittals shall include a capital and operation and maintenance cost estimate; reproducible drawings and specifications; and a complete set of construction drawings in full and one-half size reduction.

5. Applicability of Remedial Design Requirements to Existing Facilities

If Respondents reach agreements for use of existing wells, existing treatment facilities, existing pipelines, or other existing facilities, Respondents shall submit as-built drawings and specifications, operating agreements, operation and maintenance manuals, or other documentation as appropriate in lieu of design submittals. EPA will review the documents to evaluate the facility's capability to contribute reliably to the attainment of the Performance Standards described in Section III of this SOW. If the existing facilities are part of an operating stand-alone system (e.g., the La Puente Valley County Water District extraction, treatment, and distribution system), EPA will evaluate: i) the extent to which the existing facilities appear to be achieving Performance Standards; and ii) any needed modifications to the project or its operation to fully satisfy Performance Standards and ensure the project's future capability to meet Performance Standards.

C. REMEDIAL ACTION

Respondents shall implement the Remedial Action. During the design period, in preparation for implementation of the Remedial Action and in accordance with the schedule included in Section V of this SOW, Respondents shall submit a Construction Quality Assurance Plan, a Construction Health and Safety Plan, and any needed updates to the RD/RA Work Plan.

Upon approval of the Final Design and Construction Quality Assurance Plan, Respondents shall begin construction in accordance with the schedule in the RD/RA Work Plan. Significant field changes to the Remedial Action as set forth in the RD/RA Work Plan and Final Design shall not be undertaken without the approval of EPA. All work on the Remedial Action shall be documented in enough detail to produce as-built construction drawings after the Remedial Action is complete. Review and/or approval of submittals does not guarantee that the remedy, when constructed, will meet Performance Standards.

1. Remedial Action Work Plan

Respondents shall not be required to submit a separate Remedial Action Work Plan. Instead, Respondents shall provide supplemental information as necessary to update the RD/RA Work Plan.

2. Preconstruction Meeting

A Preconstruction Meeting shall be held after selection of the construction contractor but before initiation of construction. The meeting shall include Respondents' representatives and federal, state and local government agency personnel; shall define the roles, relationships, and responsibilities of all parties; review work area security and safety protocols; review any access issues; review construction schedule; and review construction quality assurance procedures.

Respondents shall ensure that the results of the Preconstruction Meeting are documented and transmitted to all parties in attendance, including the names of people in attendance, issues discussed, clarifications made, and special instructions issued.

3. Remedial Action Construction

Respondents shall implement the Remedial Action as detailed in the approved RD/RA Work Plan (as updated) and approved Final Design.

4. Prefinal Construction Inspection

Within fourteen (14) days after Respondents believe that construction is complete and the remedy is operational and functional, Respondents shall notify the U.S. EPA and the State for the purposes of conducting a prefinal inspection to be attended, at a minimum, by EPA and Respondent representatives. If a Prefinal Construction Inspection is held for a portion of the remedy, one or more additional inspections shall be conducted so that the entire remedy is inspected.

The objective of the inspection(s) is to determine whether construction is complete, the remedy (or the inspected portion) is "operational and functional," and the work has been completed consistent with the Order. Any outstanding construction items discovered during the inspection shall be identified and noted on a punch list. Respondents shall certify that the equipment is effectively meeting the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. A Prefinal Construction Inspection Report shall be submitted by Respondents which outlines the outstanding construction items, actions required to resolve the items, completion date for the items, and an

anticipated date for the Final Inspection. The Prefinal Construction Inspection Report can be in the form of a punch list or letter.

5. Final Construction Inspection

Within fourteen (14) days after completion of any work identified in the Prefinal Construction Inspection Report, Respondents shall notify the U.S. EPA and the State for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection by representatives of the U.S. EPA and Respondents. The Prefinal Construction Inspection Report shall be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

Any outstanding construction items discovered during the inspection still requiring correction shall be identified and noted on a punch list. If any items are still unresolved, the inspection shall be considered to be a Prefinal Construction Inspection requiring another Prefinal Construction Inspection Report and subsequent Final Construction Inspection.

6. Remedial Action Report

As specified in the approved schedule included in Section V of this SOW, after work is completed as required by this SOW, Respondents shall submit a Remedial Action Report. The Report shall be prepared consistent with appropriate parts of the EPA guidance "Close Out Procedures for National Priorities List Sites," (US EPA January 2000), and other relevant EPA guidance. In the Remedial Action report, a registered Professional Engineer and Respondents' Project Manager shall state that the Remedial Action has been completed in full satisfaction of the requirements of this Order. The written report shall provide a synopsis of the work defined in this SOW, describe deviations from the RD/RA Work Plan, include as-built drawings signed and stamped by a Professional Engineer, provide actual costs of the Remedial Action (and O&M to date), and provide a summary of the results of operational and performance monitoring completed to date. The report shall contain the following statement, signed by a responsible corporate official of the Respondents or the Respondents' Project Manager:

> "To the best of our knowledge, after thorough investigation, we certify that the information contained in or accompanying this submission is true, accurate and complete. We are aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

As provided in Section IX of the Order, the Remedial Action shall not be considered complete until EPA approves the Remedial Action Report.

## D. OPERATION AND MAINTENANCE

Operation and Maintenance (O&M) shall be performed in accordance with the approved Operation and Maintenance Manual.

### 1. Operation and Maintenance Plan

Respondents shall not be required to submit an Operation and Maintenance (O&M) Plan. O&M-related information shall be provided in the O&M Manual (see Section IV.D.2 of this SOW) and/or the Performance Standards Evaluation Plan (see Section IV.E of this SOW) .

### 2. Operation and Maintenance Manual

Respondents shall submit a draft Operation and Maintenance Manual during the design period, in accordance with the approved schedule included in Section V of this SOW, and a revised draft after the final construction inspection to incorporate manufacturer/vendor information and any design modifications implemented during the Remedial Action. If the remedy is constructed as two or more discrete projects, separate Operation and Maintenance Manuals may be submitted for each project. The Operation and Maintenance Manuals must be reviewed and approved by EPA. The manuals shall include all necessary Operation and Maintenance information for the operating personnel, and provide or address the following:

a. System description;
b. Startup and shutdown procedures;
c. Criteria for determining when the remedy (or a discrete portion of the remedy) is "operational and functional";
d. Description and schedule of normal operation and maintenance tasks, including equipment and material requirements, anticipated equipment replacement for significant components, availability of spare parts, provisions for remote monitoring and control, operator training and certification requirements, staffing needs, and related requirements;
e. Indicators of system performance and/or maintenance (e.g., parameters to be monitored to determine timing for activated carbon or ion exchange resin replacement, or to assess biological reactor performance);
f. Criteria to be used to determine when the treated groundwater will be supplied to the primary or secondary user or use (e.g., low water demand limiting direct use, high groundwater elevations or insufficient recharge capacity limiting recharge);
g. Any planned variation in groundwater extraction rate, including a description of the magnitude and timing of any expected variation;

h. Record keeping and reporting requirements, including operating and inspection logs, maintenance records, and periodic reports; and
i. Description and analysis of potential operating problems (e.g., equipment failure, higher than expected contaminant concentrations), including emergency operating and response activities and relevant health and safety information.

## E. PERFORMANCE STANDARDS EVALUATION PLAN

Performance monitoring activities shall be performed in accordance with the approved Performance Standards Evaluation Plan, to evaluate whether Performance Standards, as described in Section III of this SOW, have been achieved and are being sustained over the life of the remedy. The Offering Parties submitted a draft final Performance Standards Evaluation and Long-Term Remedy Evaluation Plan, dated March 31, 2000. EPA expects to provide comments on the draft plan by July 28, 2000. Respondents shall respond to EPA's comments and provide a revised Plan as specified in the schedule included in Section V of this Order.

## F. SUPPORTING PLANS

### 1. Sampling and Analysis Plan and Health and Safety Plan

Sampling and Analysis Plan. In accordance with Section IX of the Order, Respondents shall prepare a Sampling and Analysis Plan (SAP), or update an existing Plan to perform performance monitoring and carry out any other field investigations needed to complete the remedial design, and construct and operate the remedial action. The Plan shall discuss the timing of data collection activities, including data collection activities needed to establish baseline conditions before startup of the remedial action.

The SAP shall include a Field Sampling and Analysis Plan (FSAP), a Quality Assurance Project Plan (QAPP), and a schedule for implementation of sampling, analysis, and reporting activities. The FSAP and QAPP may be submitted as one document or separately, and may reference an existing FSAP or QAPP. Upon EPA approval, Respondents shall proceed to implement the sampling activities described in the SAP.

**a.** The FSAP shall describe sampling objectives, analytical parameters, sample locations and frequencies, sampling equipment and procedures, sample handling and analysis, management of investigation-derived wastes, and planned uses of the data. The FSAP shall be consistent with EPA Region 9 "Sampling and Analysis Plan Guidance and Template, Version 2 (applicable to analyses by private (non-EPA) laboratories)," R9QA/002, March 2000, and any other applicable guidance. It shall be written so that a field sampling team unfamiliar with the project would be able to gather the samples and field information required. The FSAP shall include a

schedule that describes activities that must be completed in advance of sampling, including acquisition of property, access agreements, and arrangements for disposal of investigation-derived waste.

**b.** The QAPP shall describe project objectives, organizational and functional activities, data quality objectives (DQOs), and quality assurance and quality control (QA/QC) protocols that shall be used to achieve the desired DQOs. The QAPP shall be consistent with relevant EPA guidance (e.g., EPA "Guidance for the Data Quality Objectives Process" (EPA QA/G-4), "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," November 1999 (EPA QA/R-5), "Guidance for Quality Assurance Project Plans" February 1998 (EPA QA/G-5)). The DQOs shall, at a minimum, reflect use of analytical methods for obtaining data of sufficient quality to meet National Contingency Plan requirements as identified at 40 CFR 300.435 (b). In addition, the QAPP shall address personnel qualifications, sampling procedures, sample custody, analytical procedures, document control procedures, preservation of records (see Sections IX , XVI, and XXI of the Order), data reduction, data validation, data management, procedures that will be used to enter, store, correct, manipulate, and analyze data; protocols for transferring data to EPA in electronic format; and document management.

All analytical data, whether or not validated, shall be submitted to EPA within 45 calendar days of sample shipment to the laboratory. All analytical data, validated and in electronic format in an approved data structure, shall be submitted within 90 calendar days of the sample shipment to the laboratory. Well construction information shall be submitted within 90 days after completion of a well.

Respondents shall demonstrate in advance and to EPA's satisfaction that each laboratory it may use is qualified to conduct the proposed work and meets the requirements specified in Section XVI of the Order. EPA may require that Respondents submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specification, and laboratory analyses of performance samples (e.g., blank and/or spike samples). In addition, EPA may require submittal of data packages equivalent to those generated by the EPA Contract Laboratory Program (CLP).

Health and Safety Plan. To ensure protection of on-site personnel and area residents from hazards posed by sampling activities, Respondents shall also develop a Health and Safety Plan. The Plan shall be in conformance with U.S. Occupational, Safety, and Health Administration (OSHA) requirements as outlined in 29 C.F.R. §§1910 and 1926, and any other applicable requirements. The Health and Safety Plan shall describe health and safety risks, employee training, monitoring and personal protective equipment, medical

monitoring, levels of protection, safe work practices and safeguards, contingency and emergency planning, and provisions for site control. EPA will review but will neither approve nor disapprove Respondents' Health and Safety Plan.

2. Construction Quality Assurance Plan

Respondents shall develop and implement a Construction Quality Assurance Plan to ensure, with a reasonable degree of certainty, that the completed Remedial Action meets or exceeds all design criteria, plans and specifications, and Performance Standards. The Construction Quality Assurance Plan shall include the following elements:

a. Responsibilities and authorities of all organizations and key personnel involved in the design and construction of the Remedial Action;

b. A description of the quality control organization, including a chart showing lines of authority, members of the Quality Assurance team, their responsibilities and qualifications, and acknowledgment that the Quality Assurance team will implement the quality control system for all aspects of the work specified and shall report to the Respondents' Project Manager and EPA. Members of the Quality Assurance team shall have a good professional and ethical reputation, previous experience in the type of QA/QC activities to be implemented, and demonstrated capability to perform the required activities. They shall also be independent of the construction contractor;

c. Description of the observations, inspections, and control testing that will be used to assure quality workmanship, verify compliance with the plans and specifications, or meet other QC objectives during implementation of the Remedial Action. This includes identification of sample size, sample locations, and sample collection or testing frequency; and acceptance and rejection criteria. The Plan shall specify laboratories to be used, and include information which certifies that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards;

d. Reporting procedures, frequency, and format for QA/QC activities. This shall include such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records shall be presented in the Construction Quality Assurance Plan. The QA official shall report simultaneously to the Respondents' representative and to EPA; and

e. A list of definable features of the work to be performed. A definable feature of work is a task which is separate and distinct from other tasks and has separate quality control requirements.

3. Construction Health and Safety Plan

Respondents shall prepare a Construction Health and Safety Plan in compliance with OSHA regulations and protocols and other applicable requirements. The Construction Health and Safety Plan shall describe health and safety risks, employee training, monitoring and personal protective equipment, medical monitoring, individuals responsible in an emergency, and provisions for site control for workers and for visitors to the job site. EPA will review but neither approve nor disapprove Respondents' Construction Health and Safety Plan.

## G. PHASE 2 TREATABILITY STUDY

In March 2000, a subset of Respondents began implementation of the Phase 2 treatability study, as described in the Final Phase 2 Treatability Study Work Plan for a Pilot Scale Groundwater Treatment System for the Baldwin Park Operable Unit, dated February 25, 2000. The study is expected to continue through September 2000. As long as Respondents remain interested in using the biological treatment process being evaluated in the Phase 2 study for removal of perchlorate, Respondents shall complete and report on the Phase 2 study in accordance with the approved schedule in Section V of this SOW.

## V. SUMMARY AND SCHEDULE FOR MAJOR DELIVERABLES AND OTHER TASKS

| **ACTIVITY**[1] | **DUE DATE [a] (b)**[2]<br>**a= estimated no. of calendar days after effective date of order**<br>**b= estimated date** | **ESTIMATED EPA REVIEW TIME**[3] |
|---|---|---|
| Effective Date of Administrative Order | Not applicable [0] (7/10/00) | - |
| **PHASE 2 TREATABILITY STUDY** | | |
| Interim Reporting | The 15th of each month through completion of testing [5, 36, 67] (7/15/2000, 8/15/2000, 9/15/2000) | 14 |
| Final Report | Thirty (30) days after completion of testing [112] (10/30/2000) | 28 |
| **REMEDIAL DESIGN** | | |
| Notification of Project Manager (as required by Section IX of the Order) | Seven (7) days after effective date of Order [7] (7/17/2000) | - |
| Revised Conceptual Design Report | Twenty-eight (28) days after effective date of Order [28] (8/7/00) | 21 |
| Contractor Solicitation Documents | Five (5) days after issuance | - |
| Notification of name, title, and qualifications of potential construction contractors | Twenty-eight (28) days after effective date of Order [28] (8/7/00) | - |
| Notification of selected RD/RA contractor | Within five (5) days of selection | - |
| Preliminary Remedial Design Submittal | Seventy (70) days after EPA approval of Conceptual Design [119] (11/6/00) | 21 |
| Intermediate Remedial Design Submittal | Not Required | - |
| Prefinal Remedial Design Submittal | Twenty-eight (28) days after EPA approval of Preliminary Design [168] (12/25/00) | 21 |

| ACTIVITY[1] | DUE DATE [a] (b)[2]<br>a= estimated no. of calendar days after effective date of order<br>b= estimated date | ESTIMATED EPA REVIEW TIME[3] |
|---|---|---|
| **REMEDIAL DESIGN / REMEDIAL ACTION (RD/RA) WORK PLAN** | | |
| RD/RA Work Plan | New Work Plan due twenty-one (21) days after EPA approval of the conceptual design. [70] (9/18/00) | 21 |
| | If requested, revision due fourteen (14) days after receipt of EPA comments [105] (10/23/00) | 14 |
| | Update or addendum due fourteen (14) days after selection of design and/or construction contractor | 7 |
| | If requested, revision due fourteen (14) days after receipt of EPA comments | 7 |
| | Update or addendum (or written statement that update unnecessary) due twenty-one (21) days after EPA approval of the preliminary design [161] (12/18/00) | 21 |
| | If requested, revision due fourteen (14) days after receipt of EPA comments [196] (1/22/01) | 14 |
| | Update or addendum (or written statement that update unnecessary) due twenty-one (21) days after EPA approval of the pre-final design. [210] (2/5/01) | 21 |
| | If requested, revision due fourteen (14) days after receipt of EPA comments [245] (3/12/01) | 14 |
| **REMEDIAL ACTION** | | |
| Pre-Construction Meeting | As specified in approved RD/RA Work Plan | - |
| Complete Construction and Satisfy "Operational and Functional" Criteria | Three hundred (300) days after EPA approval of Prefinal Design [489] (11/11/01) | - |
| Prefinal Construction Inspection | Fourteen (14) days after remedy satisfies "Operational and Functional" criteria [503] (11/25/01) | - |
| Prefinal Construction Inspection Report | Seven (7) days after Prefinal Construction Inspection [510] (12/2/01) | 7 |
| Final Construction Inspection (if needed) | Twenty-eight (28) days after Prefinal Construction Inspection [531] (12/23/01) | - |

| ACTIVITY[1] | DUE DATE [a] (b)[2]<br>a= estimated no. of calendar days after effective date of order<br>b= estimated date | ESTIMATED EPA REVIEW TIME[3] |
|---|---|---|
| Final Construction Inspection Report (if needed) | Seven (7) days after Final Inspection [538] (12/30/01) | 7 |
| Remedial Action Report | Draft due twenty-eight (28) days after final construction inspection [559] (1/20/02) | 28 |
| | If needed, revised Report due twenty-eight (28) days after receipt of EPA comments [615] (3/17/02) | 21 |
| **OPERATION AND MAINTENANCE** | | |
| Operation and Maintenance Manual | Draft Manual due twenty-eight (28) days after EPA approval of Preliminary Design Submittal (i.e., at same time as pre-final design) [168] (12/25/00) | 21 |
| | If requested by EPA, revised Manual due twenty-one (21) days after receipt of EPA comments [210] (1/26/01) | 21 |
| | Updated Manual due fourteen (14) days after Final Construction Inspection to incorporate any design modifications made during RA (or written statement that update unnecessary) [545] (1/6/02) | 21 |
| | If requested by EPA, revised updated Manual due twenty-one (21) days after receipt of EPA comments [587] (2/17/02) | 21 |
| **PERFORMANCE EVALUATION** | | |
| Performance Standards Evaluation Plan | Revised Plan due thirty-five (35) days after date of EPA comments on draft Performance Standards and Long-Term Remedy Evaluation Plan [53] (9/1/00) | 21 |
| Progress Reports | As required by approved Performance Standards Evaluation Plan | 7 |
| Performance Evaluation Reports | As required by approved Performance Standards Evaluation Plan | 28 |
| Noncompliance Notification | Due five (5) days after receipt of information indicating noncompliance | - |
| Compliance Action Plan | Draft due fourteen (14) days after receipt of information indicating noncompliance | 14 |
| | If needed, revised Plan due seven (7) days after receipt of EPA comments on draft Plan | - |

| ACTIVITY[1] | DUE DATE [a] (b)[2]<br>a= estimated no. of calendar days after effective date of order<br>b= estimated date | ESTIMATED EPA REVIEW TIME[3] |
|---|---|---|
| Compliance Correction Report | As established in approved Compliance Action Plan | - |
| **SUPPORTING PLANS** | | |
| Sampling and Analysis Plan | Draft due thirty (30) days after EPA approval of Performance Standards Evaluation Plan [93] (10/11/00) | 28 |
| | If needed, revised Plan due twenty-one (21) days after receipt of EPA comments [142] (11/29/00) | 21 |
| Site Health and Safety Plan | Due thirty (30) days after EPA approval of Performance Standards Evaluation Plan (i.e., at same time as, or as appendix to, Sampling and Analysis Plan) [93] (10/11/00) | 28 |
| Construction Quality Assurance Plan, Construction Health and Safety Plan | Draft Plans due twenty-eight (28) days after EPA approval of Preliminary Design Submittal [168] (12/25/00) | 28 |
| | If needed, revised Plans due 21 days after receipt of EPA comments [224] (2/19/01) | 21 |
| **CERTIFICATIONS REQUIRED BY SECTION IX OF ORDER** | | |
| Pre-certification Inspection | Thirty (30) days after Respondents conclude that the Remedial Action has been fully performed | - |
| Certification that the Remedial Action has been Completed | Thirty (30) days after the pre-certification inspection | - |
| Certification that all Work has been Completed | Thirty (30) days after Respondents conclude that all Work has been performed, including completion of all Operation and Maintenance activities | - |

1. Due dates are measured from effective date of Order.
2. As defined in the Order, the term "EPA approval" means that: (a) EPA approves the submission; or (b) EPA approves the submission with modifications.
3. Failure to review a deliverable within the estimated time shall not constitute a violation of the Order by the United States.

## VI. REFERENCES

The following list, although not comprehensive, provides citations for many of the regulations and guidance documents that apply to the RD/RA process. Respondents shall review these guidance documents and shall use the information provided therein in performing the RD/RA and preparing all deliverables under this SOW.

"National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule," 55 Fed. Reg. 8,666 (March 8, 1990).

"Superfund Remedial Design/ Remedial Action Handbook," U.S. EPA, Office of Emergency and Remedial Response, June 1995 (EPA 540/R-95/059)

"Interim Final Guidance on Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties," U.S. EPA, Office of Emergency and Remedial Response, February 14, 1990, OSWER Directive No. 9355.5-01.

EPA's "Guidance for the Data Quality Objectives Process" September 1994 (EPA QA/G-4).

"EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," November 1999 (EPA QA/R-5).

"Guidance for Quality Assurance Project Plans," U.S. EPA, February 1998 (EPA QA/G-5).

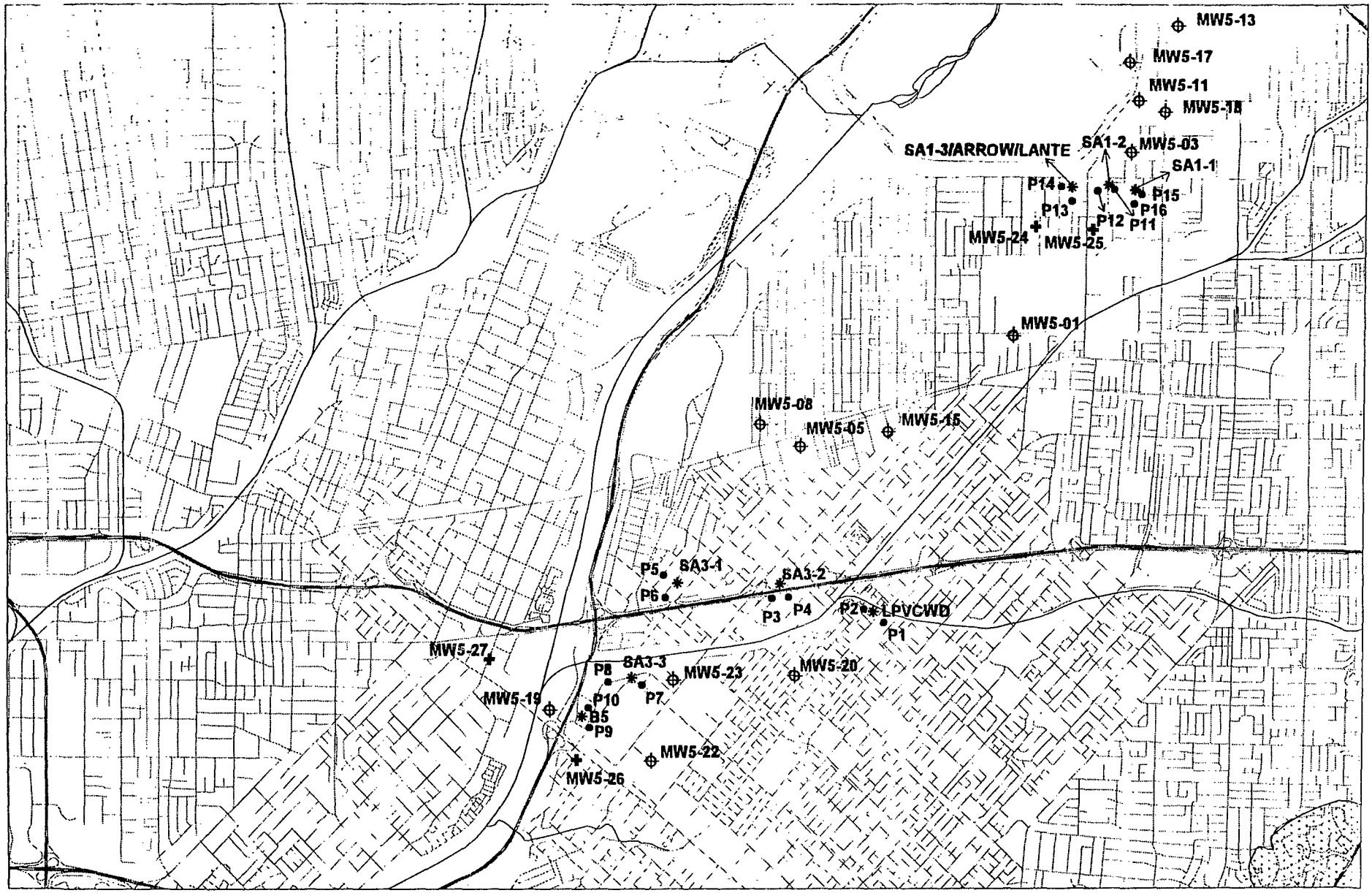
"Sampling and Analysis Plan Guidance and Template, Version 2 (applicable to analyses by private (non-EPA) laboratories)," U.S. EPA Region 9, R9QA/002, March 2000

Data Quality Objectives Process for Superfund, September 1993, U.S. EPA Office of Emergency and Remedial Response (EPA/540/G-93/071)

"Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," U.S. EPA, Office of Emergency and Remedial Response, December 1988 (EPA/540/G-88/003)

"Methods for Monitoring Pump-and-Treat Performance," U.S. EPA Office of Research and Development, June 1994 (EPA 600/R-94/123).

"Close Out Procedures for National Priorities List Sites," U.S. EPA Office of Emergency and Remedial Response, January 2000 (EPA 540-R-98-016)

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✱ EXTRACTION WELL LOCATIONS

✚ NEW MULTIPORT MONITORING WELLS

● NEW PIEZOMETERS

⊕ EXISTING MULTIPORT MONITORING WELLS

**FIGURE 1**

**BPOU WELL LOCATIONS**

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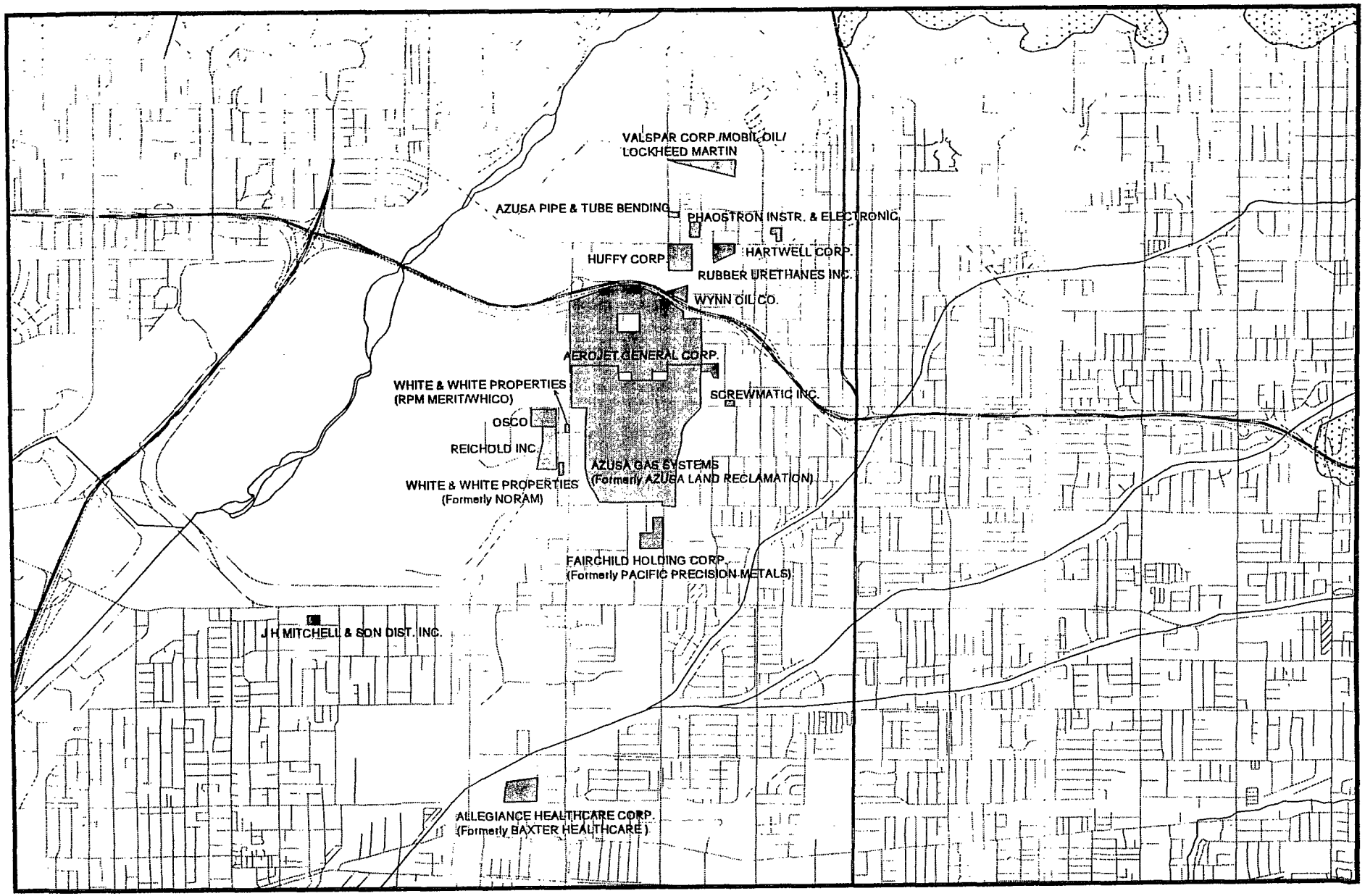


**Figure 2**

**Facility Locations for Recipients of EPA Administrative Order 2000-13 Baldwin Park OU**

76150

Attachment 5

# Draft
# Conceptual Design Report
# Baldwin Park Operable Unit
# San Gabriel Basin, California

Prepared for:

**U.S. Environmental Protection Agency**
**Region IX**

Prepared for:

**Baldwin Park Operable Unit Settling Parties**

HLA Project No. 46717 202

April 18, 2000

**Harding Lawson Associates**
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# 1.0 INTRODUCTION

Harding Lawson Associates (HLA) is submitting this Draft Conceptual Design Report (CDR) to the U.S. Environmental Protection Agency, Region IX (EPA) on behalf of the Baldwin Park Operable Unit Settling Parties (BPOUSP), which includes Aerojet General Corporation, Azusa Gas Systems, Fairchild Holding Corporation, Hartwell Corporation, Huffy Corporation, J.H. Mitchell & Sons Distributors Inc., Oil and Solvent Processing Company, Screwmatic Inc., Whico Machine Inc., Wynn Oil Company, and Reichhold Inc. This CDR is part of the ongoing activities to be performed by the BPOUSP in order to design, construct, operate, maintain, monitor, and evaluate the remedy described in the Baldwin Park Operable Unit (BPOU) Record of Decision (ROD), as modified by the Explanation of Significant Differences (ESD). This plan is intended to meet the requirements set forth in the *Remedial Design/Remedial Action* (RD/RA) Statement of Work (SOW) prepared by the EPA and BPOUSP.

On September 9, 1999, the BPOUSP submitted a revised offer to the EPA for performance of the BPOU RD and RA. On September 10, 1999, the EPA responded, concluding that the offer constituted a "good faith" offer, and requested that the BPOUSP submit the Draft RD/RA Work Plan to the EPA. Once submitted, the Draft RD/RA Work Plan underwent several revisions and was ultimately submitted as a final document on February 10, 2000. The Final RD/RA Work Plan was accepted by the EPA in their letter dated February 15, 2000. The Final RD/RA Work Plan presented the current understanding regarding the scope of the BPOU Project (HLA, 2000a).

Once the Final RD/RA Work Plan was approved, work began on the CDR. The purpose of this report is to present and justify the concepts, assumptions, standards, and preliminary interpretations and calculations, which comprise the conceptual project design.

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## 1.1 History of Groundwater Contamination-Related Activities

Beginning in 1979, volatile organic compounds (VOCs) were detected in groundwater within the San Gabriel Basin (the Basin). The location of the Basin is shown on Figure 1-1. In May 1984, four areas of groundwater contamination were listed as San Gabriel Valley Areas 1-4 on the EPA's National Priorities List (NPL) based on available water quality data. Subsequent investigation by the EPA and others revealed widespread VOC contamination in the basin. As a result, the EPA divided the basin into seven remedial investigation (RI) areas to focus characterization of the extent of contamination and plan remedial actions. RI Area 5 was designated as the BPOU.

Since 1986, the EPA, various potentially responsible parties, and numerous other agencies have compiled, investigated, and evaluated groundwater quality in the San Gabriel Basin. Initial field investigations conducted by the EPA included the installation and sampling of one multiport monitoring well and the sampling of water supply wells. In 1992, the EPA published an *Interim Remedial Investigation Report*. This report described the extent of VOC contamination in the basin. In 1993, EPA issued an Operable Unit Feasibility Study (FS) Report. This report evaluated various remedial alternatives for the remediation of groundwater contamination in the BPOU.

In 1994, the EPA issued a ROD for the BPOU. The ROD identified 17 chemicals of concern (COCs), all of which were VOCs. The EPA's selected remedy consisted of pumping and treating approximately 19,000 gallons-per-minute (gpm) of contaminated groundwater. In 1995, the Baldwin Park Operable Unit Steering Committee (BPOUSC) began to perform pre-remedial design activities including additional characterization of the extent of VOC contaminated groundwater and the development of a groundwater extraction plan. Eight multiport monitoring wells were installed and sampled, and 26 existing water supply and monitoring wells were sampled to provide additional characterization of the extent of VOC contamination in the BPOU. The results of these pre-remedial design activities were submitted to the EPA in the *Draft Pre-Remedial Design Report* dated December 1996 (CDM, 1996). Following review

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and comment by the EPA, the groundwater extraction plan was revised on several occasions as documented in the *Draft Final Pre-Remedial Design Report* dated September 1997 (CDM, 1997).

Starting in May 1997, constituents that were not previously considered as COCs in the ROD were discovered in groundwater within the BPOU. Consequently, the EPA requested that a group of potentially responsible parties, called the BPOUSC, characterize the distribution of perchlorate, n-nitrosodimethylamine (NDMA), and 1-4 dioxane, as well as conduct further characterization of VOCs in groundwater within the BPOU. As a result, the BPOUSC installed and sampled four additional multiport monitoring wells and conducted groundwater sampling to evaluate the extent of VOCs, perchlorate, NDMA, and 1,4-dioxane in groundwater in the BPOU.

The results of these investigations and several groundwater extraction plan options were presented to the EPA in a *Draft Addendum* to the *Pre-Remedial Design Report* dated January 14, 1999 (HLA, 1999b). Throughout 1999, these groundwater extraction plan options were refined, and new extraction plan options were formulated. These changes were made in response to comments from the EPA and the Main San Gabriel Basin Watermaster. This has resulted in a series of candidate groundwater extraction plans with total groundwater extraction rates ranging from 19,500 to 21,500 gpm.

In May 1999, the EPA issued an ESD to update its March 1994 ROD. The ESD extended the southern portion of the BPOU plume, Subarea 3, to reflect the results of recent investigations, and adds perchlorate, NDMA, and 1,4 dioxane to the list of COCs.

## 1.2 Overview of the Response Action

The BPOUSP have agreed to implement a BPOU project that satisfies the EPA's requirements to limit further migration of COCs and remove chemical mass. The BPOUSP will design, construct, and operate this project, which comprises extraction of groundwater in two general areas, and treatment of the

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extracted groundwater. The treated groundwater will be supplied for direct potable use if necessary agreements with water purveyors can be reached. Water not needed for direct potable use will be recharged, as described in Sections 8.0 and 9.0 of this document.

A total of approximately 21,000 gpm of groundwater will be extracted, 6,000 gpm from the northern portion of the plume (Subarea 1), and 15,000 gpm from the southern portion of the plume (Subarea 3). Extracted groundwater will be treated using a series of unit processes designed to remove all chemicals of concern to levels acceptable for recharge or direct use. The treatment train will consist of biological treatment and multimedia filtration, and/or ion exchange, in addition to ultraviolet (UV)/oxidation, air stripping, and liquid phase granular activated carbon (GAC). The BPOUSP will work with the California Department of Health Services (DHS) and the Regional Water Quality Control Board (RWQCB) to establish appropriate treatment goals.

## 1.3 Organization of Work Plan

The remainder of this Work Plan contains the following elements which address the requirements presented by the EPA (EPA, 1999):

- Section 2.0 summarizes the ongoing design-related activities.
- Section 3.0 describes the groundwater extraction plan.
- Section 4.0 summarizes the design basis for the conceptual design of the project.
- Section 5.0 presents a general description of the land acquisition and permitting issues.
- Section 6.0 describes the elements of the water delivery system design.
- Section 7.0 discusses each unit treatment process and summarizes the design characteristics of each treatment plant.
- Section 8.0 describes the treated water delivery system.
- Section 9.0 discusses potential uses of the treated water.

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- Section 10.0 presents the conceptual project schedule associated with the construction and implementation of the remedial action.
- Section 11.0 summarizes the references used during the preparation of the CDR.
- Section 12.0 summarizes the acronyms used in this CDR.

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# 2.0 ONGOING DESIGN-RELATED ACTIVITIES

Prior to the commencement of RAs, several data collection activities are required to evaluate certain design criteria. These pre-remedial action data collection activities include the following:

- Phase 2 Treatability Study
- Baseline Data Collection.

## 2.1 Phase 2 Treatability Study

To further develop the biological reduction process for application in the San Gabriel Basin, a Phase 1 Treatability Study was performed between November 1997 and May 1998 at Aerojet General Corporation's Sacramento, California facility. The results of this study have been documented in *Final Phase 1 Treatability Study Report* (HLA, 1999a). Although a considerable amount of information was obtained from the Phase 1 Treatability Study, several important issues require further evaluation, indicating the need for a second phase of treatability testing. These issues include:

- Scale-up factors
- Varying influent water quality characteristics
- Production of potable water.

The Phase 2 Treatability Study is being conducted at the Aerojet Sacramento Facility. The Phase 2 Treatability Study was constructed and is being operated at Groundwater Extraction and Treatment (GET) System F, which is an operating treatment facility that includes biological treatment for perchlorate removal, UV/Oxidation for NDMA removal, and air stripping for VOC removal. The Phase 2 Treatability Study takes advantage of the biological treatment component at GET F Facility by removing a slipstream immediately downstream of one of the four existing bioreactors at this facility. This slipstream is being treated by the Phase 2 Treatment System, which includes the remaining unit processes required to meet the objectives of the Phase 2 Treatability Study.

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The purpose of the Phase 2 Treatability Study is to demonstrate that the proposed treatment train will effectively and reliably produce potable water pursuant to all applicable state and federal regulations, confirm the destruction/removal efficiency of each unit process in the treatment train, optimize the system operating parameters, and collect data for the design and construction of a full-scale treatment facility. The *Final Phase 2 Treatability Study Work Plan* (HLA, 2000b) presents a detailed discussion of each objective.

Currently, the Phase 2 Treatability Study Treatment Plant is its initial startup period. Monthly status memos are being submitted to the EPA and DHS. Future versions of this Work Plan will include data gathered in the course of operation.

## 2.2 Baseline Data Collection

The Watermaster and the BPOUSP have collected baseline data (i.e., potentiometric head and water quality monitoring data) for more than 5 years in support of remedial planning for the BPOU project. Despite these data collection efforts, additional baseline data are required prior to the commencement of remedial actions. Specifically, a current and comprehensive round of water quality sampling and analyses is needed to refine influent concentrations for remedial design. As part of this effort, additional multiport monitoring wells will be installed.

### 2.2.1 Baseline Potentiometric Monitoring

Baseline potentiometric monitoring of selected wells will continue to be conducted by the BPOUSP and the Watermaster prior to remediation system start up to update the groundwater flow model. Currently, the Watermaster performs semi-annual measurements in more than 40 wells in the BPOU. At a minimum, potentiometric measurements in new extraction wells, existing monitoring wells, and

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piezometers will also be obtained for two consecutive quarters prior to extraction system startup (Table 2-1).

### 2.2.2 Baseline Water Quality Monitoring

Baseline water quality monitoring of selected production wells in the BPOU will continue to be conducted on an annual basis by the Watermaster prior to commencement of remedial actions. The Watermaster currently performs baseline water quality monitoring in more than 75 production wells in the BPOU area. These data will be used to supplement baseline water quality sampling in new extraction wells, multi-port monitoring wells, and other monitoring wells on a semi-annual basis prior to extraction system startup (Table 2-2).

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# 3.0 GROUNDWATER EXTRACTION PLAN

This section provides a description of the BPOU Groundwater Extraction Plan to be implemented by the BPOUSP. Groundwater will be extracted and treated from two areas within the BPOU: Subarea 1 to the north and Subarea 3 to the south. The following subsections contain descriptions of the elements for each subarea including: groundwater extraction well design and locations, extraction well flow rates, and estimated treatment plant influent concentrations. In addition, the uncertainties associated with each of these components in relation to their impact on the conceptual design are discussed.

The Groundwater Extraction Plan described in this Conceptual Design Report is consistent with the extraction plan described in the *Final Remedial Design/Remedial Action Work Plan* (HLA, 2000a). Proposed extraction well locations and results of the model extraction simulations are presented in Figures 3-1 through 3-4. The effectiveness of hydraulic containment was simulated using the DYNFLOW groundwater flow model and the DYNTRACK particle tracking code. DYNTRACK plots the starting locations of particles captured by extraction wells to provide an estimate of the hydraulic capture area for each well. Figures 3-1 through 3-4 also present the results of hydraulic capture for particles started at four different elevations. Illustrations of containment by each proposed extraction well at four elevations in the aquifer are provided to represent capture at discrete depths within the plume of contaminated groundwater. The extent of groundwater plumes for trichloroethene (TCE), carbon tetrachloride (CTC), perchlorate, and NDMA are also shown on the particle containment plots. The outer extent of the plumes is defined by concentrations of 5 micrograms per liter (µg/l), 0.5 µg/l, 18 µg/l, and 0.05 µg/l for TCE, CTC, perchlorate, and NDMA, respectively.

Groundwater flow modeling and particle tracking with an EPA-approved groundwater model of the BPOU will be performed as part of the evaluation of extraction system performance as described in the *Draft Final Performance Standards Evaluation Plan* (PSEP) (HLA, 2000e). These performance

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modeling activities will be performed to evaluate the hydraulic performance of the extraction system as it relates to limiting further migration of groundwater contamination. Prior to remedial system startup, the groundwater flow model will be updated using hydraulic conductivity data obtained from extraction well installation and aquifer pump testing. Baseline water quality monitoring of production wells, monitoring wells, and the proposed extraction wells will also be performed in accordance with the Draft Final PSEP to provide additional data in support of RD and to reduce uncertainties in extraction well flow rates and treatment plant influent concentrations.

## 3.1 Subarea 1 Extraction Plan

### 3.1.1 Extraction Well Locations

The proposed extraction well locations for the Subarea 1 extraction system are shown on Figure 3-5. Extraction well locations are considered preliminary and subject to revision until property access and acquisition issues are addressed as discussed in Section 5.0. Following better definition of property access and acquisition for extraction well locations, the wells will be installed, groundwater baseline sampling will be performed, and aquifer and well testing will be conducted, as described in the Draft Final PSEP. Information obtained from these activities will be used to refine the model simulations and to evaluate the effectiveness of migration control of alternative well locations.

### 3.1.2 Extraction Well Design

Proposed well depths and screened intervals for Subarea 1 extraction wells are shown in Table 3-1. The screened intervals at each extraction location, along with well diameter and casing material are also included in Table 3-1. Spinner log surveys, geologic boring logs, borehole geophysical logs, geologic cross sections, and chemical cross sections will be used during well installation activities to aid in the determination of the appropriate screened intervals at each extraction location. Uncertainties associated with extraction well locations will be reduced once property acquisition and access agreements have been reached.

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### 3.1.3 Extraction Well Flow Rates

Planned pumping rates for Subarea 1 extraction wells are shown in Table 3-1 and on Figures 3-1 through 3-4. Total groundwater extraction for the Subarea 1 extraction system is 6,000 gpm. Following better definition of extraction well locations as described above, modeling will be used to evaluate the effectiveness of migration control of alternative well locations. Consequently, adjustments to pumping rates may be required to ensure that the effectiveness of migration control is appropriate.

### 3.1.4 Estimated Subarea 1 Treatment Plant Influent Water Quality

The groundwater quality data used in the estimates of influent water quality to the Subarea 1 Treatment Plant are shown on Table 3-2. The estimates of influent water quality to the Subarea 1 Treatment Plant are shown on Table 3-3. These projections have been refined since the *Final Remedial Design/Remedial Action Work Plan* (HLA, 2000a) to incorporate EPA comments on the estimates presented in the *Draft Final Remedial Design/Remedial Action Work Plan* (HLA, 1999d). Estimates of influent concentrations are based on the most recent measured groundwater concentrations from monitoring or production wells screened at similar depths and located in the vicinity of proposed extraction well locations. Measured concentrations were flow weighted and blended using the proposed pumping rates and are presented in Tables 3-2 and 3-3.

The refined flow-weighted VOC concentrations for Subarea 1 are shown in Tables 3-2 and 3-3, and are approximately one-half of the concentrations presented in the Final RD/RA Work Plan. The flow-weighted concentrations of NDMA and 1,4-dioxane are also somewhat less than previously estimated whereas the flow-weighted concentrations of nitrate (as N) and perchlorate are greater than previously estimated. All refined estimates are still within an order of magnitude of previous estimates and have been considered in the design basis presented in this CDR.

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## 3.2 Subarea 3 Extraction Plan

### 3.2.1 Extraction Well Locations

The proposed extraction well locations for the Subarea 3 extraction system are shown on Figure 3-6. Extraction well locations are considered preliminary and subject to revision until property access and acquisition issues are addressed as discussed in Section 5. Following better definition of property access and acquisition for extraction well locations, the wells will be installed, baseline groundwater sampling will be performed, and aquifer and well testing will be conducted. Information obtained from these activities will be used to refine the model simulations and to evaluate the effectiveness of migration control of alternative well locations.

### 3.2.2 Extraction Well Design

The proposed well depths and screened intervals for Subarea 3 extraction wells are shown in Table 3-4. The preliminary screened intervals at each extraction location, along with well diameter and casing material are also included in Table 3-4. Spinner log surveys, geologic boring logs, borehole geophysical logs, geologic cross sections, and chemical cross sections will be used during well installation activities to aid in the determination of the appropriate screened intervals at each extraction location.

### 3.2.3 Extraction Well Flow Rates

The planned pumping rates for Subarea 3 extraction wells are shown in Table 3-4 and on Figures 3-1 through 3-4. Total groundwater extraction for the Subarea 3 extraction system is 15,000 gpm. Following better definition of extraction well locations as described above, modeling will be used to evaluate the effectiveness of migration control of alternative well locations. Consequently, adjustments to pumping rates may be required to ensure that the effectiveness of migration control is appropriate.

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### 3.2.4 Estimated Subarea 3 Treatment Plant Influent Water Quality

The groundwater quality data used in the estimates of influent water quality to the Subarea 3 Treatment Plant are shown on Table 3-5. The estimates of influent water quality to the Subarea 3 Treatment Plant are shown on Table 3-6. These projections have been refined since the Final RD/RA Work Plan (HLA, 2000a) to incorporate EPA comments on the estimates presented in the Draft Final RD/RA Work Plan (HLA, 1999d). The estimates are based on the most recent measured groundwater concentrations from monitoring or production wells screened at similar depths and located in the vicinity of proposed extraction well locations. Measured concentrations were flow weighted and blended using the proposed pumping rates presented in Tables 3-5 and 3-6. The Subarea 3 extraction system is designed such that two extraction wells will be present at each extraction location (one shallow well and one deeper well; see Table 3-4). For the estimation of the treatment plant influent concentrations, the flows were split equally among the shallow and deep wells and the representative monitoring well data was used for each depth interval. Flow-weighted concentrations for each depth were calculated and weighted again to the total flow (15,000 gpm). The two results were then added together to estimate the overall flow weighted concentrations for the Subarea 3 Treatment Plant.

The refined Subarea 3 flow-weighted VOC concentration estimated for this CDR is slightly higher than the concentration presented in the Final RD/RA Work Plan. Whereas the flow-weighted concentrations of perchlorate and 1,4-dioxane are greater than previously estimated. The flow-weighted concentrations of nitrate (as N) and NDMA are also less than previously estimated.

## 3.3 Uncertainties in BPOU Extraction Plan

Several sources of uncertainty exist relative to the BPOU extraction plan. These uncertainties include the following:

- Adjustments in extraction well flow rates may result in increased or decreased hydraulic loading to the Subarea 1 and Subarea 3 Treatment Plants. These adjustments may be necessary to

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establish and maintain adequate hydraulic control of contaminated groundwater migrating downgradient. Currently, the design basis for the Subarea 1 and Subarea 3 extraction systems is 6,000 and 15,000 gpm, respectively. These design flow rates are based on groundwater model simulations that utilize approximations of aquifer hydraulic properties in the vicinity of the proposed extraction wells. In the event that aquifer tests that will be conducted on the actual extraction wells yield aquifer hydraulic properties that significantly differ from those assumed in previous model simulations, extraction well rates may need to be increased to obtain adequate groundwater migration control. In addition, possible short-term adjustments in extraction well flow rates may be necessary to accommodate seasonal variations in groundwater flow or extraction well maintenance activities.

- Influent concentrations to the Subarea 1 and Subarea 3 Treatment Plants may vary based on actual well locations and depths. Current estimates of influent concentrations are based on the most recent measured groundwater concentrations from monitoring or production wells screened at similar depths and located in the vicinity of proposed extraction well locations. These estimates will be updated based on water quality monitoring during project design. However, more definitive estimates of influent concentrations will not be available until the actual extraction wells are installed and sampled.

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# 4.0 BASIS FOR DESIGN

This section provides the basis for design of the BPOU groundwater extraction, treatment, and delivery system. The various aspects of the design basis include Applicable or Relevant and Appropriate Requirements (ARARs), groundwater RA objectives, and DHS permitting requirements for potable water use.

## 4.1 Applicable or Relevant and Appropriate Requirements

EPA's ROD summarizes a number of ARARs for the BPOU. These ARARs have been evaluated further resulting in a detailed compilation of potential ARARs as listed in Table 4-1. ARARs must be considered relative to specific permitting requirements for the project given that Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(d) states that the off-site and on-site portions of a RA must comply with all ARARs. CERCLA response actions are exempted by law from the requirement to obtain federal, state, or local permits related to any activities conducted entirely on-site. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03 clarifies the EPA's policy with respect to obtaining permits for activities at a CERCLA site. The substantive requirements of permits, which would otherwise have been required, are met on-site through the EPA's approval process. Therefore, on-site facilities will not require permits, but must comply with ARARs. To the extent that the ARARs reference specific standards and rules of an agency, that agency's rules will be complied with, but without actually applying, paying for and obtaining a permit. All engineering designs will be submitted to those local agencies with the delegated authority for building and safety codes and standards. The remainder of this section presents the various types of ARARs and the identification of ARARs for the BPOU project.

### 4.1.1 Types of Applicable or Relevant and Appropriate Requirements

There are three different categories of ARARs as follows:

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- *Chemical specific*: Requirements that are health-, risk-, or technology-based concentration limits for various constituents that may be found in or discharged to an environmental media.
- *Action specific*: Requirements that set controls or restrictions on particular kinds of activities related to management of hazardous substances, pollutants, or contaminants.
- *Location specific*: Requirements that restrict activities on the basis of site characteristics and the immediate site environment.

### 4.1.2 Identification of Applicable or Relevant and Appropriate Requirements

A detailed evaluation of potential ARARs for the BPOU groundwater, extraction, treatment, and delivery system has been conducted. Based on the ARARs evaluation, potential ARARs specific to the BPOU groundwater treatment system are identified and summarized in Table 4.1. A general summary of each category of ARARs as they apply to the BPOU project is provided below:

#### 4.1.2.1 Chemical-Specific ARARs

Chemical-specific ARARs are requirements that are health-, risk-, or technology-based concentration limits for various constituents that may be found in or discharged to an environmental media. The BPOU project requires compliance with several different types of chemical-specific ARARs, which include the following:

- Compliance with federal Maximum Contaminant Levels (MCLs) or more stringent state MCLs or interim action levels regardless of the end-use of treated water.
- Meeting all current drinking water standards, such as the MCL for nitrate, prior to the treated water entering a public drinking water supply.
- Monitoring the treated water delivered to a public water supply system in accordance with the California Domestic Water Quality Monitoring regulations.
- Monitoring the treated water potentially recharged to the aquifer.

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#### 4.1.2.2 Action-Specific ARARs

Action-specific ARARs are requirements that set controls or restrictions on particular kinds of activities related to management of hazardous substances, pollutants, or contaminants. The BPOU project requires compliance with several different types of action-specific ARARs, which include the following:

- The South Coast Air Quality Management District (SCAQMD) Regulation XIV Rules 1401 for new source review and T-BACT (Best Available Control Technology) apply given that the treatment process includes air stripping. Also Regulation XIII Rules 1301 through 1313 for new sources and Rules 401, 402, and 403 regarding visible emissions, nuisances and down-wind particulate concentrations apply.

- Recharge of treated water into the aquifer in which it was withdrawn is allowed pursuant to a CERCLA action approved by the EPA. Also, recharged water must meet Section 3020 of Resource Conservation and Recovery Act (RCRA) regarding disposal of hazardous waste into an aquifer used as a drinking water source.

- Recharge of treated water is also regulated by the Los Angeles Regional Water Quality Control Board's (LARWQCB) Water Quality Control Plan which incorporates the State Water Resources Control Board (SWRCB) Resolution No. 68-16 regarding maintenance of high quality of waters in California and limit the chemical contents of water discharged to surface waters.

- For short-term discharges of treated water to the San Gabriel River, the treated water quality shall meet MCLs in accordance with the substantive requirements of the National Pollution Discharge Elimination System (NDPES).

- If the treated water is to be used as drinking water, then the treated water must meet the California Secondary Drinking Water Standards prior to the point of delivery to the water purveyor. If the treated water is discharged to the San Gabriel River or spreading basins for recharge, the water will not be required to meet State Secondary Drinking Water Standards.

- The sections of the California Hazardous Waste Control Act pertaining to the management of hazardous wastes are applicable as summarized on Table 4-1. Water from the purging and/or aquifer testing of monitoring or extraction wells must be treated to federal and state MCLs.

#### 4.1.2.3 Location-Specific ARARs

No location-specific ARARs were identified in the ROD for the BPOU.

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## 4.2 Groundwater Remedial Objectives

This subsection provides a description of the remedial objectives and other project requirements for the BPOU project set forth in the RD/RA Statement of Work, currently in preparation by the EPA and the BPOUSP. The Performance Standards are drawn from the remedial objectives as specified in the ROD and ESD as follows.

The remedial objectives of the Baldwin Park OU are to prevent future increases in, and to begin to reduce, concentrations of trichloroethene, tetrachloroethene, carbon tetrachloride, and other VOCs in groundwater in the Baldwin Park area (hereafter referred to as contaminants or contaminated groundwater) by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection, and by removing contaminants from the aquifer.

The BPOU project involves the design, installation, operation, and maintenance of groundwater extraction systems at the downgradient end of two subareas of the BPOU. The two subareas are designated in the ROD and ESD as Subarea 1 (the upper area) and Subarea 3 (the lower area). Remedial objectives as they apply to the two subareas are described below.

***Subarea 1 Remedial Objectives:***

In Subarea 1, the movement of COCs in groundwater shall be limited by groundwater extraction at rates and locations that will establish the necessary groundwater flow field, such that the resultant capture zone encompasses most known or suspected source areas and depths within Subarea 1. Source areas and depths include locations believed, through direct measurement or indirect evidence, to contain a significant mass of soil (i.e., vadose zone) contamination, or continuing subsurface sources of dissolved-phase groundwater contamination. In Subarea 1, the remedial objectives are designed to prevent

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groundwater near source areas with higher concentrations of COCs from moving downgradient toward areas with lower concentrations. As part of the groundwater extraction process, chemical mass will be removed from Subarea 1 groundwater.

***Subarea 3 Remedial Objectives:***

In Subarea 3, the movement of COCs in groundwater shall be limited by groundwater extraction at rates and locations that will establish the necessary groundwater flow field, such that the resultant capture zone reduces the potential for groundwater containing unacceptable concentrations of PCE, TCE, CTC, perchlorate, NDMA, 1,4-dioxane or other COCs from moving into areas where these chemicals are not present at unacceptable concentrations. As part of the groundwater extraction process, chemical mass will be removed from Subarea 3 groundwater.

Two distinct Performance Standards have been derived from the remedial objectives cited above: (1) limit further migration of chemicals of concern in groundwater, and; (2) remove chemicals of concern from groundwater. If these Performance Standards are achieved then the remedy will prevent future increases in, begin to reduce concentrations, and prevent the spread of COCs from more contaminated areas to less contaminated areas. Details regarding the these performance standards and methods to be used to monitor and demonstrate that these standards are being met are provided in the *Draft Final Performance Standards Evaluation Plan* (HLA, 2000e).

## 4.3 Department of Health Services, Office of Drinking Water Requirements

The California DHS, Office of Drinking Water, reviews all plans for water treatment and distribution systems that will be used for public water supply. As such, the design basis for the BPOU project must consider the substantive requirements of the DHS, Office of Drinking Water in order to provide treated water for potable use. To be considered for use as a potable water source, the effluent water from the

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BPOU treatment plant must meet the more stringent of either federal or state drinking water quality standards. The effluent water quality requirements for the BPOU water treatment plant are set forth in the California Code of Regulations (CCR) as treatment standards for various chemicals that are not to be exceeded in a drinking water source. The (1) analytical detection limits for reporting, and (2) concentrations not to be exceeded consist of several classes of requirements listed in different sections in Title 22, Division 4 of the CCR. These requirements, presented in Table 4-2, are as follows:

- *Sampling Plan for all Monitoring Except Bacteriological* – Chapter 15, Article 2, Section 64416
- *Coliform Bacteria Requirements* – Chapter 15, Article 3, Sections 64423 through 64426
- *California Drinking Water Primary Maximum Contaminant Levels (MCLs)* – Chapter 15, Article 4, Sections 64431, 64432, and 64433; Article 4.5, Sections 64439, 64441, and 64443; Article 5.5, Sections 64444 and 64445
- *Treatment Technique Requirements* – Chapter 15, Article 14, Section 64448
- *California Drinking Water Secondary Maximum Contaminant Levels (MCLs)* – Chapter 15, Article 16, Section 64449
- *California Drinking Water Unregulated Chemicals Requiring Monitoring* – Chapter 15, Article 17, Section 64450
- *Treatment Requirements, Watershed Protection Requirements, and Performance Standards* – Chapter 17, Article 2, Sections 64652 through 64654
- *California Drinking Water Lead and Copper* – Chapter 17.5, Section 64672.3
- *California Drinking Water Action Levels* – Health and Safety Code, Section 116455

In addition to these effluent requirements, the DHS requires an evaluation process prior to the potable use of extremely impaired drinking water source. Contaminated groundwater in the BPOU is considered an extremely impaired water source as defined by DHS in Policy Memorandum 97-005. Required elements of proposals submitted to DHS for their evaluation process are summarized as follows:

- Source water assessment consisting of the delineation of the capture zone of source water and identification of contaminant sources.

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- Full characterization of raw water quality including, but not limited to, Title 22 drinking water regulated and unregulated chemicals.
- A source protection program to prevent the level of contamination from increasing and to minimize the dependency on treatment.
- Demonstration of effective monitoring and treatment of the extremely impaired water source including performance standards to measure treatment efficiency, an Operations Plan that defines operational procedures, reliability features such as multi-barrier treatment, a compliance monitoring and reporting program, a Notification Plan, and a Surveillance Plan.
- An assessment of human health risks associated with potential failure of the proposed treatment.
- Identification of alternatives to the use of the extremely impaired water source.
- Completion of the California Environmental Quality Act (CEQA) review of the project.

The conceptual treatment train for the BPOU project presented in this Conceptual Design Report uses a series of unit processes to remove all chemicals of concern to levels acceptable for potable use or recharge. The treatment train will consist of biological treatment and multimedia filtration, and/or ion exchange, in addition to UV oxidation, air stripping, liquid phase GAC, and disinfection (if used as a potable supply). Approval for this treatment train will be obtained from the DHS should the BPOUSP choose to supply treated water for direct potable use. Currently, the Phase 2 Treatability Study described in Subsection 2.1 of this report is being conducted to provide performance data on the proposed treatment train in support of obtaining DHS approval for the use of a extremely impaired drinking water source.

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# 5.0 LAND ACQUISITION AND PERMITTING ISSUES

## 5.1 Land Acquisition

A comprehensive search and evaluation of available land parcels for extraction wells and treatment plants was performed to determine the difficulty, approximate time requirements, and estimated cost to the project. In addition, available utility alignments were identified and evaluated for the construction of the raw water pipelines from the extraction well fields to the treatment plants, treated water pipelines from the treatment plants to water purveyor distribution systems or recharge wells, and discharge pipelines to storm water facilities or surface water features for occasional discharge of treatment plant effluent.

The search and evaluation of available land was performed in Azusa, Baldwin Park, City of Industry, Covina, unincorporated Los Angeles County, Irwindale, La Puente, and West Covina. Meetings were held with each of these cities and counties, and contact was established with each City Engineer, Public Works Director, and Planning Director as available. These meetings served to provide project details to of these cities and counties, and to collect information on the following:

- Discuss availability of land for extraction wells and treatment plant
- Discuss acceptable routes for needed pipelines
- Review current zoning of candidate properties
- Review any planned changes to zoning and land use in each city
- Review permitting needs and processes with each agency
- Identify any community groups that may play a role in the review of this project
- Identify any other potential public relations issues with this project
- Identify contacts for design review and permit application/review

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### 5.1.1 Subarea 1

The Subarea 1 system is located in northern area of the BPOU and currently has proposed extraction wells, pipelines, and treatment plants located in the City of Baldwin Park and in the City of Irwindale.

#### 5.1.1.1 Extraction Well Field Sites

Several candidate extraction well field sites were identified in areas currently zoned commercial or industrial, and these sites will not require any zoning change or conditional use permit. Approximate locations determined by groundwater modeling work are presented on Figure 5-1. The locations on the figure are approximate, and land parcels located during the field search were identified in the area of the map location. Each candidate site is located along a street right-of-way suitable for the construction of raw water pipelines to deliver the water to the Subarea 1 treatment plant, and adequate land should be available for buffer landscaping and architectural screening, if needed. Table 5-1 presents the land requirements for each of the proposed extraction well sites.

#### 5.1.1.2 Treatment Plant Sites

Candidate treatment plant sites were identified in both the City of Baldwin Park and in the City of Irwindale. Candidate sites are at least 3 acres in size, and are currently zoned commercial or light industrial to avoid the delays of rezoning or conditional use hearings. Figure 5-2 presents an approximate location for the treatment plant site. A typical plant site layout with a 6,000 gpm treatment plant is presented in Figure 5-3 for a 3-acre site. Each candidate site is located along a street right-of-way suitable for the construction of pipelines from the extraction well fields and to point of use for the treated water. For short-term discharge of water to the San Gabriel River or to Big Dalton Wash, adequate utility corridors in street right-of-way are available. Each site has land available for buffer landscaping and architectural screening, if needed. Figure 5-6 presents a typical elevation for a treatment plant site. Since the sites are not located in residential areas, significant noise abatement will probably not be required.

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#### 5.1.1.3 Pipeline Alignments

Street right-of- way with adequate utility capacity is available in Irwindale Avenue, Azusa Canyon Road, Arrow Highway, and Olive Street. The streets provide excellent access to the San Gabriel River, Big Dalton Wash, and to some extraction well and treatment plant sites. Secondary streets are available for the connection of the extraction well and treatment plant sites to the main utility corridors in the above named streets, if needed.

### 5.1.2 Subarea 3

The Subarea 3 system is located in southern area of the BPOU and currently has proposed extraction wells, pipelines, and treatment plants located in the City of Baldwin Park, City of Industry, and in unincorporated sections of Los Angeles County.

#### 5.1.2.1 Extraction Well Field Sites

Several candidate extraction well field sites were identified in areas currently zoned commercial or industrial, and these sites will not require any zoning change or conditional use permit. Approximate locations determined by groundwater modeling work are presented on Figure 5-1. The locations on the figure are approximate, and land parcels located during the field search were identified in the area of the map location. Each candidate site is located along a street right-of-way suitable for the construction of raw water pipelines to deliver the water to the Subarea 3 treatment plant, and adequate land should be available for buffer landscaping and architectural screening, if needed. Table 5-2 presents the land requirements for each of the proposed extraction well sites.

#### 5.1.2.2 Treatment Plant Sites

Candidate treatment plant sites were identified in both the City of Baldwin Park and in the City of Industry. Candidate sites are at least 5 acres in size, and are currently zoned industrial to avoid the delays of rezoning or conditional use hearings. Figure 5-4 presents an approximate location for the treatment plant site. A typical plant site layout with a 15,000 gpm treatment plant is presented in Figure 5-5 for a 5-

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acre site. Each candidate site is located with adjacent street right-of-way accessible for the construction of pipelines from the extraction well fields and to point of use for the treated water. For short-term discharge of water to the San Gabriel River or to Walnut Creek Wash, adequate utility corridors in street rights-of-way are available. Each site has land available for buffer landscaping and architectural screening, if needed. Figure 5-6 presents a typical elevation for a treatment plant site. Since the sites are not located in residential areas, significant noise abatement will probably not be required.

#### 5.1.2.3 Pipeline Alignments

Street right-of- way with adequate utility capacity are available in Frazer Street, Baldwin Park Boulevard, and Francisquito Avenue. For the extraction well and treatment plants site identified, a considerable amount of pipeline work will be located on secondary streets with some located in residential areas. The necessary routing of the needed pipelines will be a significant consideration in the further evaluation of candidate extraction well and treatment plants sites.

## 5.2 Permitting

This subsection presents the anticipated permitting requirements for the project as conceived in the Conceptual Design phase as detailed in this document. The actual permitting and the identification of any additional requirements will be the responsibility of the design-build contractor once the size, location, and type of facilities needed is finalized. The permitting requirements can be evaluated and coordination started during the preliminary, intermediate, and final design of the groundwater extraction system, water treatment plants, associated pipelines, treated water use, and planning for system operation. The permitting discussion presented here is a result of research performed and meetings attended based on the facilities proposed in the approximate locations identified.

EPA OSWER Directive 9355.7-03 clarifies the EPA's policy with respect to obtaining permits for activities at a CERCLA site. The substantive requirements of permits, which would otherwise have been

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required, are met on-site through the EPA approval process. Therefore, on-site facilities will not require permits, but must comply with ARARs. To the extent that the ARARs reference specific standards and rules of an agency, that agency's rules will be compiled with, but without actually applying, paying for and obtaining a permit. All engineering designs will be submitted to those local agencies with the delegated authority for building and safety codes and standards.

A table including all of the permits discussed in this section is presented as Table 5-1 – List of Required Permits. The time required for the application and review cycles associated with each permit has been incorporated in the project schedule presented in Section 10.00.

### 5.2.1 Extraction Well Facilities

The permitting discussion presented in this section is related to the construction of the extraction wells and wellhead facilities as well as the installation of monitoring wells. The final locations for the extraction and monitoring wells have not been to be determined, so additional State and local agencies may in be involved in actual permitting activities.

#### 5.2.1.2 City of Azusa

The City of Azusa issues utility permits, public works permits and building permits. A conditional use permit may be required if the land selected for the extraction well facilities is not properly zoned. A traffic control permit will be required if monitoring wells are located in street rights-of-way.

#### 5.2.1.3 City of Baldwin Park

The City of Baldwin Park issues utility permits, traffic control lane closure permits, public works permits, and building permits.

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#### 5.2.1.4 City of Industry

The City of Industry issues utility permits, public works permits, and building permits. The entire City is zoned industrial, so a conditional use permit will not be required.

#### 5.2.1.5 City of Irwindale

The City of Irwindale requires a conditional use permit for land parcels zoned commercial or residential, and issues utility permits, traffic lane closure permits, public works permits, and building permits.

#### 5.2.1.6 Los Angeles Regional Water Quality Control Board

The LARWQCB will require notification once the construction of an extraction or monitoring well is complete. No permit from this agency is required.

#### 5.2.1.7 Los Angeles County Department of Health Services – Environmental Management Division

The Los Angeles County DHS Environmental Management Division will require the project to meet substantive well permitting requirements for all extraction and monitoring wells.

#### 5.2.1.8 Main San Gabriel Basin Watermaster

The Main San Gabriel Basin Watermaster will require a Section 28 permit for the construction, modification, and operation of extraction and monitoring wells.

#### 5.2.1.9 State of California Department of Health Services – Division of Drinking Water and Environmental Management

The California DHS, Office of Drinking Water will require an operating permit to install wells that extract water for use in a public water supply.

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#### 5.2.1.10 State of California Department of Water Resources

After the completion of all extraction and monitoring wells, a Water Well Driller's Report will be completed by the drilling contractor and filed with the State of California Department of Water Resources.

### 5.2.2 Treatment Plant Construction and Operation

The permitting discussion presented in this section is related to the construction and operation of the Subarea 1 and Subarea 3 treatment facilities at the proposed locations in the Cities of Baldwin Park, City of Industry, and City of Irwindale. The final size and selected sites for these facilities could require additional permitting and zoning requirements from the proposed cities or other cities where facilities are located.

#### 5.2.2.1 City of Baldwin Park

The City of Baldwin Park issues utility permits, traffic control lane closure permits, public works permits, building permits, rough grading permits, dust control permits, and a water and sewer connection permit for control building facilities.

#### 5.2.2.2 City of Industry

The City of Industry issues utility permits, traffic control lane closure permits, public works permits, building permits, and a water and sewer connection permit for control building facilities.

#### 5.2.2.3 City of Irwindale

The City of Irwindale issues conditional use permits for the sites proposed, public works permits, building permits, and a water and sewer connection permit for control building facilities.

#### 5.2.2.4 Main San Gabriel Basin Watermaster

The Main San Gabriel Basin Watermaster issues Section 28 permits for the construction and operation of water treatment facilities.

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#### 5.2.2.5 South Coast Air Quality Management District

The SCAQMD requires a new source review and best available control technology evaluation be completed. This review will determine that effects from visible emissions, nuisances, and down-wind particulates be evaluated. A vapor control permit is required.

#### 5.2.2.6 State of California Department of Health Services – Division of Drinking Water and Environmental Management

The California DHS, Division of Drinking Water and Environmental Management will review all plans and issues an operating permit for the construction and operation of a water treatment facility used for treatment of water to be used in a public water supply. The Drinking Water Program administered by the Division of Drinking Water and Environmental Management recognizes in *Policy Memo 97-005 Policy Guidance for Direct Domestic Use of Extremely Impaired Sources* that extremely impaired water sources represent a significant resource and should be considered for domestic use.

### 5.2.3 Pipeline Construction

Pipelines for this project will be required to deliver water to the treatment plants, and from the treatment plant to the point of use or discharge. The pipeline alignments will generally be located within existing street rights-of-way, but will occasionally require agreements, leases, and easements granted from property owners that include, private parties, utilities, railroads, transportation districts, cities, and counties. The needed access and land use will include a temporary construction easement during the construction of the pipeline, and a permanent easement for the installation and access for maintenance of the pipeline.

#### 5.2.3.1 City of Azusa

The City of Azusa issues public works permits, traffic lane closure permits, dust control permits, and right-of-way permits.

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#### 5.2.3.2 City of Baldwin Park

The City of Baldwin Park issues utility permits, traffic lane closure permits, right-of-way permits, public works permits, and building permits.

#### 5.2.3.3 City of Industry

The City of Industry issues public works permits, traffic lane closure permits, right-of-way permits, and building permits.

#### 5.2.3.4 City of Irwindale

The City of Irwindale issues lane closure permits, public works permits, and building permits.

#### 5.2.3.5 Los Angeles County – Department of Transportation

The Department of Transportation for Los Angeles County issues encroachment permits for any pipeline construction crossing or located within a street right-of-way in the unincorporated sections of the County.

#### 5.2.3.6 Los Angeles County Department of Public Works – Bureau of Engineering

The Bureau of Engineering for Los Angeles County issues permits for any permanent pipeline construction located within the unincorporated sections of the County.

#### 5.2.3.7 Los Angeles County Department of Public Works – Flood Control Division

If a pipeline to deliver water to the Santa Fe Spreading Grounds adjacent to the Santa Fe Dam is needed, a likely alignment is along the San Gabriel River. A permit or easement from the Los Angeles County Department of Public Works, Flood Control Division would be needed with a technical review from the USACE to install a pipeline in this river corridor.

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#### 5.2.3.8 Los Angeles Department of Water and Power

The Department of Water and Power (LADWP) issues permits and grants easements for pipeline crossings or encroachments on LADWP property.

#### 5.2.3.9 California Department of Health Services – Division of Drinking Water and Environmental Management

The California DHS, Division of Drinking Water and Environmental Management will review all plans for the construction of distribution pipelines that will convey water to be used in a public water supply.

#### 5.2.3.10 Union Pacific Railroad

Final pipeline alignments are likely to cross railroad rights-of-way. These crossings will require an access permit for utility surveys, and a railroad encroachment permit for the boring/jacking pits and pipeline/carrier pipe installation.

#### 5.2.3.11 Southern California Regional Rail Authority (SCRRA)

The SCRRA, also known as Metrolink, has a rail section that passes through the City of Baldwin Park and the City of Industry. Conceptual pipeline alignments have crossings that will involve a right-of-way application and the granting of easement for the proposed encumbrance.

#### 5.2.3.12 State of California – Department of Transportation (CALTRANS)

CALTRANS issues encroachment permits and maintenance access permits for sections of pipelines that cross CALTRANS right-of-ways or lie parallel in the right-of-way.

#### 5.2.3.13 U.S. Army Corps of Engineers (USACE)

The USACE issues permits for right-of-entry to cross drainage way structures like Walnut Creek Wash and Big Dalton Wash, and issue a Section 404 permit if the hydraulic capacity of the channel, if affected. For pipelines that are located in the San Gabriel River corridor the USACE will provide a technical review to determine the effect on the river channel.

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### 5.2.4 Recharge Water Discharge

The permitting discussion in this section considers the treated water from the treatment facilities may be delivered by pipeline to the Santa Fe Spreading Grounds, delivered by pipeline to recharge wells, or provided to local water purveyors for use in domestic water supply systems.

#### 5.2.4.1 Los Angeles County Department of Public Works – Flood Control

The Los Angeles County Department of Public Works, Flood Control Division issues connection permits to use the Santa Fe Spreading Grounds, and for storm drainage discharge to the San Gabriel River.

#### 5.2.4.2 State of California Regional Water Quality Control Board

The California RWQCB issues a NPDES permit for the discharge of plant effluent to surface waters. The RWQCB manages the Water Control Plan for the Los Angeles region, and will review all plans that involve the discharge of treated water to surface water features. The NPDES permit is required for the short-term discharges of treated water to the San Gabriel River.

#### 5.2.4.3 State of California Department of Fish and Game

The California Department of Fish and Game will require a permit if the construction of the discharge to the San Gabriel River Channel involves construction activity in the river channel or the discharge involves alteration of the river channel.

#### 5.2.4.4 Recharge Well Permits

The construction of recharge wells will require permits from the Los Angeles Country Department of Health Services. Other permitting requirements related to the recharge of treated water into the aquifer are currently under evaluation.

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# 6.0 RAW WATER COLLECTION SYSTEM DESIGN

The raw water collection system includes extraction well pumps and raw water transmission pipelines. The purpose of the collection system is to extract contaminated groundwater and convey the flow to the Subarea 1 and Subarea 3 Treatment Plants. Potential extraction well and Subarea 1 and Subarea 3 Treatment Plant locations are shown in Figures 5-1, 5-2, and 5-4.

## 6.1 Basis for Design – Extraction Well Pumping and Raw Water Transmission Pipelines

### 6.1.1 Extraction Well Pumping

Six extraction well locations are proposed to implement the groundwater extraction plan, three in Subarea 1 and three in Subarea 3. One extraction well at each location in Subarea 1 and two extraction wells at each location in Subarea 3. Table 6-1 presents pump hydraulic conceptual design information for each extraction well site.

### 6.1.2 Raw Water Transmission Pipelines

Raw water transmission pipelines will convey water from the extraction wells to the proposed Subarea 1 and Subarea 3 Treatment Plants. Conceptual design of the transmission pipelines is based on the criteria presented in Table 6-2.

Considering the criteria shown in Table 6-2, conceptual size of the raw water transmission pipelines was determined using the following equations:

Flow Rate = $Q = VA$

Where:

$Q$ = flow rate (cfs)

$V$ = velocity (fps)

$A$ = area (ft)

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Headloss = $H_l = H_f + H_m$

Where:

$H_l$ = total headloss

$H_f$ = friction headloss

$H_m$ = minor headloss

Friction loss accounts for the drop in system pressure due to the energy required to overcome resistance between the pipe wall and the fluid being conveyed. A form of the Hazen-Williams equation has been used to determine friction loss:

$$h_f = \frac{4.72\, Q^{1.852}\, L}{C^{1.852}\, D^{4.87}} \; *$$

Where:

Q = flow rate (cfs)

L = length of pipe (ft)

C = coefficient of friction

D = pipe diameter (ft)

* (AWWA Manual M11 Steel Pipe – A Guideline for Design and Construction)

Minor headloss accounts for reduction in system pressure due to changes in pipeline diameter and direction; flow through valves, meters, and other pipeline appurtenances; and as flow enters or exits various facilities. Minor headloss has been determined by the equation:

$$h_m = \frac{K\, v^2}{2\, g}$$

Where:

K = minor loss coefficient

v = fluid velocity (fps)

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g = acceleration of gravity (32.2 ft/s$^2$)

Transmission pipeline characteristics, selected based on the aforementioned criteria, are presented in Table 6-3. Due to the fact that exact locations for the Subarea 1 and Subarea 3 Treatment Plants and the extraction well have not been identified, estimated pipeline lengths are based on a worst case scenario; longest distance from the potential extraction well sites to potential treatment plant sites. Surge pressures are not anticipated to exceed 100 pounds per square inch (psi); therefore, the design pressure stated in Table 6-3 is the sum of the operating pressure and a 100 psi surge allowance.

### 6.1.3 Pipe Material Evaluation

Pipe materials were evaluated based on:

- *Availability.* The ability to accept delivery of the pipe in a timely manner as to not adversely affect the overall project schedule.
- *Internal and external corrosion resistance.* The ability to resist corrosion due to contaminants in the raw water and/or corrosive soils.
- *Ability to meet operating pressure.* Availability of proper pipe class or thickness with respect to calculated operating and surge pressures.
- *Material cost.* Cost per linear foot of uninstalled pipe.
- *Ease of installation.* Pipe jointing methods with respect to other materials being evaluated.
- *Local contractor experience.* General experience in the installation of each pipe material.
- *Service life.* Continuous operation with only routine maintenance. The project, as defined, is expected to be in operation for approximately 25 years.

The evaluation matrix shown in Table 6-4 has been prepared to illustrate results of the pipe material evaluation. Each of the above stated criteria has been weighted 1 to 5, with 5 being the highest ranking. Each material has been ranked relative to its ability to meet the criteria. The product of the rank and the weight is the score for that material under that particular criteria. The individual scores are then totaled in the right-hand column giving an overall score for each pipe material.

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Results of the matrix indicate that Polyvinyl Chloride (PVC) be used for construction of the raw water transmission pipelines. The distinct advantages of PVC are:

- Internal and external corrosion resistance is inherent to the material (additional coating or wrapping is not required as with metallic materials).
- Relative ease of installation due to a lower weight per foot of pipe than metallic materials and a less labor intensive jointing system than high-density polyethylene (HDPE).
- PVC pipe is less likely than HDPE to deform during installation.
- PVC is competitively priced in the diameters necessary for this project.
- Local contractors are very experienced in the installation of PVC.

PVC pipe should be pressure class 150 and meet the requirements of AWWA C-900 for diameters through 12-inch and C-905 for diameters 14-inch and larger.

### 6.1.4 Raw Water Transmission Pipeline Routing

Potential raw water transmission pipeline routes are indicated on Figures 5-1, 5-2, and 5-4. Factors considered in the conceptual selection of these alignments include:

- Easement acquisition
- Constructability
- Major crossings.

***Subarea 1:***

Pipeline corridors identified in Subarea 1 generally follow existing streets and will be constructed within public right-of-way, eliminating the need for easement acquisition. Additionally, the existing streets are major thoroughfares with relatively wide rights-of-way providing space for construction operations and options for traffic control.

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The conceptual pipeline routes selected within Subarea 1 do not pose the challenge of major surface crossings such as highways or rivers, however existing utility investigations must be completed during the preliminary design phase in order to define exact alignments.

***Subarea 3:***

Pipeline corridors identified in Subarea 3 follow varying types of existing land use including major thoroughfares, power line easements, and drainage easements. As with Subarea 1, easements will not be an issue for alignments within public rights-of-way. However, easement acquisition or permission will be required if the final pipeline routes within power line and/or drainage easements.

Raw water transmission pipeline construction within Subarea 3 will involve pipe installation in relatively narrow areas restricting construction operations movement and possibly trucking excavated material off-site for temporary storage. Several sections of the proposed corridors are in or near industrial areas requiring additional traffic control efforts during morning and afternoon rush hours.

The corridors identified in Subarea 3 will have major surface crossings of Interstate 10 and Walnut Creek which will require bored pipeline installation. Existing utility investigations must be completed during the preliminary design phase in order to define exact pipeline alignments.

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# 7.0 CONCEPTUAL TREATMENT SYSTEM DESIGN

## 7.1 Overview of Treatment Train

The treatment train for the San Gabriel Basin Groundwater Treatment Systems is designed to progressively remove contaminants from the water using a series of unit operations. The unit operations are sequenced to provide maximum removal efficiencies, while minimizing potential interferences with downstream processes. The sequence of treatment operations will enable the treatment systems to meet effluent goals, while minimizing costs and waste production. The treatment train is designed to be a multibarrier system with respect to both chemical and biological contaminants. The ultimate objective of the treatment systems is to reliably treat the extracted groundwater to produce potable water meeting all applicable state and federal requirements for chemical and biological contaminants, turbidity, color, odor, and residual disinfectant concentration.

Based on the extraction rates predicted by groundwater modeling, and the large geographic area affected by the plume, treatment of the extracted groundwater will be performed at two separate systems. A 6,000 gpm system will be constructed in Subarea 1 and a 15,000 gpm system will be constructed in Subarea 3.

The treatment trains for both the Subarea 1 and Subarea 3 Treatment Plants are identical with respect to the unit operations utilized. Both systems include influent equalization, biological reduction, flash mixing and flocculation/aeration, multimedia filtration, UV/OX, air stripping and offgas treatment, liquid-phase granular activated carbon (LPGAC) adsorption, disinfection, effluent equalization, and backwash reclamation and waste solids processing. Figure 7-1 presents a process flow diagram for the Subarea 1 Treatment Plant and Figure 7-2 presents a process flow diagram for the Subarea 3 Treatment Plant.

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### 7.1.1 Influent Equalization

Extracted groundwater will be pumped to influent equalization tanks, which will allow for equalization of flow and contaminant concentrations. This process will enable the treatment system to accommodate fluctuations in flow and contaminant loading from individual wells without disrupting other treatment processes.

### 7.1.2 Biological Reduction

The treatment plants will utilize granular activated carbon/fluidized bed reactors (GAC/FBRs) to remove perchlorate and nitrate through a biological reduction process under anoxic conditions. The influent groundwater is fed into the bottom of the reactor through a network of nozzles. The upward velocity of the water fluidizes the GAC medium contained in the reactor. The fluidized medium provides extensive surface area for growth of microorganisms. Ethanol is fed into the GAC/FBR to serve as a carbon source for growth of microorganisms. The dissolved oxygen (DO) present in the influent groundwater is quickly used via aerobic breakdown of the ethanol, creating an anoxic condition in the GAC/FBR. Under these conditions, facultative organisms utilize nitrogen and perchlorate as electron acceptors while metabolizing ethanol. Nitrate is reduced to nitrogen gas, and perchlorate is reduced to chloride ion.

The GAC/FBRs are the first unit operation in the treatment train because nitrate interferes with the UV/OX system and the low DO levels present in the influent groundwater enable rapid development of anoxic conditions within the reactor. Minimizing influent DO concentration also minimizes the contact time required in the GAC/FBR and reduces the required ethanol dosage. Low influent DO concentrations ensure that aerobic activity is limited to a small portion of the bottom of the GAC/FBR, leaving most of the GAC/FBR column available for nitrate and perchlorate reduction.

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### 7.1.3 Flash Mix and Flocculation/Aeration

Effluent from the GAC/FBRs will flow by gravity through a flash mix tank and a flocculation/aeration tank. The flash mix tank will be used to mix a polymer-based filter aid into the effluent from the GAC/FBRs, and the flocculation/aeration tank will be used to form flocculants and raise the DO concentration in the flash mix tank effluent.

Polymer will be added to the GAC/FBR effluent as it enters the flash mix tank. The flash mix tank will be continuously mixed to maximize distribution of the polymer and thus maximize the potential for flocculation of suspended solids prior to filtration.

In the flocculation/aeration tank, air will be gently sparged into the water to minimize stripping of VOCs while raising the DO concentration to a level (approximately 4 mg/l to 5 mg/l) sufficient to maintain aerobic conditions in the multimedia filters. The tank will be covered and will vent through a vapor phase GAC adsorber.

The flash mix and flocculation/aeration system will be designed to meet the requirements of the California DHS Surface Water Treatment Rule and, combined with the multimedia filter system, qualify for two orders of magnitude reduction of Giardia cysts and viruses as a conventional filtration system.

### 7.1.4 Multimedia Filtration

The multimedia filters will remove suspended solids from the flocculation/aeration tank effluent and provide biological degradation of residual ethanol and metabolic byproducts not fully removed in the GAC/FBR. The multimedia filters are positioned between the GAC/FBRs and the UV/OX systems in the treatment train. This positioning allows removal of suspended biomass and GAC fines that could interfere with the performance of the UV/OX systems, and reduces hydrogen peroxide demand by biologically degrading excess ethanol or ethanol breakdown products before they enter the UV/OX systems.

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The multimedia filters require periodic backwashing. A backwash tank and pumps will be used to backwash the filter as it becomes loaded with solids. The spent backwash water will be treated in the reclamation system discussed below.

The multimedia filter system will be designed to meet the requirements of the California DHS Surface Water Treatment Rule and, combined with the flash mix and flocculation/aeration system, qualify for two orders of magnitude reduction of Giardia cysts and viruses as a conventional filtration system.

### 7.1.5 Ultraviolet/Chemical Oxidation

The UV/OX system will oxidize VOCs, NDMA, and 1,4 dioxane using a combination of UV light and hydrogen peroxide. The UV light reacts with the hydrogen peroxide to form hydroxyl radicals, which are extremely reactive. The hydroxyl radicals will rapidly react with the contaminants remaining in the groundwater. In general, reaction with UV light, hydrogen peroxide, or hydroxyl radicals will cleave a contaminant molecule into two or more breakdown products which, in turn, react with the oxidants in successive steps to the end products $CO_2$, $H_2O$, and $Cl^-$.

This system is positioned after the GAC/FBR and the multimedia filters in the treatment train so that nitrate and suspended solids, which interfere with the UV/OX process, are removed from the water before it enters the UV/OX system. Nitrate absorbs UV light at approximately the same wavelength output by the UV lamps proposed for this system (200 to 300 nanometers) and converts it into heat. This leaves fewer photons available for photolysis and increases the UV power required. The biologically active multimedia filters will also remove excess ethanol or ethanol breakdown products upstream of the UV/OX system which should minimize consumption of UV light, hydrogen peroxide, and hydroxyl radicals.

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The UV/OX systems included in this CDR are conventional high-energy systems. A low-energy UV/OX system that uses lower wattage UV lamps than those used in conventional high-energy UV/OX systems is currently being evaluated as part of the Phase 2 Treatability Study. If this low-energy system is proven to be effective, it will be evaluated for use in the full-scale treatment systems.

It is anticipated that inclusion of the UV/OX system in the treatment train will qualify for one order of magnitude reduction of Giardia cysts and viruses under the California DHS Surface Water Treatment Rule.

### 7.1.6 Air Stripping and Offgas Treatment

The air stripping and offgas treatment system is designed to remove compounds such as carbon tetrachloride and chloroform which are unaffected or incompletely treated in the UV/OX system. Air stripping is a process by which VOCs are removed from the liquid phase and transferred into the vapor phase. This process takes advantage of the tendency of compounds with relatively low solubility in water and relatively high vapor pressure to exist in the vapor phase rather than the liquid phase. The air strippers contact air to contaminated water in a countercurrent configuration, and maximize the surface area of the air/water interface to maximize the rate of transfer of these compounds from the water into the air. The air strippers are cylindrical towers filled with packing media, which distribute the water into droplets and maximize mass transfer between the liquid phase (water) and the vapor phase (air). The stripping air is blown into the base of each tower, flows up through the tower, exits at the top of the tower. Stripped VOCs are transferred into the air stream and exit the stripper system with the air. The air exiting the air strippers flows through vapor-phase granular activated carbon (VPGAC) adsorbers where VOCs in the air stream are adsorbed onto the GAC media.

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### 7.1.7 Liquid-Phase Granular Activated Carbon Adsorption

The treatment system incorporates liquid-phase GAC adsorption to remove VOCs remaining in the effluent from the air stripping system, and act as a final polishing step. LPGAC is a proven method for removal of most VOCs from water. The LPGAC will also serve as a second barrier for VOCs if the UV/OX system experiences a failure. The LPGAC will be biologically active, so problems associated with assimilable organic carbon will be prevented from occurring in the distribution system.

The GAC system is positioned at the end of the treatment train to maximize the utilization of the destructive unit operations upstream, and to minimize the use of GAC. This approach will minimize the frequency of GAC bed replacement and the associated cost. Placement downstream from the multimedia filters will also protect the GAC adsorbers from fouling due to suspended solids in the groundwater.

### 7.1.8 Disinfection

The disinfection system will introduce sodium hypochlorite into the treated water to provide a source of chlorine. Contact time will be provided in a baffled tank, which will force the water through a circuitous path. The disinfection system will be designed to provide sufficient contact time and residual concentration to qualify for one order of magnitude reduction of Giardia cysts and viruses under the California DHS Surface Water Treatment Rule.

### 7.1.9 Effluent Equalization

The equalization of plant effluent is provided with holding time in the treated water storage tank. This tank will also provide volume for storage of clean backwash water for the LPGAC system. In addition, the tank will provide equalization for the operation of the high-service pump station delivering the treated water to its end use.

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### 7.1.10 Backwash Reclamation

The backwash reclamation system is used to store filtered water for backwashing the multimedia filters, pump this filtered water through the filter media, collect the spent backwash water and the filter to waste water, remove suspended solids from the spent backwash, and return the clarifier overflow to the main process flow upstream of the flash mix tanks. In this system, a clarifier is used to remove suspended solids from the spent backwash water exiting the multimedia filters. The settled sludge from the clarifier will be amended with aluminum sulfate, which serves as a filter aid, and pumped through a filter press. The cake from the filter press will be loaded into a truck using a conveyor system, and driven to an offsite disposal facility.

## 7.2 Subarea 1 Groundwater Treatment System

The Subarea 1 groundwater treatment system will have a hydraulic capacity of 6,000 gpm. The treatment train for this area includes biological reduction, aeration, filtration, UV/OX, air stripping with vapor-phase GAC offgas treatment, liquid-phase GAC treatment, disinfection, and a backwash reclamation system..

### 7.2.1 Influent Equalization

***System Components***

The influent equalization system includes the influent equalization tank and associated instrumentation and fittings.

***Design Criteria***

The influent equalization tank will have a hydraulic residence time of 10 minutes and will have 1 foot of freeboard at design capacity. This tank will be vented to atmosphere through a VPGAC adsorber. The design criteria for this tank are summarized in Table 7.1.

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### *Tanks and Vessels*

The influent equalization tank will have a capacity of 60,000 gallons, dimensions of 28 feet in diameter and 15 feet in height, and will be constructed of welded carbon steel.

### *Mechanical Equipment*

There are no pumps, blowers, or other mechanical equipment associated with this system.

### *Instrumentation*

Control of the influent equalization system will be based on level in the tank. A level indicator/transmitter will transmit a level signal for control purposes. High and low level switches will also be provided as backup to the level indicator/transmitter. The influent equalization tank will be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

## 7.2.2 Biological Reduction

### *System Components*

The biological reduction system includes GAC/FBRs, fluidization pumps, eductor pumps, ethanol storage tank and ethanol feed pumps, and phosphoric acid storage tank and feed pumps.

### *Design Criteria*

The biological reduction system will be designed to reduce the concentration of pechlorate from approximately 100 to less than 4 µg/l, and the concentration of nitrate from approximately 4 to 10 mg/l to < 1 mg/l. This system will have a forward flow capacity of 6,000 gpm, and a recycle rate of 20 percent. This flow capacity will be provided by installing four parallel GAC/FBRs, each with a forward flow

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capacity of 1,500 gpm and recycle flow of 375 gpm. Each GAC/FBR will be designed for a liquid loading rate of 12 gpm/ft$^2$ and empty bed contact time of 9.4 minutes.

The ethanol feed system will be designed to deliver a dosage of 8.1 mg/l to the influent stream to each GAC/FBR. The storage tanks will be designed to provide 30 days of storage at the design usage rate of 116 gpd.

The phosphoric acid feed system will be designed to deliver a dosage of 1 mg/l to the influent stream to each GAC/FBR. The storage tanks will be designed to provide 30 days of storage at the design usage rate of 13 gpd.

### *Vessel Construction*

Each GAC/FBR will have dimensions of 14 feet in diameter and 23 feet in height, and will be constructed of welded stainless steel or rectangular tanks constructed with reinforced concrete. Each GAC/FBR will be equipped with a network of fluidization nozzles and a media separation system.

The ethanol storage tank will have a capacity of 3,500 gallons, dimensions of 9 feet in diameter and 9 feet in height, and will be constructed of welded carbon steel. This tank will be equipped with inlet and outlet nozzles, vent nozzle with flame arrestor, emergency vent, and flanged nozzles for level instruments and spares.

The phosphoric acid storage tank will have a capacity of 400 gallons, dimensions of 5 feet in diameter and 5 feet in height, and will be constructed of welded stainless steel. This tank will be equipped with inlet and outlet nozzles, vent nozzle, emergency vent, and flanged nozzles for level instruments and spares.

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### *Mechanical Equipment*

Each GAC/FBR will be fed by a fluidization pump. The fluidization pumps will be centrifugal pumps with capacities of 1,875 gpm at 43 feet Total Dynamic Head (TDH). Pump drivers will be 30 hp, 480 VAC, 3-phase, 60 Hz, totally enclosed fan cooled (TEFC) motors with variable frequency drives (VFDs). Each GAC/FBR will be equipped with a centrifugal-type pump as part of its media separation system.

Ethanol will be fed to each GAC/FBR by an individual motor driven, double diaphragm type chemical metering pump.

Phosphoric acid will be fed to each GAC/FBR by an individual motor driven, double diaphragm type chemical metering pump.

### *Instrumentation*

The GAC/FBRs are maintained at a constant liquid level. The recycle flow rate is set by the operator, and is maintained by a flow control valve on the recycle line that operates based on the output of the flow transmitter in the recycle line. The flow rate through the bioreactor is controlled by an inlet flow control valve that operates based on the flow transmitter in the fluidization pump discharge line. Flow rates, pH signals, and DO signals, from each GAC/FBR are transmitted to the Programmable Logic Control (PLC) in the main control room. Each GAC/FBR will be equipped with the following instrumentation:

- Inlet flow control valve
- Recycle flow control valve
- Inlet flow meter
- Recycle flow meter
- pH element/pH indicator transmitter

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- DO element/DO indicator transmitter
- High level switch
- Fluidization pump suction and discharge pressure indicators
- Eductor pump suction and discharge pressure indicators.

The ethanol tanks will be controlled based on tank level. A level transmitter will transmit an analog signal to the PLC. High and low level switches will provide digital signals to the PLC. The ethanol storage tanks will each be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

The phosphoric acid storage tanks will each be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

### 7.2.3 Flash Mix and Aeration/Flocculation

***System Components***

The flash mix system includes flash mix tanks and mixers, polymer blending tanks and pumps, and polymer feed pumps. The aeration/flocculation system includes tanks, diffusers, and blowers.

***Design Criteria***

This system is designed to promote the formation of flocculants in the wastewater prior to filtration, and to raise the DO concentration in the wastewater to 5 mg/l. The oxygen transfer efficiency is estimated to be 5 percent. Each aeration/flocculation tank is designed to provide 17.5 minutes of residence time. Each

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flash mix tank is designed to provide 3.5 minutes of residence time. Each flash mix tank and aeration/flocculation tank will be covered and vented through VPGAC. The polymer blending and feed system is designed to provide a 0.2 percent polymer solution and for 5 days of storage at a dosage rate of 1 mg/l. The design criteria for this system are summarized in Table 7.1.

### *Vessel Construction*

The flash mix tanks will have dimensions of 10 feet by 10 feet by 16-feet deep, and will be constructed of reinforced concrete. The aeration/flocculation tanks will have dimensions of 10-feet wide by 50-feet long by 16 feet deep, and will be constructed of reinforced concrete. The tanks will share common walls. Adjustable weirs will be installed to regulate flow through these tanks.

The two polymer mixing and storage tanks will each have a capacity of 12,000 gallons and dimensions of 13 feet in diameter and 13 feet in height, and will be constructed of welded carbon steel.

### *Mechanical Equipment*

The flash mix tanks will each be equipped with a flash mixer powered by a 30-hp motor.

Air will be added to each flocculation/aeration tank through a network of bladder-type fine bubble diffusers using 10 hp rotary positive displacement blowers to provide pressurized air.

The polymer mixing and storage tanks will each be equipped with a motor driven mixer.

Polymer solution will be fed to each flash mix tank by an individual motor driven, double diaphragm type chemical metering pump.

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### *Instrumentation*

Flow through the flash mix and flocculation/aeration tanks is by gravity and will be controlled with adjustable weirs. The influent flow rate to each system will be controlled by a flow control valve. Instrumentation will be included to monitor process variables such as DO, level, and pressure. The polymer feed tank will be controlled based on level. Instrumentation for the flash mix and flocculation/aeration systems will include:

- Inlet flow control valve
- Inlet flow indicator transmitter
- Level indicator transmitter
- Aeration blower pressure indicator transmitter
- Polymer tank level indicator transmitters
- Polymer tank high level switches
- Polymer tank low level switches.

## 7.2.4 Multimedia Filters

### *System Components*

The multimedia filter system will include filter vessels and filter effluent equalization tank.

### *Design Criteria*

The multimedia filters will be designed to reduce the turbidity in the wastewater to <0.2 nephelometric turbidity units (NTU). The filters will be operated in constant level, constant flow mode. The filters will be designed to operate at a hydraulic loading rate of 5 gpm/ft$^2$. The filters will process the forward flow of 6,000 gpm plus an additional 450 gpm from the reclamation system. The total filter area required is 1,290 ft$^2$. Four filters will be installed, each with 430 ft$^2$ of surface area. Three filters will be in operation at any given time, with the fourth undergoing backwash. The filter media will include anthracite, silica sand, and fine garnet. The support gravel will include coarse gravel and finer garnet gravel. The filter

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effluent tank will be designed for a 10-minute hydraulic residence time. The design criteria for this system are summarized in Table 7.1.

### *Vessel Construction*

The multimedia filter tanks will have dimensions of 21 feet by 21 feet by 15 feet deep, and will be constructed of reinforced concrete. The tanks will share common walls. An underdrain system will be installed in each tank to promote even flow distribution during both filtration and backwash. The tanks will be covered and vented through VPGAC.

The filter effluent storage tank will have a capacity of 65,000 gallons, dimensions of 35 feet by 35 feet by 10 feet deep, and will be constructed of reinforced concrete.

### *Mechanical Equipment*

There are no pumps, blowers, or other mechanical equipment associated with this system.

### *Instrumentation*

Process control for the multimedia filter system includes maintaining constant flow through the filter, assessment of filter performance, and monitoring of physical parameters to initiate the backwash cycle when the filter is loaded with solids.

Constant flow rate through the filters will be maintained by measuring the water level in the filters and positioning a control valve on the outlet from each filter to decrease the resistance to flow out of each filter and maintain a constant level in each filter as the pressure drop across the filter media increases.

Influent and effluent turbidity will be measured to assess the performance of the filter. Effluent turbidity can also be used as a criterion for initiating backwash. Pressure drop across the media will be measured and can be used as a criterion for initiating the backwash cycle.

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Each multimedia filter will be equipped with the following instrumentation:

- Outlet flow control valve
- Inlet flow meter
- Influent turbidity indicator transmitter
- Effluent turbidity indicator transmitter
- Differential pressure indicator transmitter
- Level indicator transmitter
- High level switch
- Low level switch
- Low-low level switch.

The filter effluent equalization tank will be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

### 7.2.5 Ultraviolet/Chemical Oxidation

***System Components***

The UV/OX system includes UV/OX reactors and power supply modules, UV/OX feed pumps, hydrogen peroxide storage tanks, and hydrogen peroxide feed pumps.

***Design Criteria***

The UV/OX system will be designed to treat 6,000 gpm and reduce the concentrations of TCE from about 200 µg/l to <5 µg/l, PCE from about 130 µg/l to <5 µg/l, DCE from 25.7 µg/l to <5 µg/l, NDMA from

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0.19 μg/l to 2 parts per trillion (ppt), and 1,4-dioxane from 3.96 μg/l to <3 μg/l. The estimated UV power required to meet the treatment goals is 1,030 kW. Each UV/OX reactor will be designed to deliver 350 kW of UV power. The UV/OX system will be comprised of four reactors including one spare.

The hydrogen peroxide feed system will be designed to provide a dosage of 15 mg/l at design flow. The hydrogen peroxide storage tank will be designed to contain a 30-day supply of product. A hydrogen peroxide solution of 50 percent by weight will be used.

The design criteria for this tank are summarized in Table 7.1.

### *Tanks and Vessels*

The UV/OX reactors will be 5 feet in diameter and will be constructed of welded stainless steel. The hydrogen peroxide storage tank will have a capacity of 7,800 gallons with dimensions of 11 feet in diameter and 12 feet high, and will be constructed of welded stainless steel.

### *Mechanical Equipment*

Each UV/OX reactor will be fed by a centrifugal-type feed pump with a capacity of 2,000 gpm at 85 feet of head. Each feed pump will be equipped with a 60-hp motor and variable speed drive.

Hydrogen peroxide will be fed to each UV/OX reactor by an individual motor driven, double diaphragm type chemical metering pump.

### *Instrumentation*

Control of the UV/OX system is based on monitoring temperature, pressure, and UV intensity in each reactor, and flow through each reactor. Each UV/OX reactor will be equipped with the following instrumentation:

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- Inlet flow indicator transmitter
- Pressure indicator transmitter
- Temperature indicator transmitter
- UV intensity indicator transmitter.

The hydrogen peroxide storage tank will be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

### 7.2.6 Air Stripping and Offgas Treatment

***System Components***

The components of the air stripping and offgas treatment system include air stripper columns, air stripper blowers, and vapor phase GAC adsorbers.

***Design Criteria***

The air stripping system will be designed to reduce the concentration of 1,1,1-TCA, 1,1-DCA, 1,2-DCA, carbon tetrachloride, and chloroform. The hydraulic loading rate in the air strippers will be 20 gpm/ $ft^2$, and the air to water ratio will be 30:1. The air strippers will be designed to operate in forced draft mode. Three air strippers will be installed, with two being active at any time.

The offgas treatment system will be designed to remove 99.9 percent of VOCs from the air exiting the air strippers. The pressure drop through the vapor phase GAC adsorbers will be 9 inches of $H_2O$.

The design criteria for this tank are summarized in Table 7.1.

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### *Tanks and Vessels*

The air stripping towers will be 14 feet in diameter and 25 feet in height, and will be constructed of fiberglass reinforced plastic (FRP). The vessels will have a water distributor above the top of the packing material, and a liquid re-distributor midway through the packing column. The vessels will also have an air distributor below the air inlet.

The vapor phase GAC vessels will have a capacity of 13,600 pounds of GAC, dimensions of 16 feet in length by 8 feet in width by 8 feet in height, and will be constructed of welded carbon steel with a coal tar epoxy interior liner.

### *Mechanical Equipment*

Each air stripper will be equipped with a blower capable of producing approximately 12,000 cubic feet per minute (cfm) at a discharge pressure of approximately 16 inches of $H_2O$.

### *Instrumentation*

Influent flow to each air stripper will be controlled using a flow control valve. Instrumentation for the air stripping and offgas treatment system will include:

- Influent flow indicator transmitter
- Influent flow control valve
- Sump level indicator transmitter
- Sump high level switch
- Sump low level switch
- Blower pressure indicator transmitter
- Blower flow indicator transmitter
- Vapor phase GAC pressure indicator transmitter.

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### 7.2.7 Liquid-Phase Granular Activated Carbon Adsorption

#### *System Components*

The LPGAC system includes LPGAC contactors, feed pumps, spent carbon holding tank, and eductor pump.

#### *Design Criteria*

The GAC system will utilize gravity downflow reactors with a liquid loading rate of 2 gpm $ft^2$ and an empty bed contact time of 16 minutes. The total surface area required will be 3000 $ft^2$. The GAC bed depth will be 4 feet. Five LPGAC contactors will be installed, with four active contractors during routine operations.

The design criteria for this system are summarized in Table 7.1.

#### *Tanks and Vessels*

The GAC contactors will have dimensions of 28 feet by 28 feet by 17 feet in height, and will be constructed of reinforced concrete. The vessels will have an underdrain system to promote even flow through the carbon bed. An eductor system will be used to transfer GAC in and out of the reactors in slurry form.

The spent carbon holding tanks will each have a capacity of 15,000 gallons, dimensions of 15 feet in diameter and 13 feet in height, and will be constructed of welded stainless steel.

#### *Mechanical Equipment*

The LPGAC system will be equipped with four feed pumps, each driven by a 40 hp motor with a variable speed drive.

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The LPGAC system will be equipped with two eductor pumps for transferring GAC in and out of the contactors.

***Instrumentation***

The LPGAC adsorption system will include the following instrumentation:

- Inlet flow indicator transmitters
- Pressure differential indicator transmitters
- Level indicator transmitters
- High level switches.

### 7.2.8 Disinfection

***System Components***

The disinfection system will include a disinfection tank, mixer, a sodium hypochlorite storage tank, and sodium hypochlorite feed pumps.

***Design Criteria***

The disinfection system will provide an average chlorine dose of 3 mg/l. The contact time will be 15 minutes. The sodium hypochlorite storage tank will be designed for a 7-day storage capacity.

The design criteria for this tank are summarized in Table 7.1.

***Tanks and Vessels***

The disinfection tanks will be 30 feet by 30 feet by 15-feet deep and will be constructed from reinforced concrete.

The sodium hypochlorite storage tank will have a capacity of 15,200 gallons, dimensions of 15 feet in diameter and 12 feet in height, and will be constructed of stainless steel.

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### *Mechanical Equipment*

Sodium hypochlorite will be fed to each disinfection contactor by an individual motor driven, double diaphragm type chemical metering pump.

### *Instrumentation*

The disinfection system will include the following instrumentation:

- Low level switch
- High level switch.

## 7.2.9 Treated Water Storage System

### *System Components*

The treated water storage system includes the treated water storage tank and its instrumentation and fittings.

### *Design Criteria*

The treated water storage tank will have a capacity of 60,000 gallons and a hydraulic residence time of 10 minutes. The design criteria for this tank are summarized in Table 7.1.

### *Vessel Construction*

The treated water storage tank will have dimensions of 28 feet in diameter and 15 feet in height, and will be constructed of welded carbon steel. The tank will have 1 feet of freeboard at design capacity.

### *Mechanical Equipment*

Treated water pumps are discussed in Section 8.0 of this report, blowers, or other mechanical equipment associated with this system.

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***Instrumentation***

Control of the treated water storage system will be based on level in the tank. The treated water storage tank will be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

### 7.2.10 Backwash Reclamation

***System Components***

The reclamation system includes the backwash water storage tank, backwash pumps, reclamation system equalization tank, reclamation pumps, flocculator/clarifier tank, reclaimed water holding tank, return pumps, sludge pumps, sludge holding tank, coagulant storage tank, coagulant feed pumps, filter press feed pump, and the filter press.

***Design Criteria***

The backwash water storage tank is designed to hold 1.5 times the sum of the volume required to backwash a single filter at a rate of 20 gpm $ft^2$ for a duration of 10 minutes.

The reclamation system equalization tank is designed to hold 1.5 times the volume required to backwash a single filter at a rate of 20 gpm/$ft^2$ for a duration of 10 minutes plus the volume of the water generated during the 10 minute filter to waste cycle when a filter is placed back in service.

The flocculation/clarification tank is designed to treat the total volume of backwash and filter to waste water generated during a 24 hour period on a continuous basis over 24 hours at a loading rate of 0.15 gpm/$ft^2$.

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### *Tanks and Vessels*

The backwash water storage tank will have a capacity of 110,000 gallons, dimensions of 32 feet by 32 feet by 15-feet deep, and will be constructed of reinforced concrete.

The reclamation system equalization tank will have a capacity of 250,000 gallons, dimensions of 50 feet by 50 feet by 15-feet deep, and will be constructed of reinforced concrete.

The flocculator/clarifier tank will have dimensions of 62 feet in diameter 13-feet deep, and will be constructed of reinforced concrete.

The reclaimed water equalization tank will have a capacity of 4,500 gallons, dimensions of 10 feet by 10 feet by 10-feet deep, and will be constructed of reinforced concrete.

The sludge holding tank will have a capacity of 4,000 gallons, dimensions of 10 feet diameter and 10 feet deep, and will be constructed of welded carbon steel.

The alum storage tank will have a capacity of 1,000 gallons, dimensions of 7 feet diameter and 5 feet high, and will be constructed of welded carbon steel.

### *Mechanical Equipment*

Three backwash pumps will be used to backwash the filters. Each pump will have a capacity of 4,300 gpm at 40 feet of head, and will be powered by a 60 hp motor.

Pressurized air will be used to scour the media during the backwash cycle. This air will be provided by three 10 hp rotary positive displacement blowers.

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Two reclamation pumps will be used to pump water into the clarifier. Each pump will have a capacity of 450 gpm at 15 feet of head and will be powered by a 5 hp motor.

Two return pumps will be used to pump water from the reclaimed water equalization tank back to the flash mix tanks. Each pump will have a capacity of 450 gpm at 15 feet of head and will be powered by a 5 hp motor.

Two centrifugal type sludge pumps will be used to pump underflow from the flocculation/clarification tank to the sludge holding tanks.

Two double diaphragm type chemical metering pumps will be used to add alum to the sludge upstream of the filter press.

Two diaphragm pumps will be used to pump sludge from the sludge holding tank through the filter press.

***Instrumentation***

Each tank in the reclamation system will be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

Each pump in the reclamation system will be equipped with a flow indicator transmitter.

## 7.3 Subarea 3 Groundwater Treatment System

The Subarea 3 groundwater treatment system will have a hydraulic capacity of 15,000 gpm. The treatment train includes influent equalization, biological reduction, flash mixing and flocculation/aeration,

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multimedia filtration, UV/OX, air stripping with GAC offgas treatment, liquid-phase GAC adsorption, disinfection, treated water storage, and reclamation.

### 7.3.1 Influent Equalization

#### *System Components*

The influent equalization system includes the influent equalization tank and its instrumentation and fittings.

#### *Design Criteria*

The influent equalization tank will have a capacity of 150,000 gallons and a hydraulic residence time of 10 minutes and will have 1 feet of freeboard at design capacity. This tank will be vented to atmosphere through a vapor phase GAC adsorber. The design criteria for this tank are summarized in Table 7.2.

#### *Vessel Construction*

The influent equalization tank will have dimensions of 37 feet in diameter and 20 feet in height, and will be constructed of welded carbon steel.

#### *Mechanical Equipment*

There are no pumps, blowers, or other mechanical equipment associated with this system.

#### *Instrumentation*

Control of the influent equalization system will be based on the level in the tank. A level indicator/transmitter will transmit a level signal for control purposes. High and low level switches will also be provided as backup to the level indicator/transmitter. The influent equalization tank will be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch

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- High level switch.

### 7.3.2 Biological Reduction

***System Components***

The biological reduction system includes GAC/FBRs, fluidization pumps, eductor pumps, ethanol storage tank and ethanol feed pumps, and phosphoric acid storage tank and feed pumps.

***Design Criteria***

The biological reduction system will be designed to reduce the concentration of pechlorate from approximately 50 to < 4 µg/l, and the concentration of nitrate from 4 to 10 mg/l to < 1 mg/l. The biological reduction system will have a forward flow capacity of 15,000 gpm, and a recycle rate of 20 percent. This flow capacity will be provided by installing 10 GAC/FBRs arranged in parallel, each with a forward flow capacity of 1,500 gpm and recycle flow of 375 gpm. Each GAC/FBR will be designed for a liquid loading rate of 12 gpm/ft$^2$ and empty bed contact time of 9.4 minutes.

The ethanol feed system will be designed to deliver a dosage of 8.3 mg/l to the influent stream to each GAC/FBR. The storage tanks will be designed to provide 30 days of storage at the design usage rate of 294 gpd.

The phosphoric acid feed system will be designed to deliver a dosage of 1 mg/l to the influent stream to each GAC/FBR. The phosphoric acid storage tanks will be designed to provide 30 days of storage at the design usage rate of 32 gpd.

The design criteria for this system are summarized in Table 7.2.

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### *Vessel Construction*

Each GAC/FBR will have dimensions of 14 feet in diameter and 23 feet in height, and will be constructed of welded 304 stainless steel or rectangular vessels constructed from reinforced concrete. Each GAC/FBR will be equipped with 10-inch diameter flanged inlet and outlet nozzles, a 2-inch-diameter flanged drain nozzle, and

The two ethanol storage tanks will each have a capacity of 8,000 gallons, dimensions of 14 feet in diameter and 8 feet in height, and will be constructed of welded carbon steel. Each tank will be equipped with flanged inlet and outlet nozzles, vent with flame arrestor, emergency vent, and flanged nozzles for level instruments and spares.

The two phosphoric acid storage tanks will each have a capacity of 1,000 gallons, dimensions of 6 feet in diameter and 6 feet in height, and will be constructed of welded 316 stainless steel. Each tank will be equipped with flanged inlet and outlet nozzles, vent nozzle, emergency vent, and flanged nozzles for level instruments and spares.

### *Mechanical Equipment*

Each GAC/FBR will be fed by a fluidization pump. The fluidization pumps will be centrifugal pumps with capacities of 1,875 gpm at 43 feet TDH. Pump drivers will be 30 hp, 480 VAC, 3-phase, 60 Hz, TEFC motors with variable frequency drives (VFDs).

The biomass separation eductor system for each GAC/FBR will be equipped with a centrifugal pump.

Ethanol will be fed to each GAC/FBR by an individual motor-driven, double-diaphragm type chemical metering pump.

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Phosphoric acid will be fed to each GAC/FBR by an individual motor-driven, double-diaphragm type chemical metering pump.

### *Instrumentation*

The GAC/FBRs are maintained at a constant liquid level. The recycle flow rate is set by the operator, and is maintained by a flow control valve on the recycle line that operates based on the output of the flow transmitter in the recycle line. The total flow through the bioreactor is controlled by an inlet flow control valve that operates based on the flow transmitter in the fluidization pump discharge line. Flow rates, pH signals, and DO signals, from each GAC/FBR are transmitted to the PLC in the main control room. Each GAC/FBR will be equipped with the following instrumentation:

- Inlet flow control valve
- Recycle flow control valve
- Inlet flow meter
- Recycle flow meter
- pH element/pH indicator transmitter
- DO element/DO indicator transmitter
- High level switch
- Fluidization pump suction and discharge pressure indicators
- Eductor pump suction and discharge pressure indicators.

The ethanol storage tanks will be controlled based on tank level. A level transmitter will transmit an analog signal to the PLC. High and low level switches will provide digital signals to the PLC. The ethanol storage tanks will each be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch

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- High level switch.

The phosphoric acid storage tanks will each be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

### 7.3.3 Flash Mix and Aeration/Flocculation

***System Components***

The flash mix system includes flash mix tanks and mixers, polymer blending tanks and pumps, and polymer feed pumps. The aeration/flocculation system includes tanks, diffusers, and blowers.

***Design Criteria***

The flash mix tanks are designed to provide 3.5 minutes of residence time. The aeration/flocculation tanks are designed to provide 17.5 minutes of residence. This system is designed to raise the DO concentration to 5 mg/l. The oxygen transfer efficiency is estimated to be 5 percent. Each flash mix tank and aeration/flocculation tank will be covered and vented through VPGAC. The polymer blending and feed system is designed to provide a 0.2 percent polymer solution and for two days of storage at a dosage rate of 1 mg/l.

The design criteria for this system are summarized in Table 7.2.

***Vessel Construction***

The flash mix tanks will have dimensions of 10 feet by 10 feet by 16 feet deep, and will be constructed of reinforced concrete. The aeration/flocculation tanks will have dimensions of 10-feet wide by 50-feet long by 16-feet deep, and will be constructed of reinforced concrete. The tanks will share common walls. Adjustable weirs will be installed to regulate flow through these tanks.

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The two polymer mixing and storage tanks will each have a capacity of 12,000 gallons and dimensions of 13 feet in diameter and 13 feet in height, and will be constructed of welded carbon steel.

### *Mechanical Equipment*

The flash mix tanks will each be equipped with a flash mixer with a 30 hp motor.

Air will be added to each flocculation/aeration tank through a network of bladder-type fine bubble diffusers using 10 hp rotary positive displacement blowers to provide pressurized air.

The polymer mixing and storage tanks will each be equipped with a motor-driven mixer.

Polymer solution will be fed to each flash mix tank by an individual motor-driven, double-diaphragm type chemical metering pump.

### *Instrumentation*

Flow through the flash mix and flocculation/aeration tanks is by gravity and will be controlled with adjustable weirs. The influent flow rate to each system will be controlled by a flow control valve. Instrumentation will be included to monitor process variables such as DO, level, and pressure. The polymer feed tank will be controlled based on level. Instrumentation for the flash mix and flocculation/aeration systems will include:

- Inlet flow control valve
- Inlet flow indicator transmitter
- Level indicator transmitter
- Aeration blower pressure indicator transmitter
- Polymer tank level indicator transmitter

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- Polymer tank high level switch
- Polymer tank low level switch.

### 7.3.4 Multimedia Filters

#### *System Components*

The multimedia filter system will include filter vessels and filter effluent equalization tank.

#### *Design Criteria*

The multimedia filters will be operated in constant level, constant flow mode. The filters will be designed to operate at a hydraulic loading rate of 5 gpm/ft$^2$. The filters will process the forward flow of 15,000 gpm plus an additional 1,000 gpm from the reclamation system. The total filter area required is 3200 ft$^2$. Six filters will be installed, each with 640 ft$^2$ of surface area. Five filters will be in operation at any given time, with the sixth undergoing backwash. The filter media will include anthracite, silica sand, and fine garnet. The support gravel will include coarse gravel and finer garnet gravel. The design criteria for this system are summarized in Table 7.2.

#### *Vessel Construction*

The multimedia filter tanks will have dimensions of 25 feet by 25 feet by 15-feet deep, and will be constructed of reinforced concrete. The tanks will share common walls. An underdrain system will be installed in each tank to promote even flow distribution during both filtration and backwash. The tanks will be covered and vented through vapor phase GAC.

#### *Mechanical Equipment*

Pressurized air will be used to scour the media during the backwash cycle. This air will be provided by three 40 hp rotary positive displacement blowers.

#### *Instrumentation*

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Process control for the multimedia filter system includes maintaining constant flow through the filter, assessment of filter performance, and monitoring of physical parameters to initiate the backwash cycle when the filter is loaded with solids.

Constant flow through the filter will be maintained by measuring the water level in the filter and positioning a control valve on the outlet from each filter to decrease the resistance to flow out of the filter and maintain a constant level in the filter as the pressure drop across the filter media increases.

Influent and effluent turbidity will be measured to assess the performance of the filter. Effluent turbidity can also be used as a criteria for initiating backwash.

Pressure drop across the media will be measured and can be used as a criteria for initiating the backwash cycle.

Each multimedia filter will be equipped with the following instrumentation:

- Outlet flow control valve
- Inlet flow meter
- Differential pressure indicator transmitter
- Level indicator transmitter
- High level switch
- Low level switch
- Low-low level switch.

The filter effluent equalization tank will be equipped with the following instrumentation:

- Level indicator transmitter

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- High level switch.
- Low level switch

### 7.3.5 Ultraviolet/Chemical Oxidation

***System Components***

The UV/OX system includes UV/OX reactors and power supply modules, UV/OX feed pumps, hydrogen peroxide storage tanks, and hydrogen peroxide feed pumps.

***Design Criteria***

The UV/OX system will be designed to reduce the concentration of TCE from about 46 µg/l to <5 µg/l, PCE from about 15 µg/l to <5 µg/l, DCE from about 6 µg/l to <5 µg/l, NDMA from about 0.2 µg/l to 2 parts per trillion (ppt). 1,4-dioxane will also be oxidized by the UV/OX system. The estimated UV power required to meet the treatment goals is 1,800 kW. The UV/OX system will be designed to treat 15,000 gpm. The UV/OX system will be comprised of seven reactors including one spare.

The hydrogen peroxide feed system will be designed to provide a dosage of 15 mg/l at design flow. The hydrogen peroxide storage tank will be designed to contain a 30-day supply of product. A hydrogen peroxide solution at a concentration of 50 percent by weight will be used.

The design criteria for this tank are summarized in Table 7.2.

***Tanks and Vessels***

The UV/OX reactors will be 5 feet in diameter and will be constructed of welded stainless steel. The hydrogen peroxide storage tank will have a capacity of 19,500 gallons with dimensions of 16 feet in diameter and 15-feet high, and will be constructed of welded stainless steel.

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***Mechanical Equipment***

Each UV/OX reactor will be fed by a centrifugal-type feed pump with a capacity of 1,365 gpm at 65 feet of head. Each feed pump will be equipped with a 30 hp motor and variable-speed drive.

Hydrogen peroxide will be fed to each UV/OX reactor by an individual motor driven, double diaphragm type chemical metering pump.

***Instrumentation***

Control of the UV/OX system is based on monitoring temperature, pressure, and UV intensity in each reactor, and flow through each reactor. Each UV/OX reactor will be equipped with the following instrumentation:

- Inlet flow indicator transmitter
- Pressure indicator transmitter
- Temperature indicator transmitter
- UV intensity indicator transmitter.

The hydrogen peroxide storage tank will be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

### 7.3.6 Air Stripping and Offgas Treatment

***System Components***

The components of the air stripping and offgas treatment system include air stripper columns, air stripper blowers, and vapor phase GAC adsorbers.

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### Design Criteria

The air stripping system will be designed to reduce the concentrations of carbon tetrachloride, chloroform, 1,1,1-TCA, 1,1-DCA, and 1,2-DCA. The hydraulic loading rate in the air strippers will be 20 gpm/ $ft^2$, and the air to water ratio will be 30:1 The air strippers will be designed to operate in forced draft mode. Six air strippers will be installed, with five being active at any time.

The offgas treatment system will be designed to remove 99.9 percent of VOCs from the air exiting the air strippers. The pressure drop through the vapor phase GAC offgas treatment system is 14 inches $H_2O$.

The design criteria for this tank are summarized in Table 7.2.

### Tanks and Vessels

The air stripping towers will be 14 feet in diameter and 25-feet in height, and will be constructed of FRP. The vessels will have a water distributor above the top of the packing material, and a liquid re-distributor midway through the packing column. The vessels will also have an air distributor below the air inlet.

The vapor phase GAC vessels will have a capacity of 13,600 pounds of GAC, dimensions of 16 feet in length by 8 feet in width by 8 feet in height, and will be constructed of welded carbon steel with a coal tar epoxy interior liner.

### Mechanical Equipment

Each air stripper will be equipped with a blower capable of producing approximately 12,000 cfm at a discharge pressure of approximately 16 inches of $H_2O$.

### Instrumentation

Influent flow to each air stripper will be controlled using a flow control valve. Instrumentation for the air stripping and offgas treatment system will include:

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- Influent flow indicator transmitter
- Influent flow control valve
- Sump level indicator transmitter
- Sump high level switch
- Sump low level switch
- Blower pressure indicator transmitter
- Blower flow indicator transmitter
- Vapor phase GAC pressure indicator transmitter.

### 7.3.7 Liquid-Phase Granular Activated Carbon

***System Components***

The LPGAC system includes LPGAC contactors, feed pumps, spent carbon holding tank, and eductor pump.

***Design Criteria***

The GAC system will utilize gravity downflow reactors with a liquid loading rate of 2 gpm/ft$^2$. and an empty bed contact time of 16 minutes. The total surface area required will be 7,500 feet. The GAC bed depth will be 4 feet. Eleven LPGAC contactors will be installed, with ten active during routine operations.

The design criteria for this system are summarized in Table 7.1.

***Tanks and Vessels***

The GAC contactors will have dimensions of 28 feet by 28 feet by 17 feet in height, and will be constructed of reinforced concrete. The vessels will have an underdrain system to promote even flow

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through the carbon bed. An eductor system will be used to transfer GAC in and out of the reactors in slurry form.

The spent carbon holding tanks will each have a capacity of 15,000 gallons, dimensions of 15 feet in diameter and 13 feet in height, and will be constructed of welded stainless steel.

#### *Mechanical Equipment*

The LPGAC system will be equipped with five feed pumps, each driven by a 40 hp motor with a variable speed drive.

The LPGAC system will be equipped with two eductor pumps for transferring GAC in and out of the contactors.

#### *Instrumentation*

The LPGAC adsorption system will include the following instrumentation:

- Inlet flow indicator transmitters
- Pressure differential indicator transmitters
- Level indicator transmitters
- High level switches
- Design Criteria.

### 7.3.8 Disinfection

#### *Design Criteria*

The disinfection system will provide an average chlorine dose of 3 mg/l. The contact time will be 15 minutes. The sodium hypochlorite storage tank will be designed for a 7-day storage capacity.

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The design criteria for this tank are summarized in Table 7.2.

### *Tanks and Vessels*

The disinfection tanks will be 45 feet by 45 feet by 10-feet deep and will be constructed from reinforced concrete.

The sodium hypochlorite storage tank will have a capacity of 38,000 gallons, dimensions of 20 feet in diameter and 16 feet in height, and will be constructed of stainless steel.

### *Mechanical Equipment*

Sodium hypochlorite will be fed to each disinfection contactor by an individual motor driven, double diaphragm type chemical metering pump.

### *Instrumentation*

The disinfection system will include the following instrumentation:

- Level Switch High
- Level Switch Low

## 7.3.9 Treated Water Storage System

The effluent equalization tank will have a capacity of 150,000 gallons and a hydraulic residence time of 10 minutes. The design criteria for this tank are summarized in Table 7.2.

### *Vessel Construction*

The effluent equalization tank will have dimensions of 37 feet in diameter and 20 feet in height and will be constructed of welded carbon steel. The tank will have 1 feet of freeboard at design capacity.

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### *Mechanical Equipment*

Treated water pumps are discussed in Section 8.0 of this report, blowers, or other mechanical equipment associated with this system.

### *Instrumentation*

Control of the treated water storage system will be based on level in the tank. The treated water storage tank will be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

## 7.3.10 Backwash Reclamation

### *System Components*

The reclamation system includes the backwash water storage tank, backwash pumps, reclamation system equalization tank, reclamation pumps, flocculator/clarifier tank, reclaimed water holding tank, return pumps, sludge pumps, sludge holding tank, coagulant storage tank, coagulant feed pumps, filter press feed pump, and the filter press.

### *Design Criteria*

The backwash water storage tank is designed to hold 1.5 times the sum of the volume required to backwash a single filter at a rate of 20 gpm $ft^2$ for a duration of 15 minutes.

The reclamation system equalization tank is designed to hold 1.5 times the volume required to backwash a single filter at a rate of 20 gpm/$ft^2$ for a duration of 15 minutes plus the volume of the water generated during the 10-minute filter to waste cycle when a filter is placed back in service.

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The flocculator/clarifier tank is designed to treat the total volume of backwash and filter to waste water generated during a 24-hour period on a continuous basis over 24 hours at a loading rate of 0.15 gpm/ft$^2$.

### *Tanks and Vessels*

The backwash water storage tank will have a capacity of 290,000 gallons, dimensions of 74 feet by 74 feet by 10-feet deep, and will be constructed of reinforced concrete.

The reclamation system equalization tank will have a capacity of 340,000 gallons, dimensions of 76 feet by 76 feet by 11-feet deep, and will be constructed of reinforced concrete.

The flocculator/clarifier tank will have dimensions of 93-feet in diameter 13-feet deep, and will be constructed of reinforced concrete.

The reclaimed water equalization tank will have a capacity of 10,000 gallons, dimensions of 12 feet by 12 feet by 12-feet deep, and will be constructed of reinforced concrete.

The sludge holding tank will have a capacity of 4,000 gallons, dimensions of 10 feet diameter and 10-feet deep, and will be constructed of welded carbon steel.

The alum storage tank will have a capacity of 2,000 gallons, dimensions of 7 feet diameter and 10-feet high, and will be constructed of welded carbon steel.

### *Mechanical Equipment*

Three backwash pumps will be used to backwash the filters. Each pump will have a capacity of 6,400 gpm at 40 feet of head, and will be powered by a 100 hp motor.

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Pressurized air will be used to scour the media during the backwash cycle. This air will be provided by three 25 hp rotary positive displacement blowers.

Two reclamation pumps will be used to pump water into the clarifier. Each pump will have a capacity of 1000 gpm at 15 feet of head and will be powered by a 10 hp motor.

Two return pumps will be used to pump water from the reclaimed water equalization tank back to the flash mix tanks. Each pump will have a capacity of 1,000 gpm at 15 feet of head and will be powered by a 10 hp motor.

Two centrifugal type sludge pumps will be used to pump underflow from the flocculation/clarification tank to the sludge holding tanks.

Two double diaphragm type chemical metering pumps will be used to add alum to the sludge upstream of the filter press.

Two diaphragm pumps will be used to pump sludge from the sludge holding tank through the filter press.

***Instrumentation***

Each tank in the reclamation system will be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

Each pump in the reclamation system will be equipped with the following instrumentation:

- Flow indicator transmitter

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## 7.4 Control System Description

Each individual system in the Subarea 1 and Subarea 3 Treatment Plants will be controlled by local PLCs. Digital and analog signals from field instruments will be transmitted to the local PLC for each system. A personal computer based graphical operator interface will be provided at each system.

In addition to the local control systems, a plant-wide control system at each subarea will communicate with the local control systems, and allow operators to monitor process variables and alarm conditions, and modify set points.

### 7.4.1 Plant Site – Laboratory/Utility Building

Each plant site, SA1-4 and SA3-1 will have a one-story building of approximately 1,200 $ft^2$ and 12 feet to top of parapet. The building will provide space for: wash room/water closet, small laboratory, control room, multi-use breakroom, and tool storage. HVAC equipment will be roof-mounted. The structure will be of non-combustible construction: concrete masonry bearing walls and steel deck roof supported by bar joists. The exterior grade will be 6 inches below finish floor and will have minimal landscaping since it will not be exposed to public view. Parking will provided for at least of six vehicles.

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# 8.0 TREATED WATER DELIVERY SYSTEM

## 8.1 Treated Water Delivery

This section discusses options for delivery of treated water and options for short-term alternative discharge of treated water from the proposed Subarea 1 and Subarea 3 Treatment Plants.

Three treated-water delivery systems have been considered:

- Distribution to customers as potable water
- Aquifer recharge
- Combined distribution and recharge.

### 8.1.1 Distribution to Customers as Potable Water

Delivering potable water to local distribution systems will be accomplished by making a pipeline connection or connections to existing water distribution systems. Design considerations for delivering potable water to local distribution systems include:

- Matching existing water distribution system at the selected connection point(s)
- Matching system demands by providing equalization storage at the water treatment plants and using variable frequency drive pump motors
- Water quality issues associated with blending
- Pipeline routing
- Metering.

#### 8.1.1.1 Subarea 1

The Subarea 1 Treatment Plant will be designed to discharge 6,000 gpm, which will be delivered to distribution system(s) from a high service pump station located at the plant site. Design criteria for the high service pumps must be established during preliminary design, once there is agreement as to where

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the water will be distributed. Typical high service pump station configurations include a clearwell, providing potable water storage and suction supply for the pumps, and horizontal or vertical centrifugal pumps.

The transmission pipeline from the high service pump station to the distribution system will be designed utilizing the following criteria:

- Minimum Velocity — 3 fps
- Maximum Velocity — 10 fps
- Coefficient of Friction — 130
- Maximum Headloss — 2.5 feet / 100 feet
- Minimum Depth of Cover — 4.5 feet

See Table 6-2 for rationale used regarding the stated criteria.

Based on these criteria, the treated water pipeline diameter will range between 16- and 30-inches producing velocities of 9.6 and 2.7 fps, respectively, under normal operating conditions. Final selection of the pipeline diameter will depend on overall length and distribution system pressure at the point of connection.

#### 8.1.1.2 Subarea 3

The Subarea 3 Treatment Plant will be designed to produce 15,000 gpm, which will be delivered from the high service pump station to the water distribution system in a manner similar to that described for Subarea 1, above. Based on the previously presented criteria, the Subarea 3 treated water transmission pipeline diameter will range between 24- and 48-inches which results in velocities of 10.6 and 2.7 fps, respectively. The 10.6 fps velocity is slightly higher than the stated criteria, however is reasonable for

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this application. As with the Subarea 1 pipeline, final diameter selection will depend on overall length and distribution system pressure at the point of connection.

## 8.2 Aquifer Recharge

Several options are available for aquifer recharge with treated water. The two options considered for this conceptual design are delivering recharge water to the Santa Fe Spreading Grounds (SFSG) or to recharge wells.

Design considerations for the aquifer recharge system include:

- Matching high service pump station discharge rates to allowable recharge rates
- Providing adequate water storage facilities at the water treatment plants for operation flexibility in delivering water at an acceptable rate to recharge wells and/or spreading grounds allowing for a constant water production rate
- Siting and sizing recharge wells
- Pipeline routing.

### 8.2.1 Deliver Water to the Santa Fe Spreading Grounds

As stated in the *Final Remedial Design/Remedial Action Work Plan* (HLA, 2000a), the SFSG has adequate capacity to accept the treated water from both Subarea 1 and 3 with no or minimal loss to the ocean.

Conceptual design phase hydraulics have been completed in an effort to investigate the feasibility of pumping treated water from both the Subarea 1 and Subarea 3 Treatment Plants to the SFSG. System components include high service pumping, treated water transmission pipeline, and an energy dissipater located at the SFSG.

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Due to the fact that exact Subarea 1 and Subarea 3 Treatment Plant locations have not yet been determined, estimated transmission pipeline lengths and static head conditions are based on a worst case scenario. Pipe lengths are the longest distance from the potential treatment plant sites to the SFSG and the static head is based on the elevation difference associated with the pipeline alignment being evaluated. Potential pipeline corridors for pumping to the SFSG are shown on Figures 5-1, 5-2, and 5-4.

Pipeline design criteria is similar to that stated above, however considering these pipelines will discharge through an energy dissipater at the SFSG, maximum velocities are limited to 8.0 fps with a target design velocity of approximately 5.0 fps.

#### 8.2.1.1 Subarea 1

The estimated pipeline length and static head from the Subarea 1 Treatment Plant to the SFSG is approximately 21,500 feet and 0 feet, respectively. Based on these parameters and a design flow rate of 6,000 gpm, the transmission pipeline diameter will range from 18- to 30-inches resulting in velocities of 7.6 and 2.7 fps and horsepower requirements of 410 to 35, respectively.

#### 8.2.1.2 Subarea 3

The estimated pipeline length and static head from the Subarea 3 Treatment Plant to the SFSG are approximately 38,000 feet and 150 feet, respectively, and the conceptual design flow rate from the Subarea 3 Treatment Plant is 15,000 gpm. Considering these factors, the transmission pipeline diameter will be between 28- and 48-inches which results in velocities of 7.8 and 2.7 fps and horsepower requirements of 1,850 and 800, respectively. Based on the excessive pipeline length and horsepower requirements, this is an undesirable option.

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### 8.2.2 Deliver Treated Water to Recharge Wells

Recharge well locations and screened intervals were shown conceptually in the *Remedial Design/ Remedial Action Work Plan* (HLA, 2000a). Conceptual design phase hydraulics have been completed with regard to of the recharge well delivery system.

Due to the fact that exact Subarea 1 and Subarea 3 Treatment Plant locations have not yet been determined, estimated transmission pipeline lengths and static head conditions are based on a worst case scenario. Pipe lengths are the longest distance from the potential Subarea 1 and Subarea 3 Treatment Plant sites to the recharge well fields and the static head is based on the elevation difference associated with the pipeline alignment being analyzed. Potential pipeline corridors for pumping to the recharge wells are shown on Figures 5-1, 5-2, and 5-4.

#### 8.2.2.1 Subarea 1

The estimated pipeline length and static head from the Subarea 1 Treatment Plant to the recharge wells is approximately 15,000 feet and 0 feet, respectively. Based on these parameters and a design flow rate of 6,000 gpm, the transmission pipeline diameter will range from 18- to 30-inches resulting in velocities of 7.6 and 2.7 fps and horsepower requirements of 270 to 25, respectively.

#### 8.2.2.2 Subarea 3

The estimated pipeline length and static head from the Subarea 3 Treatment Plant to the recharge well site is approximately 12,000 feet and 50 feet respectively and the conceptual design flow rate from the Subarea 3 Treatment Plant is 15,000 gpm. Considering these factors, the transmission pipeline diameter will be between 28- and 48-inches which results in velocities of 7.8 and 2.7 fps and horsepower requirements of 615 and 265, respectively.

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### 8.2.3 Combined Distribution and Recharge

Depending on the final outcome of water use negotiations, the possibility exists to divide the flow from the treatment plants between distribution systems and recharge facilities. Considerations for this scenario involve design of separate pumping and transmission systems to discharge flow to the appropriate end use. Further investigation will be necessary once final end use is determined.

### 8.2.4 Additional Considerations

During initial start-up of the Subarea 1 and Subarea 3 Treatment Plants, or in the event that the finished water does not meet requirements of the Surface Water Treatment Rule for potable water, treated water will need to be discharged. Preliminary design of the treatment plants must consider discharge locations such as a near-by storm sewer, creek, or river capable of conveying the full capacity of each proposed treatment plant.

It is anticipated that conveyance of discharged water to a suitable discharge location will be accomplished using gravity pipelines. Manning's equation will be used to design gravity pipelines for the discharged water conveyance system utilizing the following criteria:

- Minimum Velocity — 2.0 fps*
- Maximum Velocity — 10.0 fps*
- Depth of Flow — 80% of full depth
- Friction factor, n (all pipe materials) — 0.013

* Discharged-water drains will be designed and constructed, with a minimum or maximum slope, necessary to transport the Subarea 1 Treatment Plant capacity of 6,000 gpm.

Several combinations of pipe diameters and slopes will meet the design criteria. Feasible pipeline alignments will be identified in the preliminary design phase and pipeline diameters and slope will be determined during final design.

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# 9.0 TREATED WATER USE

The BPOU project intends to make treated groundwater from the Subarea 1 and Subarea 3 Treatment Plants available for direct potable use provided that necessary agreements can be reached with water purveyors. However, in the event that such agreements cannot be reached or if some or all of the treated water is not needed for direct potable use, treated water will be recharged to the aquifer in the SFSG or recharged to the aquifer using wells. Several alternatives for the recharge of treated groundwater were evaluated in the Final RD/RA Work Plan. A summary of this evaluation is provided below:

1. Preliminary cost estimates indicate that conveying treated groundwater from the Subarea 3 Treatment Plant to the SFSG is significantly more expensive than recharging treated water using recharge wells.

2. For Subarea 3, preliminary model results indicate that the ability of the extraction system to limit migration of chemicals in groundwater is not adversely impacted by the use of either shallow recharge wells located downgradient of the plume or by deep recharge wells located near the Subarea 3 Treatment Plant. However, the ability of the Subarea 1 extraction system to limit the migration of chemicals appears to be slightly reduced by deep recharge beneath the plume in Subarea 1.

3. For Subarea 3, preliminary model results indicate that the performance of the extraction system with regard to limiting migration of chemicals may be enhanced by the use of either shallow or deep recharge wells.

4. With enhanced extraction system performance through the use of recharge wells, a reduction of project extraction rates in Subarea 3 may be possible.

5. In Subarea 1 the two options most favorably considered are conveyance to and discharge of treated water to the SFSG and recharge to the aquifer using shallow wells, probably located near the San Gabriel River.

6. In Subarea 3 the two options considered most favorable are recharge via deep wells screened below the groundwater plume, and recharge using shallow wells outside the plume.

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# 10.0 PROJECT SCHEDULE

A project schedule that identifies the timing for initiating and completing all critical path tasks for the construction and implementation of the RA activities presented in this report has been developed and is presented in Figure 10-1. This project schedule flows from the Work Breakdown Structure (WBS) developed concurrently with the CDR. The project schedule assigns dates, durations, and relationships between the tasks and subtasks identified in the WBS. Start and end dates for each task and subtask in the WBS are based on the past experience and knowledge of site conditions, and on the advice of regulatory agencies, interested outside parties, and vendors of key equipment. Durations shown on this schedule are work days of with 5 work days per week, not calendar days.

The baseline project schedule, once agreed upon, will be the basis for discussions between interested parties. This schedule should be reviewed on a monthly (or more frequent) basis and appropriately amended to reflect actual project conditions.

The schedule predicts an operation date for the 6,000 gpm Subarea 1 and 15,000 gpm Subarea 3 Treatment Plants in February 2002. Several key tasks, authorizations, and land acquisition activities lie on the critical path to meet this date. Key schedule elements include the following:

- The start-up of the Phase 2 Treatability Study Pilot Plant in Sacramento on February 28, 2000. This began the period when data on the performance of the biological treatment system will be available, and represents when data will be available to start the permitting process with the State of California DHS for the plant operating permit.
- Land acquisition and permitting activities are included in the schedule with a duration of 18 weeks with the process starting on June 15, 2000, after the final revision of the CDR is complete. The final revision will include EPA comments on the draft version.
- The selection of the design-build contractor is shown on the schedule as June 6, 2000, with the EPA comments on the pre-final design submittal being complete on November 17, 2000. This is the date when long lead procurement orders will be placed.

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# 11.0 ACRONYMS

| | |
|---|---|
| µg/l | Micrograms per liter |
| Aerojet | Aerojet-General Corporation |
| ALs | Action Levels |
| ARARs | Applicable or Relevant and Appropriate Requirements |
| AQMD | Air Quality Management District |
| BPOU | Baldwin Park Operable Unit |
| BPOUSC | Baldwin Park Operable Unit Steering Committee |
| BPOUSP | Baldwin Park Operable Unit Settling Parties |
| $C_2F_3O_2H$ | Fluoroacetic acid |
| $C_5H_7O_2N$ | Empirical formula for cell mass |
| CALTRANS | State of California – Department of Transportation |
| CCR | California Code Requirements |
| CDM | Camp Dresser McKee |
| CDR | Conceptual Design Report |
| $C_e$ | Ethanol concentration |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| cfm | Cubic feet per minute |
| $CH_3CH_2OH$ | Ethanol |
| $CHCl_3$ | Chloroform |
| $Cl^-$ | Chloride ion |
| $ClO_2^-$ | Chlorite |
| $ClO_3^-$ | Chlorate |

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| | |
|---|---|
| $ClO_4^-$ | Perchlorate |
| $CO_2$ | Carbon dioxide |
| COCs | Chemicals of Concern |
| CTC | Carbon tetrachloride |
| CWA | Clean Water Act |
| DBP-FP | Disinfection byproducts formation potential |
| DHS | State of California Department of Health Services |
| DO | Dissolved oxygen |
| DPW | Department of Public Works |
| EBCT | Empty bed contact time |
| EPA | United States Environmental Protection Agency Region IX |
| ESD | Explanation of Significant Differences |
| FB | Fluidized bed |
| fps | feet per second |
| FRP | Fiberglass-reinforced plastic |
| FS | Feasibility Study |
| ft | feet |
| $ft^2$ | Square feet |
| GAC | Granular activated carbon |
| GAC/FBR | Granular activated carbon/fluidized bed reactor |
| GET | Groundwater extraction and treatment |
| gpd | Gallons per day |
| gpm | Gallons per minute |
| $gpm/ft^2$ | Gallons per minute per square foot |
| GTS | Groundwater treatment system |
| $H^+$ | Hydrogen ion |



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| | |
|---|---|
| $H_2O$ | Water |
| HDPE | High-density polyethylene |
| HLA | Harding Lawson Associates |
| Hp | Horsepower |
| HSP | Health and safety plan |
| Hz | Hertz |
| in | inch |
| kW | Kilowatt |
| LACFCD | Los Angeles County Flood Control District |
| LADWP | Los Angeles Department of Water and Power |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| lbs | Pounds |
| LPGAC | Liquid phase granular activated carbon |
| MCLs | Maximum Contaminant Levels |
| mg/kg-day | Milligram per kilogram per day |
| mg/l | Milligrams per liter |
| MSDSs | Material safety data sheets |
| mV | Millivolts |
| $N_2$ | Nitrogen gas |
| $N_2O$ | Nitrous oxide |
| NAAQS | National Ambient Air Quality Standards |
| NCEA | National Center for Environmental Assessment |
| NCP | National Contingency Plan |
| NDMA | N-nitrosodimethylamine |
| NO | Nitric oxide |
| $NO_2^-$ | Nitrite |



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| | |
|---|---|
| $NO_3^-$ | Nitrate |
| NPDES | National Pollution Discharge Elimination System |
| NPL | National Priorities list |
| NSF | National Sanitation Foundation |
| O&M | Operation and Maintenance |
| $O_2$ | Oxygen |
| $OCl^-$ | Hypochlorite |
| ORP | Oxidation-reduction potential |
| OSWER | Office of Solid Waste and Emergency Response |
| PCE | Perchloroethene (tetrachloroethene) |
| PLC | Programmed Logic Control |
| POTW | Publicly owned treatment works |
| PSEP | Performance Standards Evaluation Plan |
| PSG | Perchlorate Study Group |
| psi | Pounds per square inch |
| PVC | Polyvinyl Chloride |
| RCRA | Resource Conservation and Recovery Act |
| RD/RA | Remedial design/remedial action |
| RfD | Reference dose |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RWQCB | Regional Water Quality Control Board |
| SAP | Sampling and Analysis Plan |
| SCAQMD | South Coast Air Quality Management District |
| $scfm/ft^2$ | Standard cubic feet per minute per square foot |
| SCRRA | Southern California Regional Rail Authority |

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| | |
|---|---|
| SFSG | Santa Fe Spreading Grounds |
| SGBWQA | San Gabriel Basin Water Quality Authority |
| SOW | Scope of Work |
| Subarea 1 | Northern portion of the plume |
| Subarea 3 | Southern portion of the plume |
| SWRCB | State Water Resources Control Board |
| TCE | Trichloroethene |
| TDH | Total dynamic head |
| TEFC | Totally enclosed fan cooled |
| the Basin | San Gabriel Basin |
| TOC | Total organic carbon |
| UL | Underwriters Laboratory |
| USACE | U.S. Army Corps of Engineers |
| UV | Ultraviolet |
| VFD | Variable frequency drive |
| VOCs | Volatile organic compounds |
| VPGAC | Vapor phase granular activated carbon |
| VSS | Volatile suspended solids |
| Watermaster | Main San Gabriel Basin Watermaster |
| WBS | Work Breakdown Structure |
| Y | Cell yield |

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# TABLES

## Table 2-1: Baseline Potentiometric Monitoring Program

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **BPOUSP Extraction Wells** | | | |
| SA1-1 | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-2 | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-3 | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-1 (2 wells) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-2 (2 wells) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-3 (2 wells) | NA | Six consecutive months prior to startup | BPOUSP |
| **BPOUSP Piezometers** | | | |
| SA1-1PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-1PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-2PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-2PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-3PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-3PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-1PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-1PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-2PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-2PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-3PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-3PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| **Multiport Monitoring Wells** | | | |
| EPA MW5-1 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-03 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-05 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-08 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-11 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-13 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-15 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-17 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-18 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-19 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-20 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-22 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-23 | NA | Two consecutive quarters prior to startup | BPOUSP |
| **Other Monitoring Wells** | | | |
| AJMW-1 | W11AJMW1 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-2 | W11AJMW2 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-3 | W11AJMW3 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-4 | W11AJMW4 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-5 | W11AJMW5 | Two consecutive quarters prior to startup | BPOUSP |
| ALRC MW-1 | W11AZW01 | Two consecutive quarters prior to startup | BPOUSP |
| ALRC MW-8 | W11AZW08 | Two consecutive quarters prior to startup | BPOUSP |
| OSCO MW-2 | W11OSMW2 | Two consecutive quarters prior to startup | BPOUSP |
| LA County Santa Fe | 8000070 | Two consecutive quarters prior to startup | Watermaster |
| Baldwin Park Key Well | Z1000006 | Two consecutive quarters prior to startup | Watermaster |

## Table 2-1 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells - Owner** | | | |
| Valley County Water District | 01900028 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900029 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900031 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900032 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900034 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900035 | Semi-annual until startup | Watermaster |
| California American Water Company Duarte | 01900354 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01900358 | Semi-annual until startup | Watermaster |
| Valley View Mutual Water Company | 01900365 | Semi-annual until startup | Watermaster |
| California American Water Company Duarte | 01900497 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01900829 | Semi-annual until startup | Watermaster |
| Glendora, City of | 01900831 | Semi-annual until startup | Watermaster |
| Covina Irrigating Company | 01900881 | Semi-annual until startup | Watermaster |
| Covina Irrigating Company | 01900885 | Semi-annual until startup | Watermaster |
| Champion Mutual Water Company | 01900908 | Semi-annual until startup | Watermaster |
| California Domestic Water Company | 01901181 | Semi-annual until startup | Watermaster |
| La Puente Valley County Water District | 01901460 | Semi-annual until startup | Watermaster |
| Glendora, City of | 01901524 | Semi-annual until startup | Watermaster |
| Suburban Water Systems | 01901598 | Semi-annual until startup | Watermaster |
| Sterling Mutual Water Company | 01902096 | Semi-annual until startup | Watermaster |
| Azusa Valley Water Company | 01902113 | Semi-annual until startup | Watermaster |
| Azusa Valley Water Company | 01902114 | Semi-annual until startup | Watermaster |
| Azusa Valley Water Company | 01902115 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01902457 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 01902518 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01902533 | Semi-annual until startup | Watermaster |
| Azusa, City of | 01902536 | Semi-annual until startup | Watermaster |
| Azusa, City of | 01902537 | Semi-annual until startup | Watermaster |
| Azusa, City of | 01902538 | Semi-annual until startup | Watermaster |
| City of Industry | 01902581 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 01902947 | Semi-annual until startup | Watermaster |
| California American Water Company Duarte | 01903018 | Semi-annual until startup | Watermaster |
| Suburban Water Systems | 01903067 | Semi-annual until startup | Watermaster |
| Conrock Company (also called Portland Cement) | 01903088 | Semi-annual until startup | Watermaster |

## Table 2-1 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Valley County Water District | 08000039 | Semi-annual until startup | Watermaster |
| Conrock Company (also CALMAT) | 08000063 | Semi-annual until startup | Watermaster |
| Los Angeles, County of | 08000070 | Semi-annual until startup | Watermaster |
| California Domestic Water Company | 08000100 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 08000112 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 71903093 | Semi-annual until startup | Watermaster |

* The well owner was not included in the information supplied by the Watermaster.

## Table 2-2: Baseline Water Quality Monitoring Program

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **BPOUSP Extraction Wells** | | | |
| SA1-1 | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA1-2 | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA1-3 | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA3-1 (2 wells) | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA3-2 (2 wells) | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA3-3 (2 wells) | NA | Two consecutive quarters prior to startup | BPOUSP |
| **Multiport Monitoring Wells** | | | |
| EPA MW5-1 | NA | Semi-annual until startup | BPOUSP |
| MW5-03 | NA | Semi-annual until startup | BPOUSP |
| MW5-05 | NA | Semi-annual until startup | BPOUSP |
| MW5-08 | NA | Semi-annual until startup | BPOUSP |
| MW5-11 | NA | Semi-annual until startup | BPOUSP |
| MW5-13 | NA | Semi-annual until startup | BPOUSP |
| MW5-15 | NA | Semi-annual until startup | BPOUSP |
| MW5-17 | NA | Semi-annual until startup | BPOUSP |
| MW5-18 | NA | Semi-annual until startup | BPOUSP |
| MW5-19 | NA | Semi-annual until startup | BPOUSP |
| MW5-20 | NA | Semi-annual until startup | BPOUSP |
| MW5-22 | NA | Semi-annual until startup | BPOUSP |
| MW5-23 | NA | Semi-annual until startup | BPOUSP |
| **Other Monitoring Wells** | | | |
| AJMW-1 | W11AJMW1 | Semi-annual until startup | BPOUSP |
| AJMW-2 | W11AJMW2 | Semi-annual until startup | BPOUSP |
| AJMW-3 | W11AJMW3 | Semi-annual until startup | BPOUSP |
| ALRC MW-1 | W11AZW01 | Semi-annual until startup | BPOUSP |
| ALRC MW-8 | W11AZW08 | Semi-annual until startup | BPOUSP |
| OSCO MW-2 | W11OSMW2 | Semi-annual until startup | BPOUSP |
| LA County Santa Fe | 8000070 | Annual until startup | Watermaster |
| Baldwin Park Key Well | Z1000006 | Annual until startup | Watermaster |
| **Production Wells – Owner** | | | |
| Valley County Water District | 01900027 | Annual until startup | Watermaster |
| Valley County Water District | 01900028 | Annual until startup | Watermaster |
| Valley County Water District | 01900032 | Annual until startup | Watermaster |
| Burbank Development Company | 01900093 | Annual until startup | Watermaster |
| United Rock Products Corporation | 01900106 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 01900354 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 01900358 | Annual until startup | Watermaster |
| Valley View Mutual Water Company | 01900363 | Annual until startup | Watermaster |

## Table 2-2 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Valley View Mutual Water Company | 01900364 | Annual until startup | Watermaster |
| Glendora, City of | 01900827 | Annual until startup | Watermaster |
| Glendora, City of | 01900829 | Annual until startup | Watermaster |
| Glendora, City of | 01900830 | Annual until startup | Watermaster |
| Covina Irrigating Company | 01900881 | Annual until startup | |
| Covina Irrigating Company | 01900882 | Annual until startup | |
| Covina Irrigating Company | 01900883 | Annual until startup | Watermaster |
| Covina Irrigating Company | 01900885 | Annual until startup | Watermaster |
| California Domestic Water Company | 01901181 | Annual until startup | Watermaster |
| La Puente Valley County Water District | 01901460 | Annual until startup | Watermaster |
| Livingston-Graham | 01901492 | Annual until startup | Watermaster |
| Livingston-Graham | 01901493 | Annual until startup | Watermaster |
| Suburban Water Systems | 01901598 | Annual until startup | Watermaster |
| Suburban Water Systems | 01901599 | Annual until startup | Watermaster |
| Sterling Mutual Water Company | 01902096 | Annual until startup | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 01902115 | Annual until startup | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 01902116 | Annual until startup | Watermaster |
| Polopolus et. Al. | 01902169 | Annual until startup | Watermaster |
| Owl Rock Products Company | 01902241 | Annual until startup | Watermaster |
| Azusa Agricultural Water Company (Azusa Light and Water) | 01902457 | Annual until startup | Watermaster |
| Azusa Agricultural Water Company (Azusa Light and Water) | 01902458 | Annual until startup | Watermaster |
| United Rock Products Corporation | 01902532 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 01902533 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 01902535 | Annual until startup | Watermaster |
| Champion Mutual Water Company | 01902816 | Annual until startup | Watermaster |
| La Puente Valley County Water District | 01902859 | Annual until startup | Watermaster |
| Conrock Company (Calmat Company) | 01902920 | Annual until startup | Watermaster |
| Woodland, Richard | 01902949 | Annual until startup | Watermaster |
| Woodland, Richard | 01902950 | Annual until startup | Watermaster |

## Table 2-2 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Woodland Farms (6W Farms. Inc.) | 01902951 | Annual until startup | Watermaster |
| Dawes, Mary K. | 01902952 | Annual until startup | Watermaster |
| California Domestic Water Company | 01902967 | Annual until startup | Watermaster |
| Speedway 605 Inc. | 01902968 | Annual until startup | Watermaster |
| Sonoco Products Company | 01902971 | Annual until startup | Watermaster |
| Livingston-Graham | 01903006 | Annual until startup | Watermaster |
| California Domestic Water Company/Duarte | 01903018 | Annual until startup | Watermaster |
| United Rock Products Corporation | 01903062 | Annual until startup | Watermaster |
| Suburban Water Systems | 01903067 | Annual until startup | Watermaster |
| California Domestic Water Company | 01903081 | Annual until startup | Watermaster |
| Conrock Company (Calmat Company) | 01903088 | Annual until startup | Watermaster |
| Owl Rock Products Company | 01903119 | Annual until startup | Watermaster |
| Davidson Optronics Inc. | 08000013 | Annual until startup | Watermaster |
| Miller Brewing Company | 08000034 | Annual until startup | Watermaster |
| Southern California Edison Company | 08000046 | Annual until startup | Watermaster |
| Southern California Edison Company | 08000047 | Annual until startup | Watermaster |
| La Puente Valley County Water District | 08000062 | Annual until startup | Watermaster |
| Conrock Company (Calmat Company) | 08000063 | Annual until startup | Watermaster |
| Los Angeles, City of | 08000070 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 08000072 | Annual until startup | Watermaster |
| Miller Brewing Company | 08000075 | Annual until startup | Watermaster |
| Miller Brewing Company | 08000076 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 08000086 | Annual until startup | Watermaster |
| Suburban Water Systems | 08000095 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000097 | Annual until startup | Watermaster |
| California Domestic Water Company | 08000100 | Annual until startup | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 08000103 | Annual until startup | Watermaster |
| San Gabriel Valley Water Company | 08000112 | Annual until startup | Watermaster |
| Champion Mutual Water Company | 08000121 | Annual until startup | Watermaster |

## Table 2-2 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Sterling Mutual Water Company | 08000132 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 08000139 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 08000140 | Annual until startup | Watermaster |
| AZ-Two Inc. (Southdown) | 11900038 | Annual until startup | Watermaster |
| Sonoco Products Company | A1902786 | Annual until startup | Watermaster |
| Valley County Water District | 01902356 | Annual until startup | Watermaster |
| California Domestic Water Company | 01903057 | Annual until startup | Watermaster |
| Woodland Farms (6W Farms, Inc.) | 01903072 | Annual until startup | Watermaster |
| Suburban Water Systems | 08000069 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000078 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000096 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000097 | Annual until startup | Watermaster |

## Table 3-1: Subarea 1 Preliminary Well Design and Extraction Rates,

| Well Name | Well Diameter (inches) | Well Material | Well Depth (ft bgs) | Proposed Well Screened Intervals (ft msl) | Extraction Rate (gpm) |
|---|---|---|---|---|---|
| **Subarea 1** | | | | | |
| SA1-3 | 16 | Mild Steel | 675 | -200 - 200 | 1,000 |
| SA1-1 | 16 | Mild Steel | 675 | -200 - 200 | 3,000 |
| SA1-2 | 16 | Mild Steel | 675 | -200 - 200 | 2,000 |
| | | | | Total = | 6,000 |

ft Feet
bgs Below Ground Surface
gpm Gallons per minute
msl Mean Sea Level

**Table 3-2: Groundwater Quality Data from Wells Near Subarea 1 Used to Estimate Subarea 1 Treatment Plant Influent Concentrations**

| | Subarea 1 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extraction Well | SA1-3 | | | | | | | | | | | | | SA1-1 and SA1-2 | | | | | | | |
| Surrogate Well | Lante (08000060) | 8000070 | 8000076 | MW5-11 | | | MW5-17 | | MW5-3 | | | | | MW5-11 | | | MW5-17 | | MW5-13 | | |
| Well Port | NA | NA | NA | 1 | 2 | 3 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 2 | 3 | 1 | 2 | 3 |
| Well Screen Elevation) (ft msl) | 176.5 to -125.5 | 230 to 85 | 35 to -425 | -196.4 to -206.4 | -36.4 to -46.4 | 183.6 to 193.6 | -30.6 to -205.6 | 204.4 to 214.4 | -195.6 to -40.6 | -115.6 to -125.6 | -35.6 to -45.6 | 74.4 to 84.4 | 174.4 to 184.4 | -196.4 to -206.4 | -36.4 to -46.4 | 183.6 to 193.6 | -30.6 to -40.6 | 204.4 to 214.4 | -153.2 to -163.2 | 10.8 to 0.8 | 190.8 to 200.8 |
| **Contaminants of Concern:** | | | | | | | | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-TCA | 0.5 U | 1 U | 1 U | 1 U | 5 U | 5.6 | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 2.5 U | 1 U | 5 U | 5.6 | 1 U | 1 U | 1 U | 1 U | 5 U |
| 1,1-DCA | 0.5 U | 1 U | 5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 2.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 5 U |
| 1,1-DCE | 8.6 | 1 U | 0.5 U | 1 U | 5 U | 13 | 1 U | 1 U | 5.8 | 5 U | 43 | 170 | 7.4 | 1 U | 5 U | 13 | 1 U | 1 U | 1 U | 1 U | 5 U |
| 1,2-DCA | 10.1 | 0.5 U | 0.5 U | 0.2 P | 5 U | 5 U | 0.2 P | 0.2 P | 0.2 P | 5 U | 5 U | 5 U | 2.5 U | 0.2 P | 5 U | 5 U | 0.2 P | 0.2 P | 0.2 P | 0.2 P | 5 U |
| 1,4-Dichlorobenzene | 12 U | 1 U | 0.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 2.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 5 U |
| Benzene | 6.2 U | 0.5 U | 0.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 2.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 5 U |
| cis-1,2-DCE | 33.2 | 1 U | 0.5 U | 1 | 17 | 14 | 0.5 U | 0.5 U | 1.5 | 11 | 10 | 6.5 | 7 | 1 | 17 | 14 | 0.5 U | 0.5 U | 0.5 U | 1.7 | 13 |
| CTC | 14.4 | 0.5 U | 0.5 U | 0.2 P | 5 U | 6.2 | 0.2 P | 0.2 P | 0.2 P | 5 U | 5 U | 5 U | 2.5 U | 0.2 P | 5 U | 6.2 | 0.2 P | 0.2 P | 0.2 P | 0.67 | 15 |
| Carbon Disulfide | 62 U | 5 U | | 0.18 J | 12 U | 5 U | 5 U | 5 U | 10 U | 5 U | 5 U | 5 U | 5 U | 0.18 J | 12 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U |
| Chloroform | 45.6 | 1 U | 0.5 U | 1 U | 5 U | 6.3 | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 4.6 | 1 U | 5 U | 6.3 | 1 U | 1 U | 1 U | 1 U | 5.6 |
| Ethylbenzene | 12 U | 1 U | 5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 2.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 5 U |
| MC | 25 U | 2 U | 0.5 U | 5 U | 25 U | 25 U | 5 U | 5 U | 5 U | 25 U | 25 U | 25 U | 12 U | 5 U | 25 U | 25 U | 5 U | 5 U | 5 U | 5 U | 25 U |
| PCE | 943 | 1 U | 0.5 U | 27 | 370 | 140 | 1 U | 1.8 | 42 | 280 | 230 | 30 | 37 | 27 | 370 | 140 | 1 U | 1.8 | 1.5 | 110 | 330 |
| trans-1,2-DCE | 12 U | 1 U | 0.5 U | 0.5 U | 2.5 U | 2.5 U | 0.5 U | 0.5 U | 0.5 U | 2.5 U | 2.5 U | 2.5 U | 1.2 U | 0.5 U | 2.5 U | 2.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 2.5 U |
| TCE | 1315 | 3.3 | 0.5 U | 82 | 370 | 280 | 1 U | 1 U | 82 | 320 | 180 | 76 | 150 | 82 | 370 | 280 | 1 U | 1 U | 1 U | 61 | 410 |
| Toluene | 12 U | 1 U | 1 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 5 U | 5 U | 5 U | 2.5 U | 1 U | 5 U | 5 U | 1 U | 1 U | 1 U | 1 U | 5 U |
| Xylene | 12 U | 1 U | 10 U | 1 U | 2.5 U | 1 U | 1 U | 1 U | 2 U | 1 U | 1 U | 1 U | 1 U | 1 U | 2.5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| **Total VOC's** | **2524.10** | **22.00** | **27.50** | **125.08** | **849.00** | **528.60** | **22.40** | **23.20** | **156.20** | **694.50** | **541.50** | **361.00** | **245.20** | **125.08** | **849.00** | **528.60** | **22.40** | **23.20** | **22.90** | **193.07** | **847.10** |
| **Other Compounds** | | | | | | | | | | | | | | | | | | | | | |
| 1,4-Dioxane | 3.80 * | | | 2.00 U | 2.00 U | 6.33 | 2.00 U | 2.00 U | 2.00 U | 2.00 U | 1.60 | 4.70 | 22.00 | 2.00 U | 2.00 U | 6.33 | 2.00 U | 2.00 U | 2.00 U | 2.00 U | 3.35 |
| Nitrate (as N) | 4.80 U | 1.40 | | 3.10 | 4.50 | 6.80 | 3.50 | 3.50 | [illegible] | 5.10 | 1.90 | 3.90 | 3.20 | 3.10 | 4.50 | 6.80 | 3.50 | 3.50 | 0.23 | 4.60 | 6.40 |
| NDMA | 3.00 | 1.00 U | 1.00 U | 0.033 U | 0.033 U | 0.079 | 0.033 U | [illegible] | 0.033 U | 0.066 | 0.240 | 0.090 | 0.030 | 0.033 U | 0.033 U | 0.079 | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.590 |
| Perchlorate | 93.60 | 4.00 U | 4.00 U | 4.00 U | 316.00 | 319.00 | 4.00 U | [illegible] | [illegible] | 5.30 | 4.00 | 11.00 | 100.00 | 4.00 U | 316.00 | 319.00 | 4.00 U | 4.00 U | 4.00 U | 146.00 | |

All units in µg/l except nitrate (as N), which is in mg/l

J Estimated value
NA Not applicable
P J and U qualifiers apply
U Not detected at that concentration

* Based on average detected concentration of samples collected from Well MW5-03 during the August 1998 sampling event.

## Table 3-3: Flow Weighted Influent Concentrations to Subarea 1 Treatment Plant

| Pumping Rate (gpm)-> | SA1-3 1000 | SA1-1 3000 | SA1-2 2000 | Total 6000 |
|---|---|---|---|---|
| **Contaminants of Concern:** | | | | |
| **Volatile Organic Compounds** | | | | |
| 1,1,1-TCA | 2.01 | 3.01 | 3.01 | 2.84 |
| 1,1-DCA | 2.44 | 2.96 | 2.96 | 2.87 |
| 1,1-DCE | 3.89 | 19.94 | 19.94 | 17.26 |
| 1,2-DCA | 2.71 | 2.59 | 2.59 | 2.61 |
| 1,4-Dichlorobenzene | 3.31 | 2.96 | 2.96 | 3.02 |
| Benzene | 2.53 | 2.96 | 2.96 | 2.89 |
| cis-1,2-DCE | 8.46 | 6.48 | 6.48 | 6.81 |
| CTC | 3.40 | 3.49 | 3.49 | 3.48 |
| Carbon Disulfide | 13.45 | 5.55 | 5.55 | 6.87 |
| Chloroform | 7.68 | 3.27 | 3.27 | 4.00 |
| Ethylbenzene | 3.88 | 2.96 | 2.96 | 3.11 |
| MC | 11.56 | 14.77 | 14.77 | 14.23 |
| PCE | 185.54 | 123.10 | 123.10 | 133.51 |
| trans-1,2-DCE | 2.50 | 1.48 | 1.48 | 1.65 |
| TCE | 256.60 | 154.92 | 154.92 | 171.87 |
| Toluene | 3.38 | 2.96 | 2.96 | 3.03 |
| Xylene | 3.69 | 1.19 | 1.19 | 1.61 |
| Total VOCs | 517.02 | 354.60 | 354.60 | 381.67 |
| **Other Compounds** | | | | |
| 1,4-Dioxane | 3.02 | 4.15 | 4.15 | 3.96 |
| Nitrate (as N) | 3.94 | 3.60 | 3.60 | 3.66 |
| NDMA | 0.65 | 0.10 | 0.10 | 0.19 |
| Perchlorate | 93.58 | 76.78 | 76.78 | 79.58 |

All values are in µg/l except nitrate (as N), which is in mg/l.

**Table 3-4: Subarea 3 Preliminary Well Design and Extraction Rates,**

| Well Name | Well Diameter (inches) | Well Material | Well Depth (ft bgs) | Proposed Well Screened Intervals (ft msl) | Extraction Rate (gpm) |
|---|---|---|---|---|---|
| SA3-1S | 16 | Mild Steel | 700 | 0 - -300 | 2,500 |
| SA3-1D | | | 1,000 | -300 - -600 | 2,500 |
| SA3-2S | 16 | Mild Steel | 700 | 0 - -300 | 2,000 |
| SA3-2D | | | 1,000 | -300 - -600 | 2,000 |
| SA3-3S | 16 | Mild Steel | 700 | 0 - -300 | 3,000 |
| SA3-3D | | | 1,000 | -300 - -600 | 3,000 |
| | | | | Total = | 15,000 |

ft Feet
bgs Below Ground Surface
gpm Gallons per minute
msl Mean Sea Level

**Table 3-5: Groundwater Quality Data from Wells Near Subarea 3 Used to Estimate Subarea 3 Treatment Plant Influent Concentrations**

| | Subarea 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extraction Well | SA3-1 | | | | | | | | | SA3-2 | | | | | SA3-3 | | | | | | | | | | | |
| Surrogate Well | MW5-5 | | | MW5-8 | | | | MW5-15 | | 1900035 | 1902859 | 8000062 | MW5-15 | | MW5-20 | | | | | | MW5-23 | | | | | |
| Well Port | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 1 | 2 | NA | NA | NA | 1 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 |
| Well Screen Elevation (ft msl) | -209.5 to -219.5 | -121.5 to -131.5 | -37.5 to -47.5 | -455.8 to -465.8 | -330.8 to -340.8 | -214.8 to -224.8 | -40.8 to -50.8 | -310 to -320 | -90 to -100 | 115 to -217 | -284 to -436 | -216 to -388 | -310 to -320 | -90 to -100 | -621.4 to -631.4 | -531.4 to -541.4 | -441.4 to -451.4 | -353.4 to -363.4 | -275.4 to -285.4 | -81.4 to -91.4 | -672.6 to -682.6 | -580.6 to -590.6 | -392.6 to -402.6 | -258.6 to -268.6 | -118.6 to -128.6 |
| Utilized in Shallow (sh) or Deep (d): | sh | sh | sh | d | sh, d | sh | sh | sh, d | sh | sh | sh, d | sh, d | sh, d | sh | d | d | d | sh, d | sh | sh | d | d | d | sh | sh |
| **Contaminants of Concern:** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-TCA | 1 U | 4.8 | 2 U | 1 | 1 | 1 | 4 | 1 U | 12 | 0.5 U | 0.5 U | | 1 U | 12 | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| 1,1-DCA | 1 U | 2.5 U | 2 U | 1 | 1 | 1 | 1 | 1 U | 5 U | 0.5 U | 0.5 U | | 1 U | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 0.48 J |
| 1,1-DCE | 1 U | 17 | 8.9 | 1 | 1 | 1 | 7.5 | 1 U | 31 | 0.5 U | 0.5 U | 0.5 U | 1 U | 31 | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 0.28 J | 1.7 |
| 1,2-DCA | 0.2 P | 2.5 U | 2 U | 1 | 1 | 1 | 1 | 3.7 | 5 U | 2.2 | 4.3 | 4.5 | 3.7 | 5 U | 0.5 U | 0.5 U | 0.5 U | 1.4 | 0.2 P | 3.1 | 0.2 P | 0.2 P | 0.2 P | 1.5 | 2.1 |
| 1,4-Dichlorobenzene | 1 U | 2.5 U | 2 U | 1 | 1 | 1 | 1 | 1 U | 5 U | 0.5 U | 0.5 U | | 1 U | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| Benzene | 1 U | 2.5 U | 2 U | 1 | 1 | 1 | 1 | 1 U | 5 U | 0.5 U | 0.5 U | | 1 U | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| cis-1,2-DCE | 0.5 U | 13 | 12 | 0.5 | 0.5 | 0.5 | 5.3 | 0.69 | 26 | 0.59 | 0.8 | 3.5 | 0.69 | 26 | 0.5 U | 0.5 U | 0.5 U | 1.2 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.54 J | 2.8 |
| CTC | 8.7 | 2.5 U | 2 U | 1.4 | 1 | 4.8 | 1 | 1.8 | 5 U | 0.77 | 2.6 | 2.6 | 1.8 | 5 U | 6.4 | 0.5 U | 14 | 6.8 | 0.2 P | 1.3 | 2.4 | 1.2 | 8.5 | 5.8 | 2.1 |
| Carbon Disulfide | 0.13 J | 0.2 J | 0.25 J | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U |
| Chloroform | 1 U | 2.5 U | 2 | 1 | 1 | 1 | 1 | 1.7 | 5.3 | 1.4 | 2.2 | | 1.7 | 5.3 | 1 U | 1 U | 1 U | 1 | 1 U | 1.9 | 1 U | 1 U | 0.9 J | 1.2 | 2.1 |
| Ethylbenzene | 1 U | 2.5 U | 2 U | 1 | 1 | 1 | 1 | 1 U | 5 U | 0.5 U | 0.5 U | | 1 U | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| MC | 5 U | 12 U | 10 U | 5 | 5 | 5 | 5 | 5 U | 25 U | 0.5 U | 0.5 U | | 5 U | 25 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U |
| PCE | 1 U | 80 | 52 | 1 | 1 | 1 | 43 | 1 U | 230 | 1.6 | 2.6 | 3.6 | 1 U | 230 | 1 U | 1 U | 1 U | 2 | 1 U | 2.5 | 1 U | 1 U | 1 U | 1.4 | 8.2 |
| trans-1,2-DCE | 0.5 U | 1.2 U | 1 U | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 U | 2.5 U | 0.5 U | 0.5 U | | 0.5 U | 2.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U |
| TCE | 1 U | 120 | 95 | 1 U | 1 U | 1 U | 53 | 51 | 270 | 17 | 68.4 | 41 | 51 | 270 | 1 U | 1 U | 2.7 | 19 | 1 U | 22 | 1 U | 1 U | 0.47 J | 18 | 33 |
| Toluene | 1 U | 2.5 U | 2 U | 1 | 1 | 1 | 1 | 1 U | 5 U | 0.5 U | 0.5 U | | 1 U | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| Xylene | 1 U | 2.5 U | 2.2 | 1 | 1 | 1 | 1 | 1 U | 5 U | 1 U | 0.5 U | | 1 U | 5 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| Total VOCs | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Other Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,4-Dioxane | 2 U | 2.4 | 2.43 | 2 U | 2 U | 2 U | 2 U | 11.4 | 9.6 | 1.01 | 1.9 | | 11.4 | 9.61 | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2.11 |
| Nitrate (as N) | 2 | 3.9 | 3.6 | 1.3 | 1.4 | 1.2 | 3.3 | 4.3 | 4 | 4.7 | 5.8 | | 4.3 | 4 | U | 0.43 | 3.3 | 0.1 U | 0.26 | 15.9 | 1.4 | 0.52 | 0.12 | 5.1 | 13.6 |
| NDMA | 0.033 U | 0 U | 0.03 U | 0.03 U | 0.03 U | 0 U | 0.03 U | 0.03 J | 0 | 0.076 | 0.92 | | 0.03 J | 0.05 | 0.03 U | 0.03 U | 0.03 U | 0.17 | 0.03 U | 1.1 | 0.03 U | 0.03 U | 0.033 U | 0.25 | 0.63 |
| Perchlorate | 4 U | 6.8 | 6.9 | 4 U | 4 U | 4 U | 4 U | 92.7 | 115 | 29.7 | 110 | 159 | 92.7 | 115 | 4 | 4 U | 6.08 | 28.8 | 4 U | 41.1 | 4 U | 4 U | 4 U | 23.3 | 46.7 |

All units in µg/l except nitrate (as N), which is mg/l

J Estimated value
NA Not applicable
P J and U qualifiers apply
U Not detected at that concentration

## Table 3-6: Flow Weighted Influent Concentrations to Subarea 3 Treatment Plant

| | Case 1: Baseline | | | |
|---|---|---|---|---|
| | SA3-1 | SA3-2 | SA3-3 | Total |
| Pumping Rate (gpm)-> | 2500 | 2000 | 3000 | 7500 |
| **Contaminants of Concern:** | | | | |
| **Shallow Zone:** | | | | |
| **Volatile Organic Compounds** | | | | |
| 1,1,1-TCA | 3.35 | 3.50 | 1.00 | 2.45 |
| 1,1-DCA | 1.81 | 1.75 | 0.90 | 1.43 |
| 1,1-DCE | 8.55 | 6.70 | 1.00 | 5.04 |
| 1,2-DCA | 2.05 | 3.94 | 1.66 | 2.40 |
| 1,4-Dichlorobenzene | 1.81 | 1.75 | 1.00 | 1.47 |
| Benzene | 1.81 | 1.75 | 1.00 | 1.47 |
| cis-1,2-DCE | 7.31 | 6.32 | 1.11 | 4.56 |
| CTC | 3.35 | 2.55 | 3.24 | 3.09 |
| Carbon Disulfide | 3.20 | 5.00 | 5.00 | 4.40 |
| Chloroform | 1.94 | 2.65 | 1.44 | 1.93 |
| Ethylbenzene | 1.81 | 1.75 | 1.00 | 1.47 |
| MC | 9.00 | 7.75 | 5.00 | 7.07 |
| PCE | 51.13 | 47.76 | 3.02 | 30.99 |
| trans-1,2-DCE | 0.90 | 1.00 | 0.50 | 0.77 |
| TCE | 74.00 | 89.48 | 18.60 | 55.97 |
| Toluene | 1.81 | 1.75 | 1.00 | 1.47 |
| Xylene | 1.84 | 1.88 | 1.00 | 1.51 |
| **Total VOCs** | **175.68** | **187.28** | **47.46** | **127.48** |
| **Other Compounds** | | | | |
| 1,4-Dioxane | 4.23 | 5.98 | 2.02 | 3.81 |
| Nitrate (as N) | 2.96 | 4.70 | 6.99 | 5.04 |
| NDMA | 0.03 | 0.27 | 0.44 | 0.26 |
| Perchlorate | 29.67 | 101.28 | 28.78 | 48.41 |
| **Deep Zone:** | | | | |
| 1,1,1-TCA | 1.00 | 0.75 | 1.00 | 0.93 |
| 1,1-DCA | 1.00 | 0.75 | 1.00 | 0.93 |
| 1,1-DCE | 1.00 | 0.67 | 1.00 | 0.91 |
| 1,2-DCA | 1.90 | 4.17 | 0.50 | 1.94 |
| 1,4-Dichlorobenzene | 1.00 | 0.75 | 1.00 | 0.93 |
| Benzene | 1.00 | 0.75 | 1.00 | 0.93 |
| cis-1,2-DCE | 0.56 | 1.66 | 0.60 | 0.87 |
| CTC | 1.40 | 2.33 | 5.69 | 3.36 |
| Carbon Disulfide | 5.00 | 5.00 | 5.00 | 5.00 |
| Chloroform | 1.23 | 1.95 | 0.99 | 1.33 |
| Ethylbenzene | 1.00 | 0.75 | 1.00 | 0.93 |
| MC | 5.00 | 2.75 | 5.00 | 4.40 |
| PCE | 1.00 | 2.40 | 1.14 | 1.43 |
| trans-1,2-DCE | 0.50 | 0.50 | 0.50 | 0.50 |

## Table 3.6 (continued)

| | Case 1: Baseline | | | |
|---|---|---|---|---|
| | SA3-1 | SA3-2 | SA3-3 | Total |
| Pumping Rate (gpm)-> | 2500 | 2000 | 3000 | 7500 |
| **Contaminants of Concern:** | | | | |
| **Deep Zone (continued)** | | | | |
| TCE | 17.67 | 53.47 | 3.74 | 21.64 |
| Toluene | 1.00 | 0.75 | 1.00 | 0.93 |
| Xylene | 1.00 | 0.75 | 1.00 | 0.93 |
| Total VOCs | 42.26 | 80.15 | 31.15 | 47.92 |
| **Other Compounds** | | | | |
| 1,4-Dioxane | 5.13 | 6.65 | 2.00 | 4.28 |
| Nitrate (as N) | 2.33 | 5.05 | 0.98 | 2.52 |
| NDMA | 0.03 | 0.47 | 0.05 | 0.16 |
| Perchlorate | 33.57 | 120.57 | 7.84 | 46.48 |

## Table 3.6 (continued)

| | Case 1: Baseline | | |
|---|---|---|---|
| | Shallow | Deep | Sum (both) |
| Pumping Rate (gpm)-> | 7500 | 7500 | 15000 |
| **Contaminants of Concern:** | | | |
| **Flow-Weighted Concentrations for Shallow and Deep:** | | | |
| **Volatile Organic Compounds** | | | |
| 1,1,1-TCA | 1.23 | 0.47 | 1.69 |
| 1,1-DCA | 0.71 | 0.47 | 1.18 |
| 1,1-DCE | 2.52 | 0.46 | 2.97 |
| 1,2-DCA | 1.20 | 0.97 | 2.17 |
| 1,4-Dichlorobenzene | 0.74 | 0.47 | 1.20 |
| Benzene | 0.74 | 0.47 | 1.20 |
| cis-1,2-DCE | 2.28 | 0.44 | 2.72 |
| CTC | 1.55 | 1.68 | 3.23 |
| Carbon Disulfide | 2.20 | 2.50 | 4.70 |
| Chloroform | 0.96 | 0.66 | 1.63 |
| Ethylbenzene | 0.74 | 0.47 | 1.20 |
| MC | 3.53 | 2.20 | 5.73 |
| PCE | 15.49 | 0.72 | 16.21 |
| trans-1,2-DCE | 0.38 | 0.25 | 0.63 |
| TCE | 27.98 | 10.82 | 38.81 |
| Toluene | 0.74 | 0.47 | 1.20 |
| Xylene | 0.76 | 0.47 | 1.22 |
| **Total VOCs** | **63.74** | **23.96** | **87.70** |
| **Other Compounds** | | | |
| 1,4-Dioxane | 1.91 | 2.14 | 4.05 |
| Nitrate (as N) | 2.52 | 1.26 | 3.78 |
| NDMA | 0.13 | 0.08 | 0.21 |
| Perchlorate | 24.21 | 23.24 | 47.44 |

All values are in µg/l except nitrate (as N), which is in mg/l.

## Table 4.1: Potential ARARs Conceptual Design Report
## Baldwin Park Operable Unit, San Gabriel Basin, California

| Standard, Requirements Criteria, or Limitation | Citation | Description | Comment |
|---|---|---|---|
| **Chemical-specific ARARs and TBCs** | | | |
| *Federal ARARs* | | | |
| Clean Water Act | 33 USC Chapter 26, §§ 1341-1344 | Establishes a program fot restoring and maintaining the integrity of the nation's waters. | |
| Clean Water Act Regulations | 40 CFR Parts 100-149 | Establishes programs and standards for water quality and prevention of pollution in water sources. | |
| Safe Drinking Water Act | 42 USC Chapter 6A, §§ 300h-300h-7 | Establishes standards for chemicals in drinking water sources. | |
| • National Primary Drinking Water Standards (Primary MCLs) | 40 CFR Part 141 | Establishes primary MCLs for public water systems measured at the tap based on protection of health and consideration of technical and economic feasibility. | Those primary MCLs that are more stringent than the California Primary MCLs (California has primacy) are potentially relevant and appropriate. |
| • Maximum Contaminant Level Goals (MCLGs) | 40 CFR Parts 141.50 and 141.51 | Establishes nonenforceable MCLGs for public water-supply systems which are entirely health based. | CERCLA §121(d) provides that MCLGs shall be attained if relevant and appropriate. |
| Clean Air Act | 42 USC Chapter 85, §§ 7401 - 7626 | Establishes air quality standards and emissions limitations to protect and enhance air quality and prevent or control air pollution. | |
| • National Emissions Standards for Hazardous Air Pollutants (NESHAPs) | 40 CFR Part 61 | Establishes emissions standards for designated hazardous air pollutants from specific sources. | Potentially relevant and appropriate based on chemicals identified and the specific remedial actions selected. |
| • New Source Performance Standards (NSPS) | 40 CFR Part 60 | Establishes performance standards for emissions from new or modified sources. | Potentially applicable if treatment alternatives meet the definition of a new stationary source. |
| Occupational Safety and Health Act (OSHA)* | 29 USC §§ 651 – 678 | Establishes a program and standards for maintenance of worker safety and health. | |
| • Occupational Safety and Health Standards for Air Contaminants | 29 CFR § 1910.1000 | Establishes worker exposure limits to air contaminants. | Potentially applicable if remedial measures expose workers to listed contaminants. |
| *State ARARs* | | | |
| California Safe Drinking Water Act | CA H&SC Division 5, Part 1, Chapter 7 | Establishes standards for chemicals in drinking water sources within the State of California.. | |
| • California Drinking Water Quality Standards | 22 CCR, Division 4, Chapter 15 | Establishes primary and secondary MCLs that are more stringent than the federal counterparts. | |

## Table 4.1: (continued)

| Standard, Requirements Criteria, or Limitation | Citation | Description | Comment |
|---|---|---|---|
| **Chemical-specific ARARs and TBCs (continued)** | | | |
| • Drinking Water Action Levels (ALs) | California Department of Health Services, Drinking Water Action Levels (1990) | ALs are nonenforceable advisory levels (some of which are health based) to water suppliers; if ALs are exceeded, correction of the problem is recommended. | ALs may be considered. |
| Porter-Cologne Water Quality Control Act | CA Water Code, Division 7, Chapters 1-10 | Establishes a statewide program for water quality control. | |
| • Antidegradation | CA Resolution No. 68-16, State Water Resources Control Board (10/28/68) | The State Board's policy on maintaining the high quality of California's waters. | The RWQCB establishes aquifer cleanup levels and effluent treatment standards for groundwater based on this policy. |
| | State Water Resources Control Board Resolution 92-49 (4/21/94) | Establishes requirements for investigation and cleanup and abatement of discharges. Among other requirements, dischargers must cleanup and abate the effects of discharges in a manner that promotes the attainment of either background water quality, or the best water quality that is reasonable if background water quality cannot be restored. Requires the application of Title 23, CCR, Division 3, Chapter 15 requirements to cleanups. | Potentially applicable if remedial activities involve discharges into the waters of the state. |
| South Coast Air Quality Management District (SCAQMD) Regulations | | Establishes standards for elimination or control of air pollution in southern California. | |
| • Visible Emissions | Rule 401 | Establishes limits in visible emissions. | |
| • Nuisance Discharges | Rule 402 | Restricts discharges of materials that are odorous or causes injury, nuisance or annoyance to the public | |
| • Particulate Emissions | Rule 403 | Establishes limits in particulate concentrations from man-made fugitive dust sources. | |
| • New Source Review | Rules 1301 through 1313 | Establishes requirements for assessment, control, and permitting of new air emission sources | |
| • Carcinogenic and Noncarcinogenic Risks | Rule 1401 | Establishes requirements for the use of best available control technology for toxics (T-BACT) on new stationary operating equipment, so the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of ten in one million ($1 \times 10^{-5}$) or a hazard index of 1.0. | |
| **Action-specific ARARs** | | | |

## Table 4.1: (continued)

| Standard, Requirements Criteria, or Limitation | Citation | Description | Comment |
|---|---|---|---|
| *Federal ARARs* | | | |
| • Underground Injection Control Regulations | 40 CFR Parts 144 to 147 | Establishes procedural and permitting standards for construction and operation of injection wells in order to protect underground sources of drinking water. | Substantive requirements are potentially applicable if infiltration or recharge wells are used for discharge of treated water. |
| • Monitoring | 40 CFR § 122.41 and §§ 136.1-136.4 | Establishes discharge monitoring parameters, analytical procedures, and quality control requirements. | Potentially applicable if there are point source discharges to onsite waters. |
| Clean Air Act (CAA) | | | |
| • National Emission Standards for Hazardous Air Pollutants (NESHAPs) | 40 CFR Part 61 | Sets NESHAPs for designated hazardous pollutants from specific sources. | Potentially relevant and appropriate based on chemicals identified and the specific removal actions selected. |
| • Standards of Performance for New Stationary Sources (NSPS) | 40 CFR Part 60 | Sets NSPS for emissions from new or modified sources. | Potentially applicable if treatment alternatives meet the definition of a specific new stationary source. |
| Occupational Safety and Health Act (OSHA)* | 29 USC §§ 651-678 | Regulates worker health and safety. | The NCP requires that requirements of the OSHA and of state laws with plans approved pursuant to OSHA must be complied with where applicable. |
| • Hazardous Waste Operations and Emergency Response* | 29 CFR § 1910.120 | Defines health and safety procedures necessary during remedial investigations and cleanup at sites where hazardous waste is treated, stored, or disposed. | Response actions under the NCP are required to comply with 29 CFR § 1910.120 (40 CFR § 300.150). |
| *State ARARs* | | | |
| California Occupational Safety and Health Regulations | 8 CCR Division 1, Chapter 3.2, §§ 330-344.85 | Establishes standards for maintenance of worker safety and health in the State of California. | |
| California Hazardous Waste Control Act | CA H&SC Division 20, Chapter 6.5 | Describes procedures, standards, and enforcement procedures for management of hazardous waste in California. | |
| California Surface Water Treatment Rule | 22 CCR Division 4, Chapter 17, §§ 64650-64666 | Establishes treatment techniques in lieu of MCLs for turbidity and microbial contamination, for a supplier using surface water or ground water under the influence of surface water. | |
| Los Angeles Regional Water Quality Control Board Water Quality Plan | 23 CCR Division 4, Chapter 1, Article 4 | Establishes requirements for surface water quality control in the Los Angeles Region. | |

## Table 4.1: (continued)

| Standard, Requirements Criteria, or Limitation | Citation | Description | Comment |
|---|---|---|---|
| **Action-specific ARARs (continued)** | | | |
| California Environmental Health Standards of the Management of Hazardous Waste | 22 CCR Division 4.5 | Describes procedures, standards, and enforcement procedures for management of hazardous waste in California. | |
| California Toxic Injection Well Control Act of 1985 | CA H&SC Division 20, Chapter 6.5, Article 5.5 | Establishes standards and procedures for permitting injection of material into the groundwater system. | |
| California Safe Drinking Water and Enforcement Act (Proposition 65) | CA H&SC Division 20, Chapter 6.6 | Prohibits discharge to sources of drinking water (including discharges to land) and requires exposure warnings for listed chemicals. | Potentially applicable; listed chemicals identified in the RI in the groundwater at the Group III sites. |
| • Antidegradation | California, Resolution No. 68-16, State Water Resources Control Board (10/28/68) | The State Board's policy on maintaining the high quality of California's waters. | The RWQCB establishes aquifer cleanup levels and effluent treatment standards for groundwater based on this policy. Potentially applicable if remedial activities involve discharges into the waters of the state. |
| | State Water Resources Control Board Resolution 92-49 (4/21/94) | Establishes requirements for investigation and cleanup and abatement of discharges. Among other requirements, dischargers must cleanup and abate the effects of discharges in a manner that promotes the attainment of either background water quality, or the best water quality that is reasonable if background water quality cannot be restored. Requires the application of Title 23, CCR, Division 3, Chapter 15 requirements to cleanups. | Potentially applicable if remedial activities involve discharges into the waters of the state. |
| • Water Quality Objectives | Water Quality Control Plan Report | Establishes numeric and narrative water-quality objectives for surface and groundwater. | Potentially applicable as cleanup standards or if there are discharges to surface or groundwater. |
| Water Well Standards | California Water Resource Control Board, Water Well Standards, Bulletin 74-81 and Basin Water Quality Control Plan | Establishes standards for construction or destruction of water supply wells. | Applicable to extraction, monitoring, etc wells installed as part of the remedial action. |
| General Facility Standards | | | |
| • General | Article 2 | Establishes general operating standards, including security requirements, inspection standards, and personnel training. | Potentially applicable to onsite treatment, storage, or disposal. |
| • Miscellaneous Units | 22 CCR §§ 66264.601 -.603 | Establishes substantive requirements for *miscellaneous units.* | |
| • Storage of Contaminated Groundwater | 22 CCR §§ 66264.170 - .178 | Establishes requirement for container storage requirements for the storage of contaminated groundwater over 90 days. | |
| **Action-specific ARARs (continued)** | | | |
| • Air Stripper and GAC | 22 CCR §§ 66264.111 - .115 | Establishes substantive requirements for air strippers or granular activated carbon (GAC) adsorbers | |

## Table 4.1: (continued)

| Standard, Requirements Criteria, or Limitation | Citation | Description | Comment |
|---|---|---|---|
| • Spent Carbon | 22 CCR §§ 66262 and 66268 | Establishes requirements for the storage and disposal of spent carbon classified as hazardous waste. | |
| • Spent Carbon | CHWCA - CA H&SC, Division 20, Chapter 6.5 | Establishes requirements for the storage and disposal of spent carbon classified as hazardous waste. | |
| Occupational Safety and Health Act (OSHA)* | 29 USC §§ 651-678 | Regulates worker health and safety. | The NCP requires that requirements of the OSHA and of state laws with plans approved pursuant to OSHA must be complied with where applicable. |
| • Preparedness and Prevention* | Article 3 | Establishes preparedness and prevention standards for a facility with respect to design, construction, maintenance, and operation to minimize unplanned releases. | Potentially applicable to onsite treatment, storage, or disposal. |
| • Contingency Plan and Emergency Procedures* | Article 4 | Establishes contingency and emergency response provisions to follow in the event of an unplanned release. | Potentially applicable to onsite treatment, storage, or disposal requirements. |
| Land Disposal Restrictions (LDRs) | 22 CCR Division 4.5, Chapter 18 | Establishes prohibitions on land disposal unless treatment standards are met or a "no migration variation" is granted. | Potentially applicable if hazardous wastes are land disposed onsite to the extent the state is authorized to implement the LDRs unless state LDRs are more stringent than the federal counterpart. |
| Solid Waste | 14 CCR Division 7, Chapter 3 | Establishes standards for solid waste handling and disposal activities. | |
| **Location-specific ARARS** | | | |
| *Federal ARARS* | | | |
| No Federal ARARs were identified | | | |
| *State ARARs* | | | |
| No State ARARs were identified | | | |

## Table 4.1: (continued)

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* Standards promulgated pursuant to OSHA and similar state public health laws are not ARARs but are listed because compliance is required, nevertheless.

| | |
|---|---|
| AL | Action level |
| APCD | Air Pollution Control District |
| ARAR | Applicable or relevant and appropriate requirement |
| CA H&SC | State of California Health and Safety Code |
| CAA | Clean Air Act |
| CCR | Code of California Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CHWCA | California Hazardous Waste Control Act |
| LDR | Land disposal restriction |
| MCLG | Maximum contaminant level goal |
| MCL | Maximum contaminant level |
| NCP | National Contingency Plan |
| NESHAPs | National Emission Standard for Hazardous Air Pollutants |
| NSPS | New Source Performance Standard |
| OSHA | Occupational Safety and Health Act |
| TBC | To be considered |
| USC | United States Code |

## Table 4.2: Summary of Federal and California Drinking Water Standards

| Analytical Parameter | Federal Standard (mg/l) | California Standard (mg/l) | California Detection Limit for Reporting (DLR, in mg/l) |
|---|---|---|---|
| **PRIMARY MAXIMUM CONTAMINANT LEVELS** | | | |
| **Inorganic Constituents** | | | |
| Aluminum | | 1 | 0.05 |
| Antimony | 0.006 | 0.006 | 0.006 |
| Arsenic | 0.05 | 0.05 | 0.002 |
| Asbestos | 7 MFL | 7 MFL | 0.2 MFL |
| Barium | 2 | 1 | 0.1 |
| Beryllium | 0.004 | 0.004 | 0.001 |
| Cadmium | 0.005 | 0.005 | 0.001 |
| Chromium (total) | 0.1 | 0.05 | 0.01 |
| Cyanide | 0.2 (free) | 0.2 | 0.1 |
| Fluoride | 4 (2 is secondary) | 2 | 0.1 |
| Fluoride (temperature dependent) | | 2 | 0.1 |
| Mercury | 0.002 (inorganic) | 0.002 | 0.001 |
| Nickel | | 0.1 | 0.01 |
| Nitrate as NO3 | | 45 | 2 |
| Nitrate plus nitrite (sum as N) | 11 | 10 | 0.4 |
| Nitrite (as N) | 1 | 1 | 0.4 |
| Selenium | 0.05 | 0.05 | 0.005 |
| Thallium | 0.002 | 0.002 | 0.001 |
| **Radiological** | | | |
| Gross alpha particle activity (pCi/L) | 15 | 15 | 1 |
| Gross beta particle activity (pCi/L) | 4 millirems per year | 50 | 4 |
| Gross alpha and beta (pCi/L) | | NA | 4 |
| Combined Radium-226 and Radium-228 (pCi/L) | 5 | 5 | 0.5 |
| Strontium-90 (pCi/L) | | 8 | 2 |
| Tritium (pCi/L) | | 20000 | 1000 |
| Uranium (pCi/L) | | 20 | 2 |
| **Volatile Organic Compounds** | | | |
| Benzene | 0.005 | 0.001 | 0.0005 |
| Carbon tetrachloride | 0.005 | 0.0005 | 0.0005 |
| 1,2-Dichlorobenzene (o-DCB) | 0.6 | 0.6 | 0.0005 |
| 1,4-Dichlorobenzene (p-DCB) | 0.075 | 0.005 | 0.0005 |
| 1,1-Dichloroethane (1,1-DCA) | | 0.005 | 0.0005 |
| 1,2-Dichloroethane (1,2-DCA) | 0.005 | 0.0005 | 0.0005 |
| 1,1-Dichloroethylene (1,1-DCE) | 0.007 | 0.006 | 0.0005 |
| cis-1,2-Dichloroethylene | 0.07 | 0.006 | 0.0005 |
| trans-1,2-Dichloroethylene | 0.1 | 0.01 | 0.0005 |
| Dichloromethane (Methylene chloride) | 0.005 | 0.005 | 0.0005 |
| 1,2-Dichloropropane (Propylene dichloride) | 0.005 | 0.005 | 0.0005 |
| 1,3-Dichloropropene | | 0.0005 | 0.0005 |
| Ethylbenzene (Phenylethane) | 0.7 | 0.7 | 0.0005 |
| Monochlorobenzene (Chlorobenzene) | 0.1 | 0.07 | 0.0005 |

## Table 4.2 (continued)

| Analytical Parameter | Federal Standard (mg/l) | California Standard (mg/l) | California Detection Limit for Reporting (DLR, in mg/l) |
|---|---|---|---|
| Methyl-tert-butyl ether | | 0.013 (proposed) | 0.003 |
| Styrene (Vinylbenzene) | 0.1 | 0.1 | 0.0005 |
| 1,1,2,2-Tetrachloroethane | | 0.001 | 0.0005 |
| Tetrachloroethylene (PCE) | 0.005 | 0.005 | 0.0005 |
| Toluene (Methylbenzene) | 1 | 0.15 | 0.0005 |
| 1,2,4-Trichlorobenzene (Unsym-TCB) | 0.07 | 0.07 | 0.0005 |
| 1,1,1-Trichloroethane (1,1,1-TCA) | 0.2 | 0.2 | 0.0005 |
| 1,1,2-Trichloroethane (1,1,2-TCA) | 0.005 | 0.005 | 0.0005 |
| Trichloroethylene (TCE) | 0.005 | 0.005 | 0.0005 |
| Trichlorofluoromethane (Freon 11) | | 0.15 | 0.005 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113) | | 1.2 | 0.01 |
| Total Trihalomethanes | 0.10 | 0.10 | NA |
| Vinyl chloride | 0.002 | 0.0005 | 0.0005 |
| Xylenes (single isomer or sum of isomers) | 10 (total) | 1.75 | 0.0005 |
| **Non Volatile Synthetic Organic Chemicals (SOCs)** | | | |
| Acrylamide | 0.05% dosed at 1 mg/l (TT) | | |
| Alachlor (Alanex) | 0.002 | 0.002 | 0.001 |
| Atrazine (Aatrex) | 0.003 | 0.003 | 0.001 |
| Bentazon (Basagran) | | 0.018 | 0.002 |
| Benzo(a)pyrene | 0.0002 | 0.0002 | 0.0001 |
| Carbofuran (Furadan) | 0.04 | 0.018 | 0.005 |
| Chlordane | 0.002 | 0.0001 | 0.0001 |
| 2,4-D | 0.07 | 0.07 | 0.01 |
| Dalapon | 0.2 | 0.2 | 0.01 |
| 1,2-Dibromo-3-chloropropane (DBCP) | 0.0002 | 0.0002 | 0.00001 |
| Di(2-ethylhexyl) adipate | 0.4 | 0.4 | 0.005 |
| Di(2-ethylhexyl) phthalate (DEHP) | 0.006 | 0.004 | 0.003 |
| Dinoseb | 0.007 | 0.007 | 0.002 |
| Diquat | 0.02 | 0.02 | 0.004 |
| Endothal | 0.1 | 0.1 | 0.045 |
| Endrin | 0.002 | 0.002 | 0.0001 |
| Epichlorohydrin | 0.01% dosed at 20 mg/l (TT) | | |
| Ethylene dibromide (EDB) | 0.00005 | 0.00005 | 0.00002 |
| Glyphosate | 0.7 | 0.7 | 0.025 |
| Heptachlor | 0.0004 | 0.00001 | 0.00001 |
| Heptachlor epoxide | 0.0002 | 0.00001 | 0.00001 |
| Hexachlorobenzene | 0.001 | 0.001 | 0.0005 |
| Hexachlorocyclopentadiene | 0.05 | 0.05 | 0.001 |
| Lindane (gamma-BHC) | 0.0002 | 0.0002 | 0.0002 |
| Methoxychlor | 0.04 | 0.04 | 0.01 |
| Molinate (Ordam) | | 0.02 | 0.002 |
| Oxamyl | 0.2 | 0.2 | 0.02 |
| Pentachlorophenol | 0.001 | 0.001 | 0.0002 |

## Table 4.2 (continued)

| Analytical Parameter | Federal Standard (mg/l) | California Standard (mg/l) | California Detection Limit for Reporting (DLR, in mg/l) |
|---|---|---|---|
| Picloram | 0.5 | 0.5 | 0.001 |
| Polychlorinated biphenyls (PCBs) | 0.0005 | 0.0005 | 0.0005 |
| Simazine (Princep) | 0.004 | 0.004 | 0.001 |
| Thiobencarb (Bolero) | | 0.07 | 0.001 |
| Toxaphene | 0.003 | 0.003 | 0.001 |
| 2,3,7,8-TCDD (Dioxin) | $3 \times 10^{-8}$ | $3 \times 10^{-8}$ | $5 \times 10^{-9}$ |
| 2,4,5-TP (Silvex) | 0.05 | 0.05 | 0.001 |
| **LEAD AND COPPER ACTION LEVELS** | | | |
| Copper (levels to be met at customer tap) | 1.3 (TT) | 1.3 | 0.5 |
| Lead (levels to be met at customer tap) | 0.015 (TT) | 0.015 | 0.005 |
| **SECONDARY MAXIMUM CONTAMINANT LEVELS** | | | |
| Aluminum | 0.05 to 0.2 | 0.2 | 0.05 |
| Chloride | 250 | 250 recom.<br>500 upper | NA |
| Color (color units) | 15 | 15 | NA |
| Copper | 1.0 | 1.0 | 0.05 |
| Corrosivity (pH) | Noncorrosive (6.5-8.5) | Noncorrosive (6.5-8.5) | NA |
| Foaming agents (MBAS) | 0.5 | 0.5 | NA |
| Iron | 0.3 | 0.3 | 0.1 |
| Manganese | 0.05 | 0.05 | 0.02 |
| Methyl tertiary butyl ether (MTBE) | | 0.005 | 0.003 |
| Odor (threshold odor number) | 3 units | 3 units | NA |
| Silver | 0.10 | 0.1 | 0.01 |
| Specific Conductance (micromhos) | | 900 recom.<br>1600 upper | NA |
| Sulfate | 250 | 250 recom.<br>500 upper | 0.5 |
| Thiobencarb (Bolero) | | 0.001 | 0.001 |
| Total dissolved solids | 500 | 500 recom.<br>1000 upper | NA |
| Turbidity (NTU) | 5 units<br>(1 unit if filtered) | 5 units | NA |
| Zinc | 5 | 5.0 | 0.05 |
| **CALIFORNIA DRINKING WATER ACTION LEVEL CONSTITUENTS** | | | |
| **Inorganic Chemicals** | | | |
| Boron | | 1 | NA |
| Perchlorate | | 0.004 recom.<br>0.018 upper | 0.005 |

## Table 4.2 (continued)

| Analytical Parameter | Federal Standard (mg/l) | California Standard (mg/l) | California Detection Limit for Reporting (DLR, in mg/l) |
|---|---|---|---|
| **Organic Chemicals** | | | |
| Aldicarb (Temik) | | 0.01 | 0.003 |
| Aldrin | | 0.00005 | 0.000075 |
| Baygon | | 0.09 | NA |
| a-Benzene hexachloride (a-BHC) | | 0.0007 | NA |
| b-Benzene hexachloride (b-BHC) | | 0.0003 | NA |
| n-Butylbenzene (1-Butylpropane) | | 0.045 | 0.0005 |
| Captan | | 0.35 | 0.0001 |
| Carbaryl | | 0.060 | 0.01 |
| Chloropicrin | | 0.050 (0.037) | 0.001 |
| 2-Chlorotoluene (o-Chorotoluene) | | 0.045 | 0.0005 |
| 4-Chlorotoluene (p-Chorotoluene) | | 0.045 | 0.0005 |
| Diazinon (Basudin, Neocidol) | | 0.014 | 0.00025 |
| 1,2-Dichlorobenzene (o-Dichlorobenzene) | | 0.130 (0.010) | 0.0005 |
| 1,3-Dichlorobenzene (m-Dichlorobenzene) | | 0.130 (0.020) | 0.0005 |
| Dichlorodifluoromethane (Difluorodichloromethane) | | 1 | 0.001 |
| Dieldrin | | 0.00005 | 0.00002 |
| Dimethoate (Cygon) | | 0.14 | 0.01 |
| 2,4-Dimethylphenol | | 0.4 | NA |
| 1,4-Dioxane | | 0.003 | 0.003 |
| Diphenamide | | 0.04 | 0.1 |
| Ethion | | 0.035 | NA |
| Formaldehyde | | 0.03 | NA |
| Isopropyl n (3-chlorophenyl) carbamate (CIPC) | | 0.35 | NA |
| Malathion | | 0.16 | NA |
| Methyl isobutyl ketone (MIBK) | | 0.12 | 0.005 |
| Methyl parathion | | 0.03 | NA |
| Methyl-tert-butyl ether (MTBE) | | 0.013 | 0.003 |
| N-Nitrosodimethylamine (NDMA) | | 0.00002 | NA |
| Parathion | | 0.03 | 0.00002 |
| Pentachloronitrobenzene (Terrachlor) | | 0.0009 | 0.0001 |
| Phenol | | 0.005 | NA |
| Tertiary butyl alcohol | | 0.012 | NA |
| Trichloropropane | | 0.000005 | 0.0005 |
| Trithion | | 0.007 | NA |
| **CALIFORNIA DRINKING WATER UNREGULATED CHEMICALS REQUIRING MONITORING** | | | |
| **Inorganic Chemicals** | | | |
| Perchlorate | | 0.018 (Action Level) | 0.005 |
| **Organic Chemicals** | | | |
| Aldicarb | | 0.01 | 0.003 |
| Aldicarb sulfone | | 0.002 | 0.004 |

## Table 4.2 (continued)

| Analytical Parameter | Federal Standard (mg/l) | California Standard (mg/l) | California Detection Limit for Reporting (DLR, in mg/l) |
|---|---|---|---|
| Aldicarb sulfoxide | | 0.004 | 0.003 |
| Aldrin | | 0.00005 | 0.000075 |
| Bromacil | | NA | 0.01 |
| Bromobenzene | | NA | 0.0005 |
| Bromochloromethane | | NA | 0.0005 |
| Bromodichloromethane | | 0.08 | 0.0005 |
| Bromoform | | 0.08 | 0.0005 |
| Bromomethane | | NA | 0.0005 |
| Butachlor | | NA | 0.00038 |
| n-Butylbenzene | | 0.045 | 0.0005 |
| sec-Butylbenzene | | NA | 0.0005 |
| tert-Butylbenzene | | NA | 0.0005 |
| Carbaryl | | NA | 0.005 |
| Chlorodibromomethane | | 0.08 | 0.0005 |
| Chloroethane | | NA | 0.0005 |
| Chloroform | | 0.08 | 0.0005 |
| Chloromethane | | NA | 0.0005 |
| Chlorothalonil | | NA | 0.005 |
| 2-Chlorotoluene | | NA | 0.0005 |
| 4-Chlorotoluene | | NA | 0.0005 |
| Dibromochloromethane | | 0.08 | 0.0005 |
| Dibromomethane | | NA | 0.0005 |
| Dicamba | | NA | 0.0015 |
| 1,3-Dichlorobenzene | | NA | 0.0005 |
| Dichlorodifluoromethane | | NA | 0.001 |
| 1,3-Dichloropropane | | NA | 0.0005 |
| 2,2-Dichloropropane | | NA | 0.0005 |
| 1,1-Dichloropropene | | NA | 0.0005 |
| Dieldrin | | 0.00005 | 0.00002 |
| Dimethoate | | 0.14 | 0.01 |
| Diuron | | NA | 0.001 |
| Ethyl tertiary butyl ether | | NA | 0.003 |
| Hexachlorobutadiene | | NA | 0.0005 |
| 3-Hydroxycarbofuran | | NA | 0.003 |
| Isopropylbenzene | | NA | 0.0005 |
| p-Isopropyltoluene | | NA | 0.0005 |
| Methoxychlor | | 0.04 | 0.01 |
| Methyl-tert-butyl ether | | NA | 0.003 |
| Metolachlor | | NA | NA |
| Metribuzin | | NA | NA |
| Naphthalene | | NA | 0.0005 |
| 1-Phenylpropane | | NA | 0.0005 |
| Prometryn | | NA | 0.002 |
| Propachlor | | NA | 0.0005 |
| Tertiary amyl methyl ether | | NA | 0.003 |
| 1,1,1,2-Tetrachloroethane | | NA | 0.0005 |
| 1,2,3-Trichlorobenzene | | NA | 0.0005 |

## Table 4.2 (continued)

| Analytical Parameter | Federal Standard (mg/l) | California Standard (mg/l) | California Detection Limit for Reporting (DLR, in mg/l) |
|---|---|---|---|
| 1,2,3-Trichloropropane | | NA | 0.0005 |
| 1,2,4-Trimethylbenzene | | NA | 0.0005 |
| 1,3,5-Trimethylbenzene | | NA | 0.0005 |
| **Microorganisms** | | | |
| Total Coliforms | 5% of samples positive per month | 5% of samples positive per month | NA |
| Fecal Coliforms | | 0 c/ml | NA |
| Giardia lamblia | 99.9% killed or inactivated after treatment (TT) | | |
| Heterotrophic Plate Count | 500 c/ml (TT) | 500 c/ml | NA |
| Enteric Viruses | 99.99% killed or inactivated after treatment (TT) | NA | NA |

c/ml Colony-forming units per milliliter
mg/l Milligrams per liter
MCL Maximum Contaminant Level – maximum permissible level (enforceable)
MCLG Maximum Contaminant Level Goal – non-enforceable public health goal
NA Data were not available
pCi/L picoCuries per liter
recom. Recommended
TT Treatment Technique – an enforceable procedure or level of technical performance

## Table 5-1: Subarea 1 Extraction Wells

| Extraction Well | Discharge Capacity (gpm) | Approximate Bldg. Size (sf) | Approx. Land Require (ac) |
|---|---|---|---|
| SA1 - 1 | 3,000 | 1000 | 0.18 |
| SA1 - 2 | 2,000 | 1000 | 0.18 |
| SA1 - 3 | 1,000 | 750 | 0.15 |

ac Acre
gpm Gallons per minute
sf Square feet

**Table 5-2: Subarea 3 Extraction Wells**

| Extraction Well | Discharge Capacity (gpm) | Approximate Building Size (sf) | Approximate Land Requirement (ac) |
|---|---|---|---|
| SA3 - 1 | 5,000 | 1,500 | 0.20 |
| SA3 - 2 | 4,000 | 1,500 | 0.20 |
| SA3 - 3 | 6,000 | 1,500 | 0.20 |

ac Acre
gpm Gallons per minute
sf Square feet

## Table 5-3: Extraction Well Facilities
## List of Required Permits

| Permitting Agency | Permit or Requirement |
|---|---|
| City of Azusa | Utility permit, public works permit, building permit, traffic control permit |
| City of Baldwin Park | Utility permit, traffic control lane closure permit, public works permit, building permit |
| City of Industry | Utility permit, public works permit, building permit |
| City of Irwindale | Conditional use permit, utility permit, traffic lane closure permit, public works permit, building permit |
| Los Angeles Regional Water Quality Control Board | Notification required once the construction of an extraction or monitoring well is complete |
| Los Angeles County Department of Health Services Environmental Management Division | Well construction permit for extraction and monitoring wells |
| Main San Gabriel Basin Watermaster | Section 28 Permit and extraction agreement |
| State of California Department of Health Services – Division of Drinking Water and Environmental Management | Operating permit for wells that extract water for use in a public water supply |
| State of California Department of Water Resources | Submittal of Water Well Driller's Report |

**Table 5-4: Treatment Plant Construction and Operation List of Required Permits**

| Permitting Agency | Permit or Requirement |
|---|---|
| City of Baldwin Park | Utility permit, traffic control lane closure permit, public works permit, building permit, rough grading permit, dust control permit, water line and sewer line connection permit |
| City of Irwindale | Conditional use permit, building permit, public works permit, water line and sewer line connection permit |
| City of Industry | Utility permit, traffic control lane closure permit, public works permit, building permit, water line and sewer line connection permit |
| Main San Gabriel Basin Water Master | Section 28 Permit for construction and operation of water treatment facilities |
| South Coast Air Quality Management District | Vapor control permit |
| State of California Department of Health Services – Division of Drinking Water and Environmental Management | Operating permit for a water treatment facility to produce water for a public water supply |

**Table 5-5: Pipeline Construction**
**List of Required Permits**

| Permitting Agency | Permit or Requirement |
|---|---|
| City of Azusa | Public works permit, traffic lane closure permit, dust control permit, right-of-way permit |
| City of Baldwin Park | Utility permit, traffic control lane closure permit, right-of-way permit, public works permit, building permit |
| City of Industry | Public works permit, traffic lane closure permit, right-of-way permit, building permit |
| City of Irwindale | Conditional use permit, , alne closure permit, public works permit, building permit |
| Los Angeles County – Department of Transportation | Encroachment permit for pipeline crossings or pipelines located within street right-of-way |
| Los Angeles County Department of Public Works Bureau of Engineering | Permit for any permanent pipeline located in unincorporated L.A. County |
| Los Angeles County Department of Public Works Flood Control Division | Permit or easement for pipeline in San Gabriel River corridor |
| Los Angeles Department of Water and Power | Permit and easement for pipeline crossings or encroachments |
| State of California Department of Health Services – Division of Drinking Water and Environmental Management | Permit for pipelines to convey water to be used in a public water supply |
| Union Pacific Railroad | Access permit for utility survey, and railroad encroachment permit |
| Southern California Regional Rail Authority (SCRRA) - Metrolink | License agreement, right-of-way encroachment permit, and right of entry agreement |
| State of California – Department of Transportation (CALTRANS) | Encroachment permit and maintenance access easement |
| U.S. Army Corps of Engineers – Regulatory Department | Right of Entry permit to cross Walnut Creek Wash or Big Dalton Wash, Section 404 permit for wash crossing, and technical review of pipelines in the San Gabriel River corridor |

**Table 5-6: Recharge Water Discharge**
**List of Required Permits**

| Permitting Agency | Permit or Requirement |
|---|---|
| Los Angeles County Department of Public Works Flood Control Division | Connection permit for use of spreading grounds and storm drain discharge connection San Gabriel River |
| State of California Department of Fish and Game | Streambed alteration agreement for discharge to San Gabriel River |
| State of California Regional Water Quality Control Board | NPDES Permit |
| U.S. Army Corps of Engineers | Section 401 and 402 permit for discharge to Walnut Creek Wash or San Gabriel River |
| Los Angeles County, Department of Health Services – Environmental Management Division | Well construction permit for recharge wells |

## Table 6-1: Extraction Well Pumping Hydraulics

| Location | Estimated Discharge (gpm) | Estimated Static Head (ft) | Estimated Headloss* (ft) | Estimated Total Head (ft) |
|---|---|---|---|---|
| **Subarea 1:** | | | | |
| SA1-1 | 3,000 | 20 | 34 | 54 |
| SA1-2 | 2,000 | 20 | 53 | 73 |
| SA1-3 | 1,000 | 20 | 42 | 62 |
| **Subarea 3:** | | | | |
| SA3-1 | 5,000 | -20 | 85 | 65 |
| SA3-2 | 4,000 | -40 | 92 | 52 |
| SA3-3 | 6,000 | -10 | 77 | 67 |

ft Feet
gpm Gallons per minute

* Estimated headloss has been calculated based on criteria and pipeline lengths presented under the Raw Water Transmission Pipelines subsection.

## Table 6-2: Transmission Pipeline – General Criteria

| Description | Criteria | Comment |
|---|---|---|
| Minimum Velocity | 3 fps | Promote pipeline self-cleaning. |
| Maximum Velocity | 10 fps | Limit excessive thrust at pipe bends. |
| Coefficient of Friction | 130 | Estimates pipeline performance after several years of service in an effort to ensure system reliability throughout project design life. |
| Maximum Headloss | 2.5 ft/100 ft | Limit pumping head requirements, equipment size, and long term energy costs. |
| Minimum Depth of Cover | 4.5 ft | Protect the pipeline from potential damage due to excessive external loads. |

fps Feet per second
ft Feet

## Table 6-3: Transmission Pipeline Selection

| Description | Estimated Flow Rate (gpm) | Estimated Length (ft) | Proposed Diameter (in) | Velocity (fps) | Operating Pressure (psi) | Design Pressure (psi) | Headloss (ft / 100 ft) |
|---|---|---|---|---|---|---|---|
| **Subarea 1:** | | | | | | | |
| SA1-1 to Treatment Plant | 3,000 | 3,400 | 14 | 6.26 | 35 | 135 | 0.99 |
| SA1-2 to Treatment Plant | 2,000 | 4,700 | 12 | 5.68 | 35 | 135 | 0.96 |
| SA1-3 to Treatment Plant | 1,000 | 5,300 | 10 | 4.09 | 35 | 135 | 0.64 |
| **Subarea 2:** | | | | | | | |
| SA3-1 to Treatment Plant | 5,000 | 11,800 | 18 | 6.31 | 40 | 140 | 0.72 |
| SA3-2 to Treatment Plant | 4,000 | 19,500 | 18 | 5.05 | 35 | 135 | 0.47 |
| SA3-3 to Treatment Plant | 6,000 | 7,500 | 18 | 7.57 | 35 | 135 | 1.02 |

fps Feet per second
ft Feet
gpm Gallons per minute
psi Pounds per square inch

## Table 6-4: Raw Water Pipeline Material Evaluation

| Criteria | Availability | Corrosion Resistance | Operating Pressure | Material Cost | East of Installation | Local Experience | Service Life | Total |
|---|---|---|---|---|---|---|---|---|
| Weight | 3 | 4 | 5 | 3 | 3 | 3 | 5 | |
| **Pipe Material** | | | | | | | | |
| Steel | | | | | | | | |
| Rank | 3 | 2 | 5 | 2 | 3 | 3 | 3 | |
| Score | 9 | 8 | 25 | 6 | 9 | 9 | 15 | 81 |
| Ductile Iron | | | | | | | | |
| Rank | 3 | 2 | 5 | 3 | 3 | 3 | 3 | |
| Score | 9 | 8 | 25 | 9 | 9 | 9 | 15 | 84 |
| Polyvinyl Chloride (PVC) | | | | | | | | |
| Rank | 3 | 5 | 5 | 4 | 4 | 3 | 5 | |
| Score | 12 | 20 | 25 | 12 | 12 | 9 | 25 | 112 |
| High Density Polyethylene (HDPE) | | | | | | | | |
| Rank | 3 | 5 | 5 | 3 | 2 | 3 | 5 | |
| Score | 9 | 20 | 25 | 12 | 6 | 9 | 25 | 103 |

## Table 7-1
## Draft Conceptual Design Criteria - Subarea 1 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| System Flow Rate | 6000 | gpm |
| **Influent Equilization Tank** | | |
| *Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 60,000 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 15 | ft |
| Tank Diameter | 28 | ft |
| Volume per Tank | 64,482 | gal |
| Tank Diameter to Depth Ratio | 1.9 | Dia:D |
| **GAC/FB Bioreactors** | | |
| *Fluidization Pumps* | | |
| Number of Pumps | 4 | |
| Flow Rate per Pump | 1875 | gpm |
| Head per Pump | 43 | ft |
| Pump Efficiency | 78% | |
| Nominal Horsepower per pump | 27 | Hp |
| Pump Horsepower | 30 | Hp |
| *GAC/FB Bioreactor* | | |
| Forward Flow Rate | 6,000 | gpm |
| Recycle Ratio (Recycle Flow : Forward Flow) | 25% | |
| Recycle Flow Rate | 1,500 | gpm |
| Recycle Ratio (Recycle Flow : Total Flow) | 20% | |
| Total Bioreactor Flow Rate | 7,500 | gpm |
| Liquid Loading Rate | 12 | $gpm/ft^2$ |
| Number of Reactors | 4 | |
| Surface Area/Reactor | 156.3 | $ft^2$ |
| Reactor Diameter | 14 | ft |
| Fluidized Bed Depth | 15 | ft |
| Underdrain System | 5 | ft |
| Freeboard | 3 | ft |
| Fluidized Bed Volume per tank | 17,531 | gallons |
| Volume per tank | 26,881 | gallons |
| Empty Bed Contact Time | 9.35 | minutes |
| *Ethanol Feed System* | | |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Influent Oxygen Concentration | 2 | mg/l |
| Influent Nitrate Concentration (as N) | 3.7 | mg/l |
| Influent Perchlorate Concentration | 0.08 | mg/l |
| Theoretical Ethanol Dose ($0.685O_2+1.817NO_3\text{-}N+0.443ClO_4$) | 8.1 | mg/l |
| Estimated Ethanol Overfeed Requirement | 30% | |
| Design Ethanol Dose | 10.6 | mg/l |
| Mass Loading | 761 | lb/day |
| Specific Gravity of Ethanol | 0.79 | |
| Ethanol Density | 6.55 | lb/gal |
| Volumetric Loading | 116 | gal/day |
| *Ethanol Storage Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 3,489 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 9 | ft |
| Tank Diameter | 9 | ft |
| Volume per Tank | 3,807 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| *Phosphoric Acid Feed System* | | |
| Phosphorous Dose (as P) | 1 | mg/l |
| Phosphoric Acid Mass Loading | 72 | lb/day |
| Percent Phosphoric Acid by Weight | 50% | |
| Solution Density | 11.1 | lb/gal |
| Volumetric Loading | 13.0 | gal/day |
| *Phosphoric Acid Storage Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 390 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 5 | ft |
| Tank Diameter | 5 | ft |
| Volume per Tank | 587 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| *Biomass Control System* | | |
| Theoretical Cell Yield ($0.215O_2+0.573NO_3\text{-}N+0.139ClO_4$) | 2.6 | mg/l |
| Theoretical Biological Solids Production (as VSS) | 185 | lb/day |
| Estimated Correction Factor | 40% | |
| Estimated Biological Solids Production (as VSS) | 258 | lb/day |
| Waste Biomass Flow Percentage | 0.5% | of influent flow |
| Waste Biomass Flow Rate | 30 | gpm |
| Percent of Biological Solids in Waste Biomass Line | 75% | |

## Table 7-1
## Draft Conceptual Design Criteria - Subarea 1 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| Waste Biomass VSS concentration | 384 | mg/l |
| **Multi-media Filters** | | |
| *Filters* | | |
| Loading Rate | 5 | $gpm/ft^2$ |
| Flow Rate to Filters (from bioreactor) | 6,000 | gpm |
| Flow Rate to Filter (from reclamation system) | 448 | gpm |
| Total Filter Flow Rate | 6,448 | gpm |
| Number of Filters in Service at One Time | 3 | |
| Total Number of Filters | 4 | |
| Surface Area/Filter | 430 | $ft^2$ |
| Filter Length and Width | 21 | ft |
| Filter Bed Depth | 2.6 | ft |
| Anthracite Layer | 16.5 | in |
| Sand Layer | 10.0 | in |
| Garnet Layer | 4.5 | in |
| Filter Bed Support Depth | 0.5 | ft |
| Garnet Gravel Layer | 3.0 | in |
| Graded Gravel Layer | 3.0 | in |
| Head Required for Filter | 10 | ft |
| Height Required for Underdrain | 1 | ft |
| Freeboard | 1 | ft |
| Total Filter Depth | 15.1 | ft |
| *Aeration/Floculation* | | |
| Oxygen Dose | 5 | mg/l |
| Mass Oxygen Loading | 360 | lb/day |
| Density of Air @ STP | 0.076 | lb/cf |
| Percent of Oxygen in Air | 20% | |
| Oxygen Transfer Efficiency | 5% | |
| Air Flow Rate | 329 | scfm |
| *Aeration/Floculation Tank* | | |
| Depth of Water | 15 | ft |
| Freeboard of Tank | 1 | ft |
| Width to Depth Ratio | 0.625 | W:D |
| Length to Width Ratio | 5 | L:W |
| Number of Tanks | 2 | |
| Total Depth | 16 | ft |
| Minimum Width | 10 | ft |
| Minimum Length | 50 | ft |
| Volume of Each Tank (Not including freeboard) | 56,100 | gallons |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Tank Holding Time | 17.4 | minutes |
| *Polymer Feed System* | | |
| Polymer Dose | 1 | mg/l |
| Mass Loading | 72 | lbs/day |
| Hopper Holding Time | 30 | days |
| Hopper Size | 2162 | lbs |
| Mix Ratio by Weight | 0.2% | |
| Volumetric Loading Rate | 4,320 | gal/day |
| *Polymer Mix/Storage Tank* | | |
| Tank Holding Time | 5 | days |
| Tank Volume | 21,600 | gal |
| Number of Tanks | 2 | |
| Tank Depth (Include 1 foot freeboard) | 13 | ft |
| Tank Diameter | 13 | ft |
| Volume per Tank (not including freeboard) | 11,914 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| *Flash Mixing Tank* | | |
| Tank Holding Time | 3 | minutes |
| Tank Volume | 19,344 | gal |
| Number of Tanks | 2 | |
| Tank Length to Depth Ratio | 0.7 | L:D |
| Tank Depth (includes 1 foot freeboard) | 14.1 | ft |
| Freeboard | 1.0 | ft |
| Tank Length (set equal to Minimum Width of Pre-Filter Aeration Tank) | 10 | ft |
| Volume per Tank (Including Freeboard) | 11,881 | gal |
| *Backwash System (only 1 filter at a time)* | | |
| Type: Combined Air and Water | | |
| Backwash Liquid Loading Rate | 20 | $gpm/ft^2$ |
| Air Loading Rate | 2.5 | $scfm/ft^2$ |
| Backwash Flow Rate per Filter | 8,597 | gpm |
| Air Flow Rate | 1075 | scfm |
| Backwash Time | 15 | minutes |
| Backwash Volume/Filter | 128,958 | gal |
| Backwash Frequency | 1 | days |
| Filter-to-Waste Time | 10 | minutes |
| Filter-to-Waste Volume/Filter | 21,493 | gal |
| *Backwash Water Storage Tank (Square)* | | |
| Tank Volume (1.5 x Backwash Volume) | 193,438 | gallons |
| Number of Tanks | 2 | |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Tank Length to Depth Ratio | 2.1 | L:D |
| Tank Depth (includes 1 foot freeboard) | 15.3 | ft |
| Tank Length and Width | 32.2 | ft |
| Volume per Tank | 110,706 | gal |
| *Filter Effluent Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 64,479 | gal |
| Number of Tanks | 1 | |
| Tank Length to Depth Ratio | 3.5 | L:D |
| Tank Depth (includes 1 foot freeboard) | 10.0 | ft |
| Tank Length and Width | 34.4 | ft |
| Volume per Tank | 79,639 | gal |
| **UV/Oxidation System** | | |
| *UV/Oxidation System (High-Energy Alternative)* | | |
| VOC Concentration | 381.67 | ug/l |
| NDMA Concentration | 0.19 | ug/l |
| 1,4-Dioxane Concentration | 3.96 | ug/l |
| Number of UV Towers Required | 3 | |
| Diameter of Units | 5 | ft |
| Flowrate per Unit | 2000 | gpm |
| *UV/Oxidation System (High-Energy Alternative) - Power Supply units* | | |
| Number of Units Required | 3 | |
| Length of Unit | 8 | ft |
| Width of Unit | 4 | ft |
| Footprint | 32 | $ft^2$ |
| *Hydrogen Peroxide Feed System* | | |
| Peroxide Dose | 15 | mg/l |
| Mass Loading | 1081 | lb/day |
| Percent Peroxide by Weight | 50% | |
| Peroxide (50%) Density | 8.34 | lb/gal |
| Volumetric Loading | 259 | gal/day |
| *Hydrogen Peroxide Feed Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 7,776 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 11 | ft |
| Tank Diameter | 12 | ft |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Volume per Tank | 8,460 | gal |
| Tank Diameter to Depth Ratio | 1.1 | Dia:D |
| *Transfer Pumps* | | |
| Height of Water in Equalization Tank | 15.0 | ft |
| Height of Water in Chlorine Mixing/Contact Tank (High Point) | 14.4 | ft |
| Required Flow Rate | 6000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 1 | |
| Diameter of each Pipeline | 18 | in |
| Velocity in Pipeline | 7.57 | ft per sec |
| C-Factor for Pipeline | 130 | |
| Head Loss per 1000 feet of Each Pipeline | 9.7 | ft per 1000 ft |
| Length of Each Pipeline | 300 | ft |
| Total Head (Neglects Minor Losses) | 2.36 | ft |
| Flow Rate per Pump | 6000 | gpm |
| Pump Efficiency | 78% | |
| Nominal Horsepower per pump | 4.6 | Hp |
| Pump Horsepower | | Hp |
| **Air Striping System** | | |
| *Air Strippers* | | |
| Column Diameter | 14 | ft |
| Liquid Loading Rate | 19.44 | gpm/sf |
| Flow Rate per tower | 2993 | gpm |
| Number of Columns | 2.0 | each |
| Number of Spare Columns | 1 | each |
| Total Number of Air Stripping Columns | 3.0 | each |
| Height of Airstripper | 25 | ft |
| *Vapor-Phase GAC* | | |
| Air:Water Ratio | 30 | :1 |
| Air flow per tower | 12002 | cfm |
| Max flow rate per unit | 12000 | cfm |
| Operational % of maximum flow rate | 85% | |
| Flow Rate per unit | 10200 | cfm |
| Required Number of Units | 3 | |
| Length of Unit | 16.5 | ft |
| Width of Unit | 8 | ft |
| Height of Unit | 8 | ft |
| Footprint (per unit) | 132 | sf |
| *Transfer Pumps (Pumps through GAC and disinfection)* | | |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Height of Water in sump of airstripper (Low Level) | 1.2 | ft |
| Height of Water in Carbon Vessels (High Point) | 17.0 | ft |
| Required Flow Rate | 6000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 2 | |
| Diameter of each Pipeline | 14 | in |
| Velocity in Pipeline | 6.25 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 10.6 | ft per 1000 ft |
| Length of Each Pipeline | 400 | ft |
| Total Head (Neglects Minor Losses) | 20.06 | ft |
| Flow Rate per Pump | 3000 | gpm |
| Pump Efficiency | 70% | |
| Required Horsepower per pump | 32.6 | Hp |
| Nominal Pump Horsepower per pump | 40.0 | Hp |
| **GAC Contactors** | | |
| *Contactors (Downflow Fixed-Bed Columns)* | | |
| Loading Rate | 2.0 | $gpm/ft^2$ |
| Required Surface Area | 3000.0 | $ft^2$ |
| Column Length = Width | 28 | ft |
| Column Surface Area | 784 | $ft^2$ |
| Required Number of Contactors | 4 | |
| Surface Area | 750 | $ft^2$ |
| GAC Bed Depth | 4 | ft |
| Density of GAC | 30 | $lb/ft^3$ |
| Head Required on Carbon Bed | 10 | ft |
| Freeboard | 1 | ft |
| Height Requried for Underdrain/Support System | 2 | ft |
| Total Depth of GAC Contactor | 17 | ft |
| Empty Bed Contact Time | 16 | minutes |
| Total Weight of GAC | 376,320 | lbs |
| **Disinfection System** | | |
| *Sodium Hypochlorite Feed System* | | |
| Chlorine Dose | 3 | mg/l |
| Chlorine Mass Loading | 216.2 | lb/day |
| Available Chlorine in Feed Solution | 1% | |
| Sodium Hypochlorite Mass Loading | 21,617.4 | lb/day |
| Sodium Hypochlorite Specific Gravity | 1.2 | |
| Sodium Hypochlorite Solution Density | 10.01 | lb/gal |
| Sodium Hypochlorite Volumetric Loading | 2,160 | gal/day |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Feed Tank Holding Time | 7 | days |
| Feed Tank Volume | 15,120 | gal |
| Feed Pump Flow Rate | 5,678 | ml/min |
| *Chlorine Mixing/Contact Tank* | | |
| Contact Time | 15 | minutes |
| Required Tank Volume | 90,000 | gallons |
| Number of Tanks | 1 | |
| Tank Length to Depth Ratio | 2.0 | L:D |
| Tank Depth (includes 1 foot freeboard) | 15.4 | ft |
| Tank Length and Width | 30.9 | ft |
| Volume per Tank | 102,901 | gal |
| **Reclamation System** | | |
| *Reclamation System Equalization Tank* | | |
| Equalization Tank Volume | 225,677 | gallons |
| Number of Tanks | 1 | |
| Tank Length to Depth Ratio | 3.3 | L:D |
| Tank Depth (includes 1 foot freeboard) | 15.2 | ft |
| Tank Length and Width | 49.4 | ft |
| Volume per Tank | 258,609 | gal |
| Average Flow to Reclamation System | 448 | gpm |
| *Coagulant Feed System* | | |
| Coagulant Dose | 15 | mg/l |
| Mass Loading | 81 | lb/day |
| Coagulant Density (based on alum or ferric chloride) | 10.8 | lb/gal |
| Volumetric Loading | 7 | gal/day |
| *Coagulant Feed Tank* | | |
| Tank Holding Time | 120 | days |
| Tank Volume | 897 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 5 | ft |
| Tank Diameter | 7 | ft |
| Volume per Tank | 1,151 | gal |
| Tank Diameter to Depth Ratio | 1.4 | Dia:D |
| *Flocculator/Clarifier (Reactor-clarifier)* | | |
| Surface Loading Rate | 0.15 | gpm/sf |
| Surface Area | 2,986 | sf |
| Number of Clarifiers | 1 | |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Clarifier Depth (include 1 foot freeboard) | 13 | ft |
| Clarifier Diameter | 62 | ft |
| Approximate Volume per Clarifier | 268,036 | gal |
| Bottom Slope | 1 | in/ft |
| Total Dry Solids Production (Biological + Coagulant) | 339 | lb/day |
| Clarifier Sludge Percent Solids | 2% | |
| Specific Gravity of Sludge | 1.03 | |
| Clarifier Volumetric Sludge Production | 1,973 | gal/day |
| Settling Time | 10.0 | hours |
| *Clarifier Sludge Holding Tank* | | |
| Holding Time | 2 | days |
| Tank Volume | 3,946 | gal |
| *Filter Press* | | |
| Filter Sludge Percent Solids | 30% | |
| Filter Cake Production (as wet solids) | 1130 | lbs/day |
| Filter Cake Density | 70 | $lb/ft^3$ |
| Volumetric Filter Cake Production | 121 | gal/day |
| Filter Cycles per Day | 0.5 | cycles/day |
| Number of Filter Presses | 1 | |
| Filter Press Size | 32 | $ft^3$ |
| *Reclaimation Pumps* | | |
| Height of Water in Reclamation System Equalization Tank | 14.2 | ft |
| Height of water in Flocculation/Clarification Tank | 12 | ft |
| Required Flow Rate | 448 | gpm |
| Diameter of Pipeline | 4 | in |
| Velocity in Pipeline | 11.44 | ft per sec |
| C-Factor for Pipeline | 130 | |
| Head Loss per 1000 feet of Pipeline | 120.9 | ft per 1000 ft |
| Length of Pipeline | 500 | ft |
| Total Head (Neglects Minor Losses) | 58.27 | ft |
| Number of Pumps | 1 | |
| Flow Rate per Pump | 448 | gpm |
| Pump Efficiency | 78% | |
| Nominal Horsepower per pump | 8.4 | Hp |
| Pump Horsepower | | Hp |
| *Reclaimed Water Return Pumps* | | |
| Height of Water in Reclamation System Equalization Tank | 12.0 | ft |
| Height of Water in Aeration Tank | 15 | ft |
| Required Flow Rate | 448 | gpm |
| Diameter of Pipeline | 4 | in |

**Table 7-1**
**Draft Conceptual Design Criteria - Subarea 1 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Velocity in Pipeline | 11.44 | ft per sec |
| C-Factor for Pipeline | 130 | |
| Head Loss per 1000 feet of Pipeline | 120.9 | ft per 1000 ft |
| Length of Pipeline | 500 | ft |
| Total Head (Neglects Minor Losses) | 63.46 | ft |
| Number of Pumps | 1 | |
| Flow Rate per Pump | 448 | gpm |
| Pump Efficiency | 78% | |
| Nominal Horsepower per pump | 9.2 | Hp |
| Pump Horsepower | | Hp |
| *Reclaimed Water Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 4,479 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 10 | ft |
| Tank Diameter | 10 | ft |
| Volume per Tank | 5,287 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| **Treated Water System** | | |
| *Treated Water Storage Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 60,000 | gallons |
| Number of Tanks | 1 | |
| Tank Depth | 15 | ft |
| Tank Diameter | 28 | ft |

## Table 7-2
## Draft Conceptual Design Criteria - Subarea 3 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| System Flow Rate | 15000 | gpm |
| **Influent Equalization Tank** | | |
| *Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 150,000 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 20 | ft |
| Tank Diameter | 37 | ft |
| Volume per Tank | 152,809 | gal |
| Tank Diameter to Depth Ratio | 1.9 | Dia:D |
| **GAC/FB Bioreactors** | | |
| *Fluidization Pumps* | | |
| Number of Pumps | 10 | |
| Flow Rate per Pump | 1875 | gpm |
| Head per Pump | 43 | ft |
| Pump Efficiency | 78% | |
| Required Horsepower per pump | 27 | Hp |
| Nominal Horsepower per pump | 30 | Hp |
| *GAC/FB Bioreactor* | | |
| Forward Flow Rate | 15,000 | gpm |
| Recycle Ratio (Recycle Flow : Forward Flow) | 25% | |
| Recycle Flow Rate | 3,750 | gpm |
| Recycle Ratio (Recycle Flow : Total Flow) | 20% | |
| Total Bioreactor Flow Rate | 18,750 | gpm |
| Liquid Loading Rate | 12 | $gpm/ft^2$ |
| Number of Reactors | 10 | |
| Surface Area/Reactor | 156.3 | $ft^2$ |
| Reactor Diameter | 14 | ft |
| Fluidized Bed Depth | 15 | ft |
| Underdrain System | 5 | ft |
| Freeboard | 3 | ft |
| Fluidized Bed Volume per tank | 17,531 | gallons |
| Volume per tank | 26,881 | gallons |
| Empty Bed Contact Time | 9.35 | minutes |
| *Ethanol Feed System* | | |
| Influent Oxygen Concentration | 2 | mg/l |

**Table 7-2**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Influent Nitrate Concentration (as N) | 3.78 | mg/l |
| Influent Perchlorate Concentration | 0.0474 | mg/l |
| Theoretical Ethanol Dose ($0.685O_2+1.817NO_3\text{-}N+0.443ClO_4$) | 8.3 | mg/l |
| Estimated Ethanol Overfeed Requirement | 30% | |
| Design Ethanol Dose | 10.7 | mg/l |
| Mass Loading | 1934 | lb/day |
| Specific Gravity of Ethanol | 0.79 | |
| Ethanol Density | 6.58 | lb/gal |
| Volumetric Loading | 294 | gal/day |
| *Ethanol Storage Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 8,815 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 12 | ft |
| Tank Diameter | 12 | ft |
| Volume per Tank | 9,306 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| *Phosphoric Acid Feed System* | | |
| Phosphorous Dose (as P) | 1.0 | mg/l |
| Phosphoric Acid Mass Loading | 180 | lb/day |
| Percent Phosphoric Acid by Weight | 50% | |
| Solution Density | 11.1 | lb/gal |
| Volumetric Loading | 32 | gal/day |
| *Phosphoric Acid Storage Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 974 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 6 | ft |
| Tank Diameter | 6 | ft |
| Volume per Tank | 1,057 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| *Biomass Control System* | | |
| Theoretical Cell Yield ($0.215O_2+0.573NO_3\text{-}N+0.139ClO_4$) | 2.6 | mg/l |
| Theoretical Biological Solids Production (as VSS) | 469 | lb/day |
| Estimated Correction Factor | 40% | |
| Estimated Biological Solids Production (as VSS) | 656 | lb/day |
| Waste Biomass Flow Percentage | 0.5% | of influent flow |
| Waste Biomass Flow Rate | 75 | gpm |
| Percent of Biological Solids in Waste Biomass Line | 75% | |
| Waste Biomass VSS concentration | 390 | mg/l |

## Table 7-2
## Draft Conceptual Design Criteria - Subarea 3 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| **Multi-media Filters** | | |
| *Filters* | | |
| Loading Rate | 5 | $gpm/ft^2$ |
| Flow Rate to Filters (from bioreactor) | 15,000 | gpm |
| Flow Rate to Filter (from reclamation system) | 1,009 | gpm |
| Total Filter Flow Rate | 16,009 | gpm |
| Number of Filters in Service at One Time | 5 | |
| Total Number of Filters | 6 | |
| Surface Area/Filter | 640 | $ft^2$ |
| Filter Length and Width | 25 | ft |
| Filter Bed Depth | 2.6 | ft |
| Anthracite Layer | 16.5 | in |
| Sand Layer | 10.0 | in |
| Garnet Layer | 4.5 | in |
| Filter Bed Support Depth | 0.5 | ft |
| Garnet Gravel Layer | 3.0 | in |
| Graded Gravel Layer | 3.0 | in |
| Head Required for Filter | 10 | ft |
| Height Required for Underdrain | 1 | ft |
| Freeboard | 1 | ft |
| Total Filter Depth | 15.1 | ft |
| *Aeration/Floculation* | | |
| Oxygen Dose | 5 | mg/l |
| Mass Oxygen Loading | 961 | lb/day |
| Density of Air @ STP | 0.076 | lb/cf |
| Percent of Oxygen in Air | 20% | |
| Oxygen Transfer Efficiency | 5% | |
| Air Flow Rate | 878 | scfm |
| *Aeration/Floculation Tank* | | |
| Depth of Water | 15 | ft |
| Freeboard of Tank | 1 | ft |
| Width to Depth Ratio | 0.625 | W:D |
| Length to Width Ratio | 5 | L:W |
| Number of Tanks | 5 | |
| Total Depth | 16 | ft |
| Minimum Width | 10 | ft |
| Minimum Length | 50 | ft |
| Volume of Each Tank (Not including freeboard) | 56,100 | gallons |
| Tank Holding Time | 17.5 | minutes |

## Table 7-2
## Draft Conceptual Design Criteria - Subarea 3 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| *Polymer Feed System* | | |
| Polymer Dose | 1 | mg/l |
| Mass Loading | 192 | lbs/day |
| Hopper Holding Time | 30 | days |
| Hopper Size | 5768 | lbs |
| Mix Ratio by Weight | 0.2% | |
| Volumetric Loading Rate | 11,526 | gal/day |
| *Polymer Mix/Storage Tank* | | |
| Tank Holding Time | 2 | days |
| Tank Volume | 23,053 | gal |
| Number of Tanks | 2 | |
| Tank Depth (Include 1 foot freeboard) | 13 | ft |
| Tank Diameter | 13 | ft |
| Volume per Tank (not including freeboard) | 11,914 | gal |
| Tank Diameter to Depth Ratio | 1.0 | Dia:D |
| *Flash Mixing Tank* | | |
| Tank Holding Time | 3 | minutes |
| Tank Volume | 48,027 | gal |
| Number of Tanks | 5 | |
| Tank Length to Depth Ratio | 0.64 | L:D |
| Tank Depth (includes 1 foot freeboard) | 14.6 | ft |
| Freeboard | 1.0 | ft |
| Tank Length (set equal to Minimum Width of Pre-Filter Aeration Tank) | 10.0 | ft |
| Volume per Tank (Including Freeboard) | 11,712 | gal |
| *Backwash System (only 1 filter at a time)* | | |
| Type: Combined Air and Water | | |
| Backwash Liquid Loading Rate | 20 | $gpm/ft^2$ |
| Air Loading Rate | 2.5 | $scfm/ft^2$ |
| Backwash Flow Rate per Filter | 12,807 | gpm |
| Air Flow Rate | 1601 | scfm |
| Backwash Time | 15 | minutes |
| Backwash Volume/Filter | 192,106 | gal |
| Backwash Frequency | 1 | days |
| Filter-to-Waste Time | 10 | minutes |
| Filter-to-Waste Volume/Filter | 32,018 | gal |
| *Backwash Water Storage Tank (Square)* | | |
| Tank Volume (1.5 x Backwash Volume) | 288,159 | gallons |
| Number of Tanks | 1 | |
| Tank Length to Depth Ratio | 7.5 | L:D |

## Table 7-2
## Draft Conceptual Design Criteria - Subarea 3 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| Tank Depth (includes 1 foot freeboard) | 9.8 | ft |
| Tank Length and Width | 73.6 | ft |
| Volume per Tank | 357,250 | gal |
| *Filter Effluent Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 160,088 | gal |
| Number of Tanks | 1 | |
| Tank Length to Depth Ratio | 5.4 | L:D |
| Tank Depth (includes 1 foot freeboard) | 10.0 | ft |
| Tank Length and Width | 54.1 | ft |
| Volume per Tank | 197,551 | gal |
| **UV/Oxidation System** | | |
| *UV/Oxidation System (High-Energy Alternative)* | | |
| VOC Concentration | 87.7 | ug/l |
| NDMA Concentration | 0.21 | ug/l |
| 1.4-Dioxane Concentration | 4.05 | ug/l |
| Number of UV Towers Required (Including 1 extra) | 7 | |
| Diameter of Units | 5 | ft |
| Flowrate per Unit | 2143 | gpm |
| *UV/Oxidation System (High-Energy Alternative) - Power Supply units* | | |
| Number of Units Required | 7 | |
| Length of Unit | 8 | ft |
| Width of Unit | 4 | ft |
| Footprint | 32 | $ft^2$ |
| *Hydrogen Peroxide Feed System* | | |
| Peroxide Dose | 15 | mg/l |
| Mass Loading | 2702 | lb/day |
| Percent Peroxide by Weight | 50% | |
| Peroxide (50%) Density | 8.34 | lb/gal |
| Volumetric Loading | 648 | gal/day |
| *Hydrogen Peroxide Feed Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 19,440 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 15 | ft |
| Tank Diameter | 16 | ft |
| Volume per Tank | 21,055 | gal |

**Table 7-2**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Tank Diameter to Depth Ratio | 1.1 | Dia:D |
| *Transfer Pumps (Pumps through UV/OX, Airstripper)* | | |
| Height of Water in Equalization Tank (Low Level) | 4.5 | ft |
| Height of Water in Airstripper (High Point) | 25.0 | ft |
| Required Flow Rate | 15000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 5 | |
| Diameter of each Pipeline | 14 | in |
| Velocity in Pipeline | 6.25 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 10.6 | ft per 1000 ft |
| Length of Each Pipeline | 400 | ft |
| Head Loss through UV/OX | 5 | psi |
| Total Head (Neglects Minor Losses) | 36.31 | ft |
| Flow Rate per Pump | 3000 | gpm |
| Pump Efficiency | 70% | |
| Required Horsepower per pump | 39.3 | Hp |
| Nominal Pump Horsepower per pump | 40.0 | Hp |
| **Air Striping System** | | |
| *Air Strippers* | | |
| Column Diameter | 14 | ft |
| Liquid Loading Rate | 19.488 | gpm/sf |
| Flow Rate per tower | 3000 | gpm |
| Number of Columns | 5.0 | each |
| Number of Spare Columns | 1 | each |
| Total Number of Air Stripping Columns | 6.0 | each |
| Height of Airstripper | 25 | ft |
| *Vapor-Phase GAC* | | |
| Air:Water Ratio | 30 | :1 |
| Air flow per tower | 12032 | cfm |
| Max flow rate per unit | 12000 | cfm |
| Operational % of maximum flow rate | 85% | |
| Flow Rate per unit | 10200 | cfm |
| Required Number of Units | 6 | |
| Length of Unit | 16.5 | ft |
| Width of Unit | 8 | ft |
| Height of Unit | 8 | ft |
| Footprint (per unit) | 132 | sf |
| *Transfer Pumps (Pumps through GAC and disinfection)* | | |

**Table 7-2**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Height of Water in sump of airstripper (Low Level) | 0.0 | ft |
| Height of Water in Carbon Vessels (High Point) | 17.0 | ft |
| Required Flow Rate | 15000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 5 | |
| Diameter of each Pipeline | 14 | in |
| Velocity in Pipeline | 6.25 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 10.6 | ft per 1000 ft |
| Length of Each Pipeline | 400 | ft |
| Total Head (Neglects Minor Losses) | 21.26 | ft |
| Flow Rate per Pump | 3000 | gpm |
| Pump Efficiency | 70% | |
| Required Horsepower per pump | 34.5 | Hp |
| Nominal Pump Horsepower per pump | 40.0 | Hp |
| **GAC Contactors** | | |
| *Contactors (Downflow Fixed-Bed Square Column)* | | |
| Loading Rate | 2.0 | $gpm/ft^2$ |
| Required Surface Area | 7500.0 | $ft^2$ |
| Column Length = Width | 28 | ft |
| Column Surface Area | 784 | $ft^2$ |
| Required Number of Contactors | 10 | |
| Surface Area | 750 | $ft^2$ |
| GAC Bed Depth | 4 | ft |
| Density of GAC | 30 | $lb/ft^3$ |
| Head Required on Carbon Bed | 10 | ft |
| Freeboard | 1 | ft |
| Height Requried for Underdrain/support layer | 2 | ft |
| Total Depth of GAC Contactor | 17 | ft |
| Empty Bed Contact Time | 16 | minutes |
| Total Weight of GAC | 940,800 | lbs |
| **Disinfection System** | | |
| *Sodium Hypochlorite Feed System* | | |
| Chlorine Dose | 3 | mg/l |
| Chlorine Mass Loading | 540.4 | lb/day |
| Available Chlorine in Feed Solution | 1% | |
| Sodium Hypochlorite Mass Loading | 54,043.5 | lb/day |
| Sodium Hypochlorite Specific Gravity | 1.2 | |
| Sodium Hypochlorite Solution Density | 10.01 | lb/gal |
| Sodium Hypochlorite Volumetric Loading | 5,400 | gal/day |

**Table 7-2**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Feed Tank Holding Time | 7 | days |
| Feed Tank Volume | 37,800 | gal |
| Feed Pump Flow Rate | 14,194 | ml/min |
| *Chlorine Mixing/Contact Tank* | | |
| Contact Time | 15 | minutes |
| Required Tank Volume | 225,000 | gallons |
| Number of Tanks | 2 | |
| Tank Length to Depth Ratio | 4.5 | L:D |
| Tank Depth (includes 1 foot freeboard) | 10.1 | ft |
| Tank Length and Width | 45.3 | ft |
| Volume per Tank | 138,717 | gal |
| **Reclamation System** | | |
| *Reclamation System Equalization Tank* | | |
| Equalization Tank Volume | 336,186 | gallons |
| Number of Tanks | 1 | |
| Tank Length to Depth Ratio | 7.3 | L:D |
| Tank Depth (includes 1 foot freeboard) | 10.4 | ft |
| Tank Length and Width | 76.3 | ft |
| Volume per Tank | 411,117 | gal |
| Average Flow to Reclamation System | 1009 | gpm |
| *Coagulant Feed System* | | |
| Coagulant Dose | 15 | mg/l |
| Mass Loading | 182 | lb/day |
| Coagulant Density (based on alum or ferric chloride) | 10.8 | lb/gal |
| Volumetric Loading | 17 | gal/day |
| *Coagulant Feed Tank* | | |
| Tank Holding Time | 120 | days |
| Tank Volume | 2,019 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 10 | ft |
| Tank Diameter | 7 | ft |
| Volume per Tank | 2,591 | gal |
| Tank Diameter to Depth Ratio | 0.7 | Dia:D |
| *Flocculator/Clarifier (Reactor-clarifier)* | | |
| Surface Loading Rate | 0.15 | gpm/sf |
| Surface Area | 6,726 | sf |
| Number of Clarifiers | 1 | |

## Table 7-2
## Draft Conceptual Design Criteria - Subarea 3 Treatment Plant

| Description | Value | Unit |
|---|---|---|
| Clarifier Depth (include 1 foot freeboard) | 13 | ft |
| Clarifier Diameter | 93 | ft |
| Approximate Volume per Clarifier | 603,695 | gal |
| Bottom Slope | 1 | in/ft |
| Total Dry Solids Production (Biological + Coagulant) | 838 | lb/day |
| Clarifier Sludge Percent Solids | 2% | |
| Specific Gravity of Sludge | 1.03 | |
| Clarifier Volumetric Sludge Production | 4,877 | gal/day |
| Settling Time | 10.0 | hours |
| *Clarifier Sludge Holding Tank* | | |
| Holding Time | 2 | days |
| Tank Volume | 9,754 | gal |
| *Filter Press* | | |
| Filter Sludge Percent Solids | 30% | |
| Filter Cake Production (as wet solids) | 2794 | lbs/day |
| Filter Cake Density | 70 | $lb/ft^3$ |
| Volumetric Filter Cake Production | 299 | gal/day |
| Filter Cycles per Day | 2 | cycles/day |
| Number of Filter Presses | 3 | |
| Filter Press Size | 7 | $ft^3$ |
| *Reclaimation Pumps* | | |
| Height of Water in Reclamation System Equalization Tank | 9.4 | ft |
| Height of water in Flocculation/Clarification Tank | 12 | ft |
| Required Flow Rate | 1009 | gpm |
| Diameter of Pipeline | 4 | in |
| Velocity in Pipeline | 25.76 | ft per sec |
| C-Factor for Pipeline | 130 | |
| Head Loss per 1000 feet of Pipeline | 543.9 | ft per 1000 ft |
| Length of Pipeline | 500 | ft |
| Total Head (Neglects Minor Losses) | 274.51 | ft |
| Number of Pumps | 1 | |
| Flow Rate per Pump | 1009 | gpm |
| Pump Efficiency | 78% | |
| Nominal Horsepower per pump | 89.7 | Hp |
| Pump Horsepower | | Hp |
| *Reclaimed Water Return Pumps* | | |
| Height of Water in Reclamation System Equalization Tank | 12.0 | ft |
| Height of Water in Aeration Tank | 15 | ft |
| Required Flow Rate | 1009 | gpm |
| Diameter of Pipeline | 12 | in |

**Table 7-2**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant**

| Description | Value | Unit |
|---|---|---|
| Velocity in Pipeline | 2.86 | ft per sec |
| C-Factor for Pipeline | 130 | |
| Head Loss per 1000 feet of Pipeline | 2.6 | ft per 1000 ft |
| Length of Pipeline | 500 | ft |
| Total Head (Neglects Minor Losses) | 4.29 | ft |
| Number of Pumps | 1 | |
| Flow Rate per Pump | 1009 | gpm |
| Pump Efficiency | 78% | |
| Nominal Horsepower per pump | 1.4 | Hp |
| Pump Horsepower | | Hp |
| *Reclaimed Water Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 10,088 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 15 | ft |
| Tank Diameter | 12 | ft |
| Volume per Tank | 11,844 | gal |
| Tank Diameter to Depth Ratio | 0.8 | Dia:D |
| **Treated Water System** | | |
| *Treated Water Storage Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 150,000 | gallons |
| Number of Tanks | 1 | |
| Tank Depth | 20 | ft |
| Tank Diameter | 37 | ft |

# FIGURES

46717/CAD/46717019 04/17/00 LDZ

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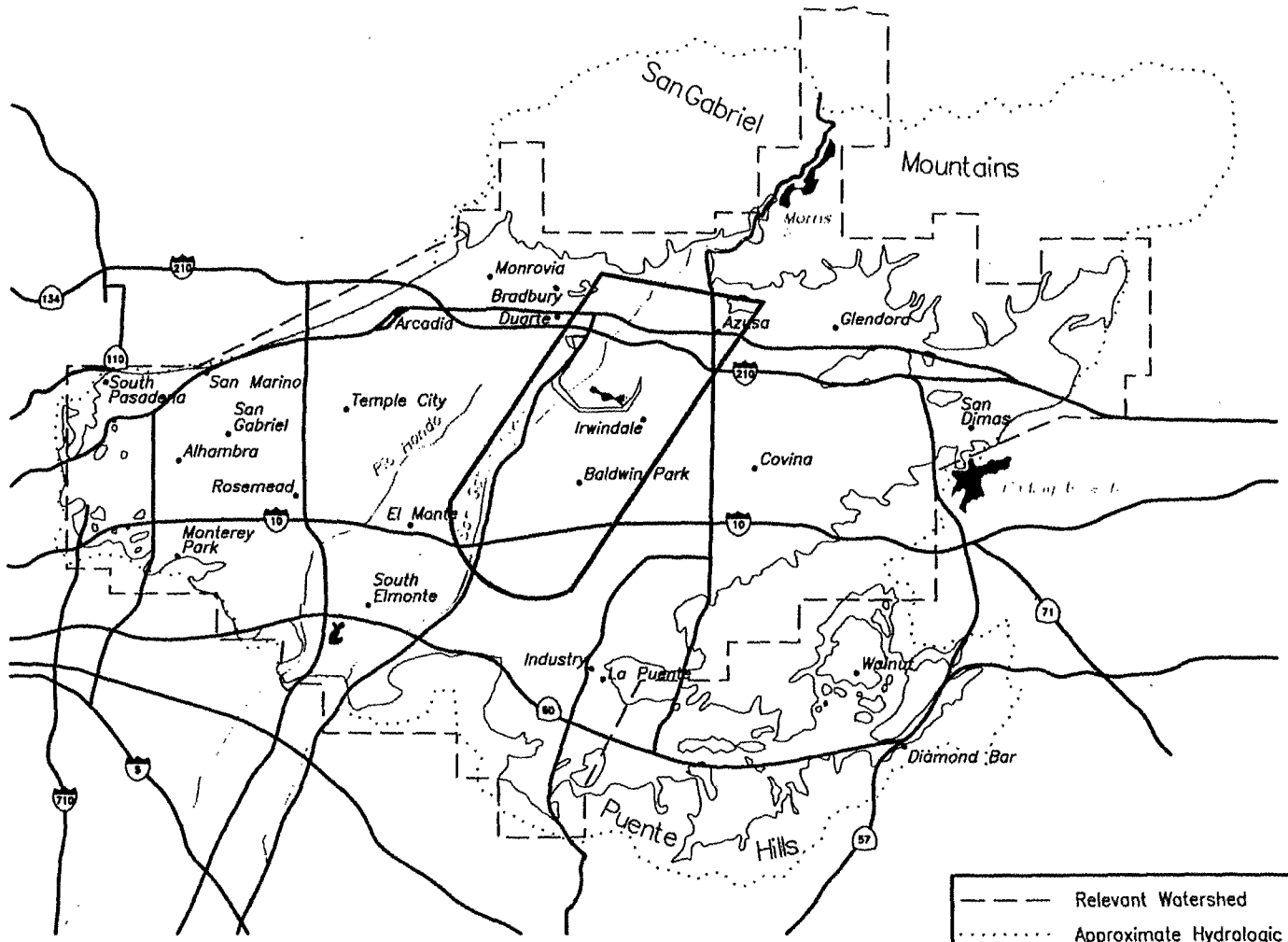
**BPOU Location Map**
**Conceptual Design Report**

Baldwin Park Operable Unit
San Gabriel Basin, California

FIGURE
**1-1**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| LDZ | 46717,202 | | 04/00 | |

40000/46717/CAD/46717018 04/17/00 LDZ




DRAFT

N

0 1 2 3 4 5 Miles

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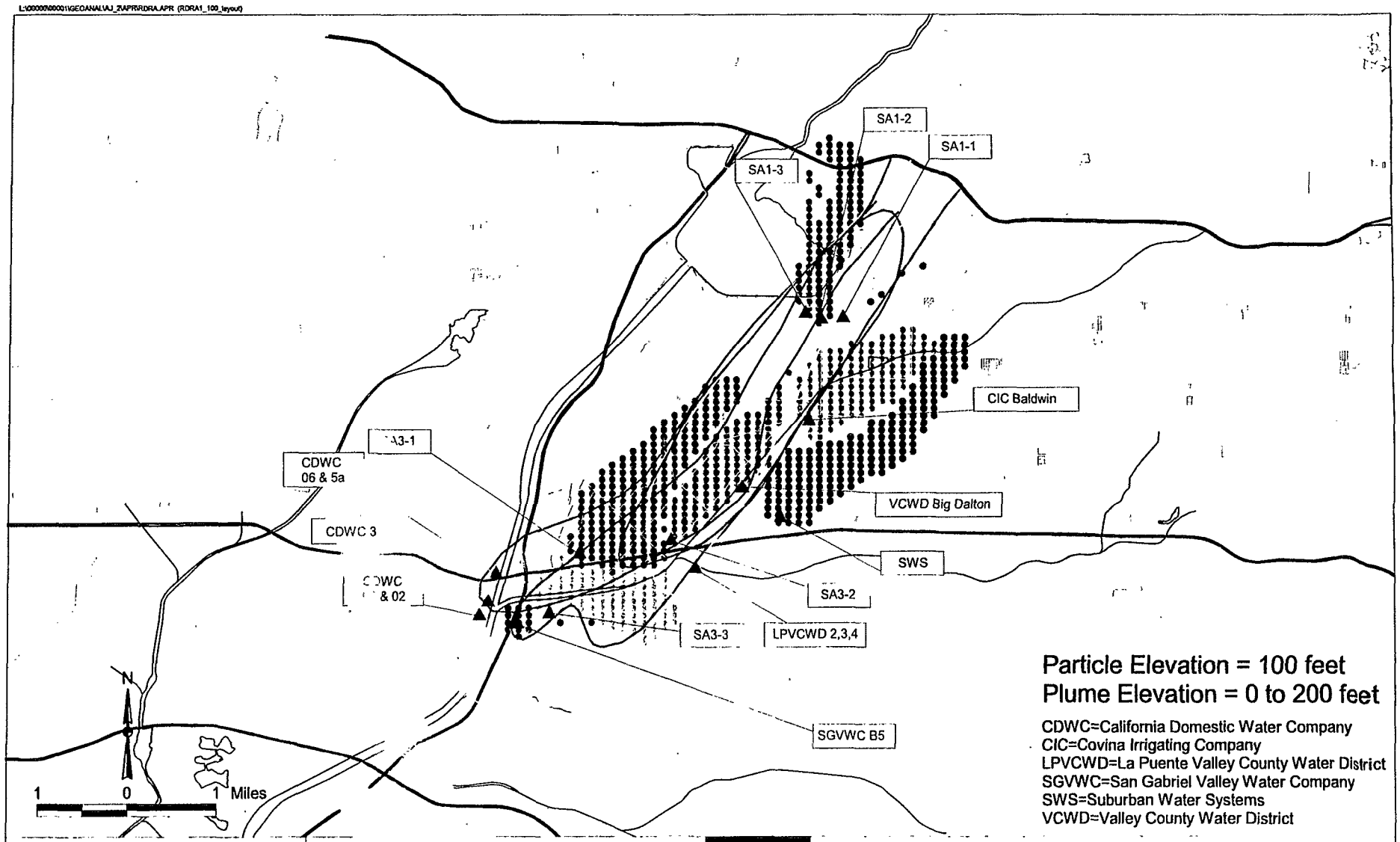
**Location Of San Gabriel Basin**
**Conceptual Design Report**
Baldwin Park Operable Unit
San Gabriel Basin, California

**Figure**
**1-2**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| LDZ | 46717.202 | | 04/00 | |




**SubArea 1**
- SA1-1 = 3,000 gpm
- SA1-2 = 2,000 gpm
- SA1-3 = 1,000 gpm

**SubArea 3**
- SA3-1 = 5,000 gpm
- SA3-2 = 4,000 gpm
- SA3-3 = 6,000 gpm

Total Extraction = 21,000 gpm

**LPVCWD - CDWC Wells**
- SWS Wells = 5,100 gpm
- SGVWC B5 = 2,000 gpm
- CIC Baldwin = 3,600 gpm

TCE 5 ug/L
Perchlorate 18 ug/L
NDMA 0.050 ug/L
Carbon Tetrachloride 0.5 ug/L

Flow Run RDRA1
Time = 5,475 days (15 Years)

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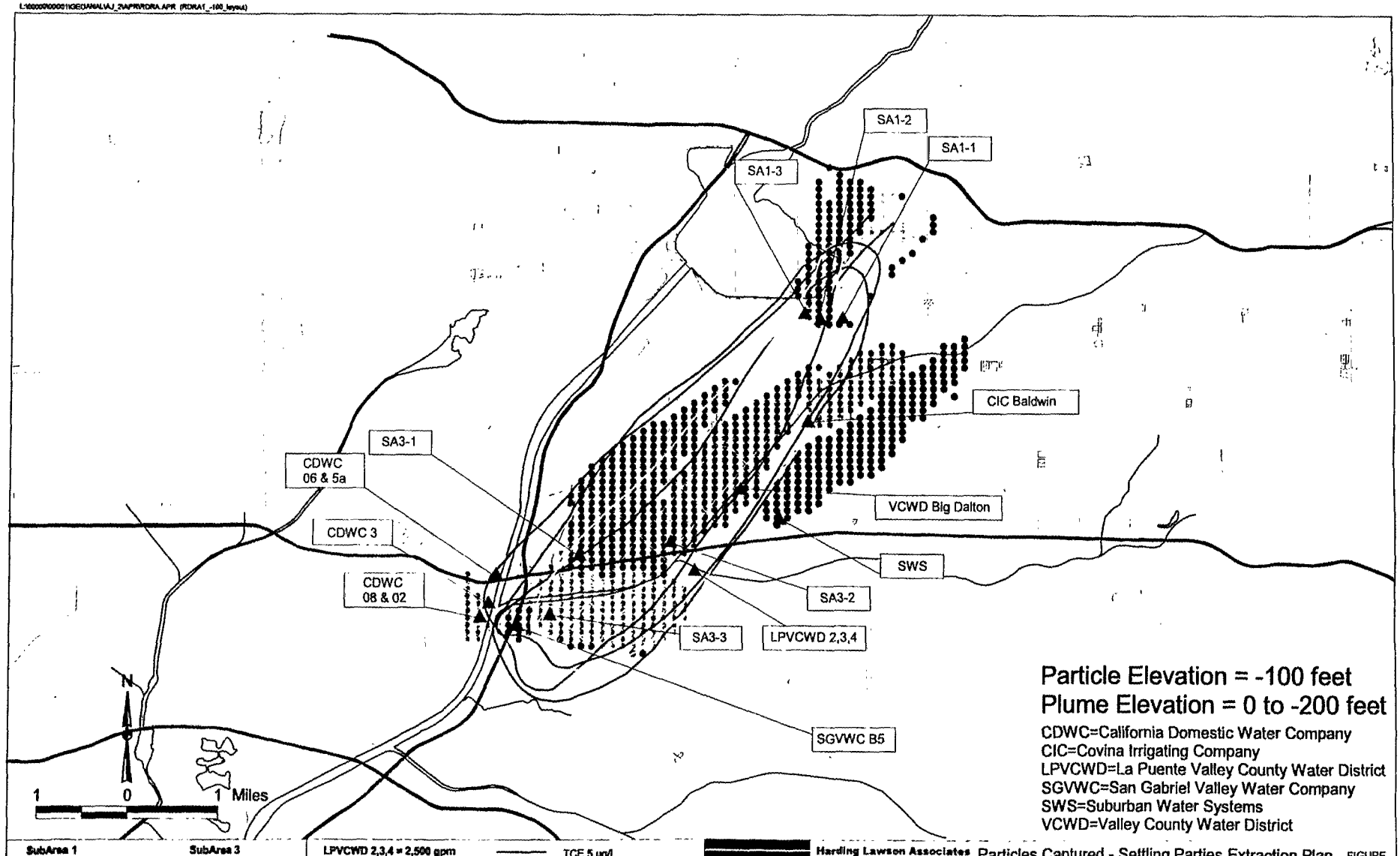
Particles Captured - Settling Parties Extraction Plan
Conceptual Design Report
Particle Elevation = 100 feet MSL
*Baldwin Park Operable Unit - San Gabriel Basin, California*

FIGURE 3-1

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | TLR | 03/00 | |




SubArea 1
- SA1-1 = 3,000 gpm
- SA1-2 = 2,000 gpm
- SA1-3 = 1,000 gpm

SubArea 3
- SA3-1 = 5,000 gpm
- SA3-2 = 4,000 gpm
- SA3-3 = 6,000 gpm

Total Extraction = 21,000 gpm

LPVCWD 2,3,4 = 2,500 gpm
CDWC Wells = 9,300 gpm
SWS Wells = 5,100 gpm
SGVWC B5 = 2,000 gpm
CIC Baldwin = 3,600 gpm

TCE 5 ug/L
Perchlorate 18 ug/L
NDMA 0.050 ug/L
Carbon Tetrachloride 0.5 ug/L

Flow Run RDRA1
Time = 5,475 days (15 Years)

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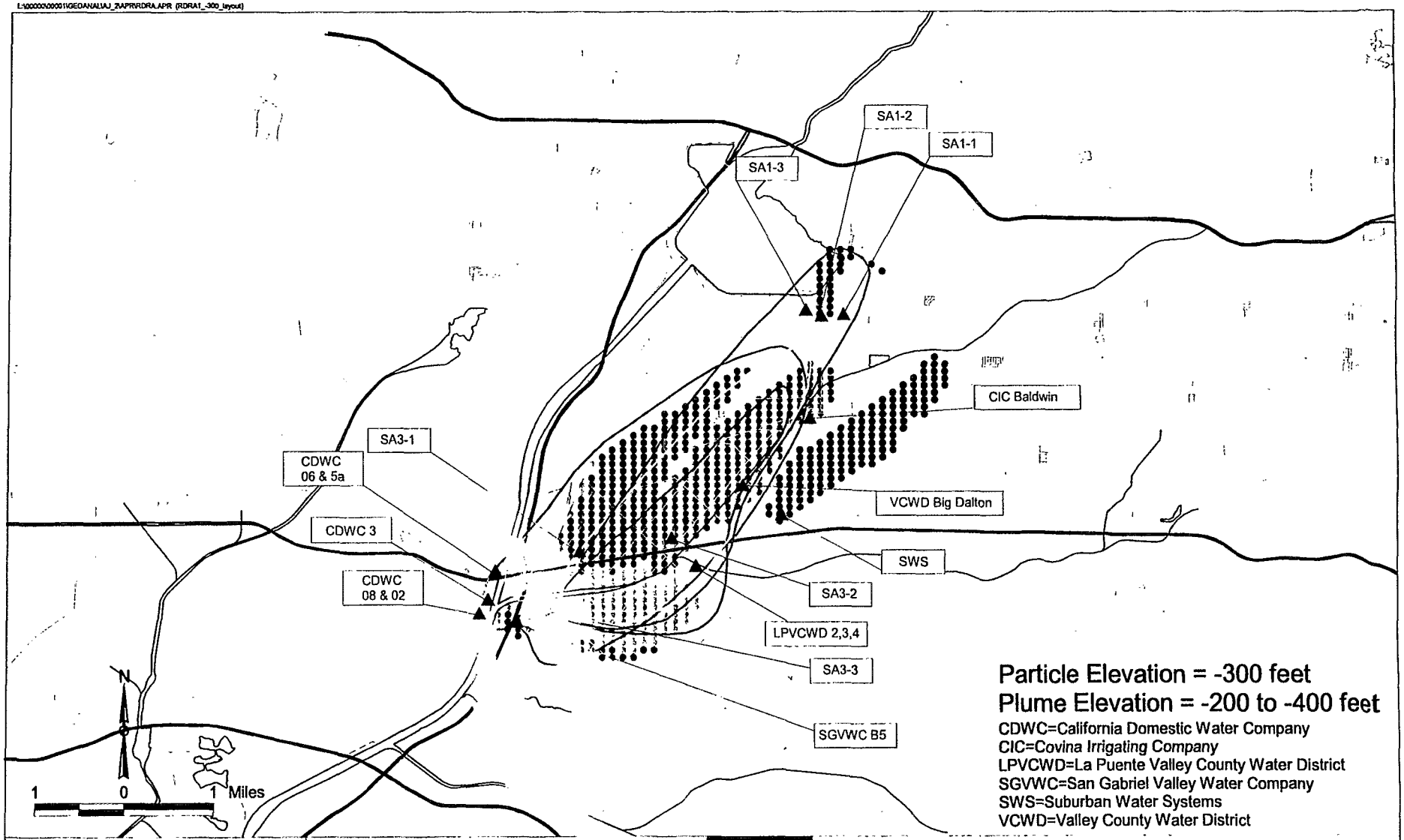
Particles Captured - Settling Parties Extraction Plan
Conceptual Design Report
Elevation = -100 feet MSL
Baldwin Park Operable Unit - San Gabriel Basin, California

FIGURE 3-2

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | TLR | 03/00 | |

L:\00000.00001\GEOANALIAJ_2\APR\RDRA.APR (RDRA1_-300_layout)




**SubArea 1**
- SA1-1 = 3,000 gpm
- SA1-2 = 2,000 gpm
- SA1-3 = 1,000 gpm

**SubArea 3**
- SA3-1 = 5,000 gpm
- SA3-2 = 4,000 gpm
- SA3-3 = 6,000 gpm

Total Extraction = 21,000 gpm

- LPVCWD 2,3,4 = 2,500 gpm
- CDWC Wells = 9,300 gpm
- SWS Wells = 5,100 gpm
- SGVWC B5 = 2,000 gpm
- CIC Baldwin = 3,600 gpm

TCE 5 ug/L
Perchlorate 18 ug/L
NDMA 0.050 ug/L
Carbon Tetrachloride 0.5 ug/L

Flow Run RDRA1
Time = 5,475 days (15 Years)

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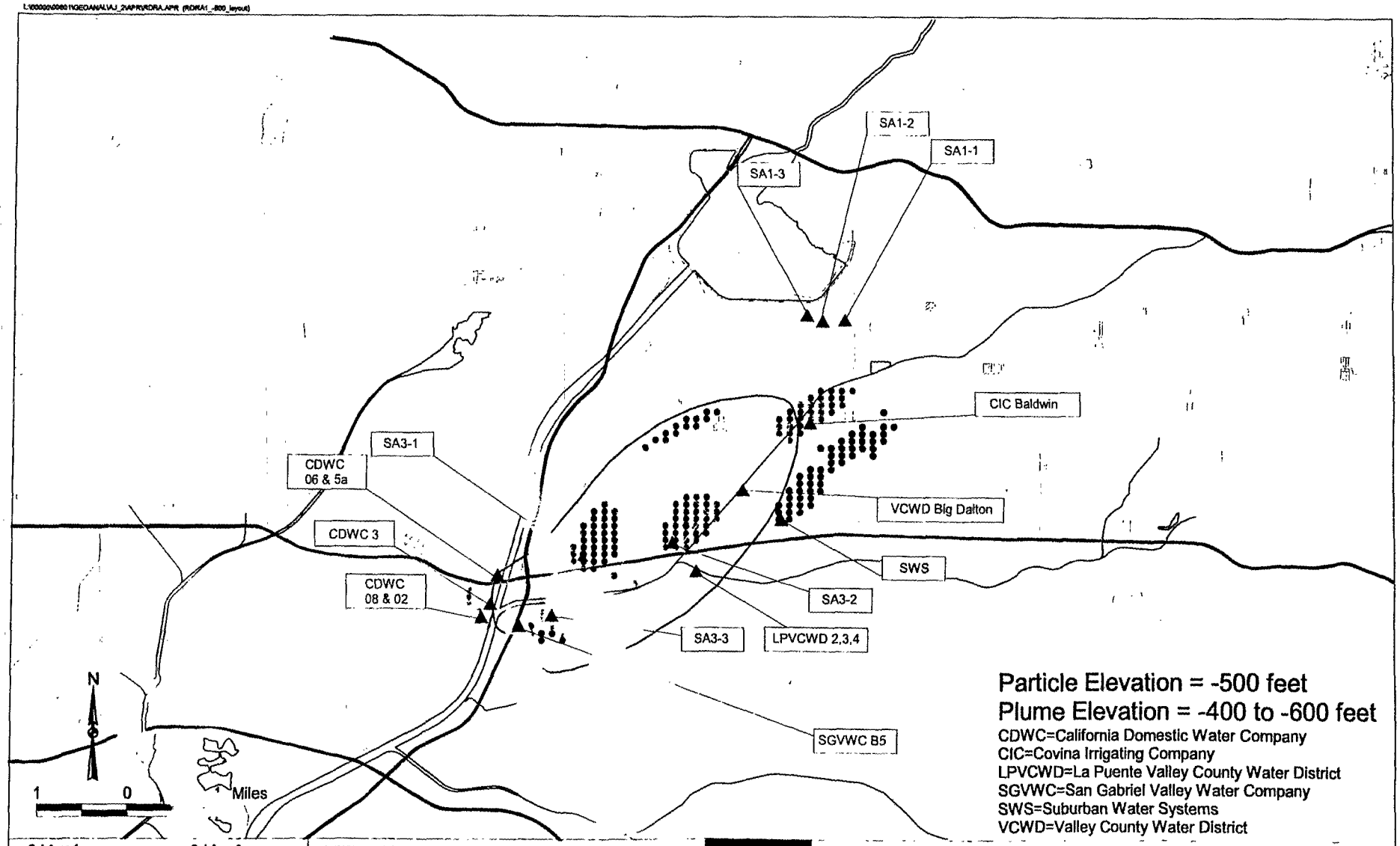
Particles Captured - Settling Parties Extraction Plan
Conceptual Design Report
Particle Elevation = -300 feet MSL
Baldwin Park Operable Unit - San Gabriel Basin, California

FIGURE 3-3

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | TLR | 03/00 | |




**SubArea 1**
- SA1-1 = 3,000 gpm
- SA1-2 = 2,000 gpm
- SA1-3 = 1,000 gpm

**SubArea 3**
- SA3-1 = 5,000 gpm
- SA3-2 = 4,000 gpm
- SA3-3 = 6,000 gpm

Total Extraction = 21,000 gpm

- LPVCWD 2,3,4 = 2,500 gpm
- CDWC Wells = 9,300 gpm
- SWS Wells = 5,100 gpm
- SGVWC B5 = 2,000 gpm
- CIC Baldwin = 3,600 gpm

TCE 5 ug/L
Perchlorate 18 ug/L
NDMA 0.050 ug/L
Carbon Tetrachloride 0.5 ug/L

Flow Run RDRA1
Time = 5,475 days (15 Years)

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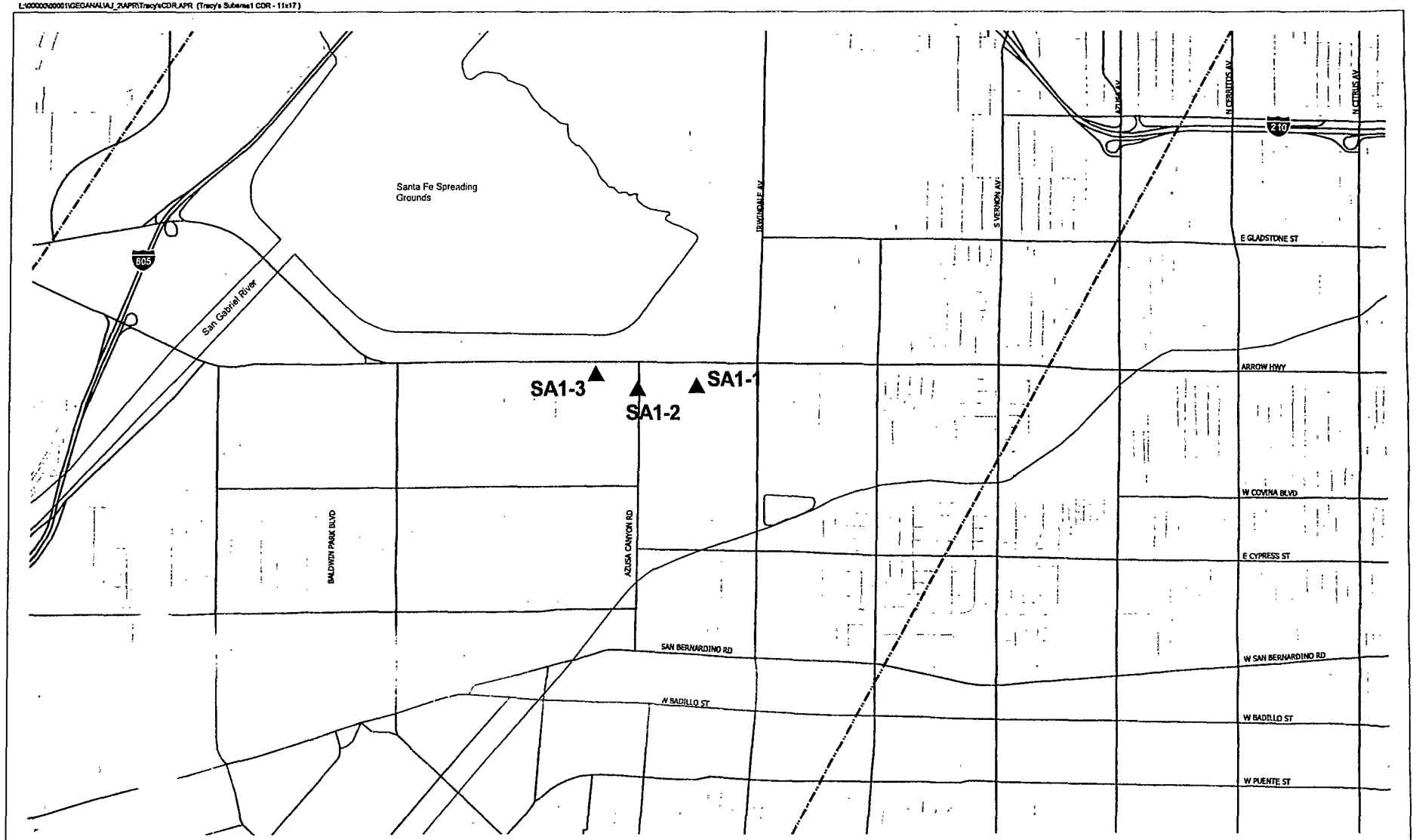
Particles Captured - Settling Parties Extraction Plan
Conceptual Design Report
Particle Elevation = -500 feet MSL
Baldwin Park Operable Unit - San Gabriel Basin, California

FIGURE 3-4

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | TLR | 03/00 | |

L:\00000\00001\GEOANAL\AJ_2\APR\Tracy's CDR\APR (Tracy's Subarea1 CDR - 11x17)




Explanation

- ▲ BPOUSP Subarea 1 Extraction Wells (Proposed)
- Surface Water Bodies
- Approximate Boundary of BPOU
- Main Roads
- Secondary Roads

N

2000 0 2000 Feet

Scale 1:24000

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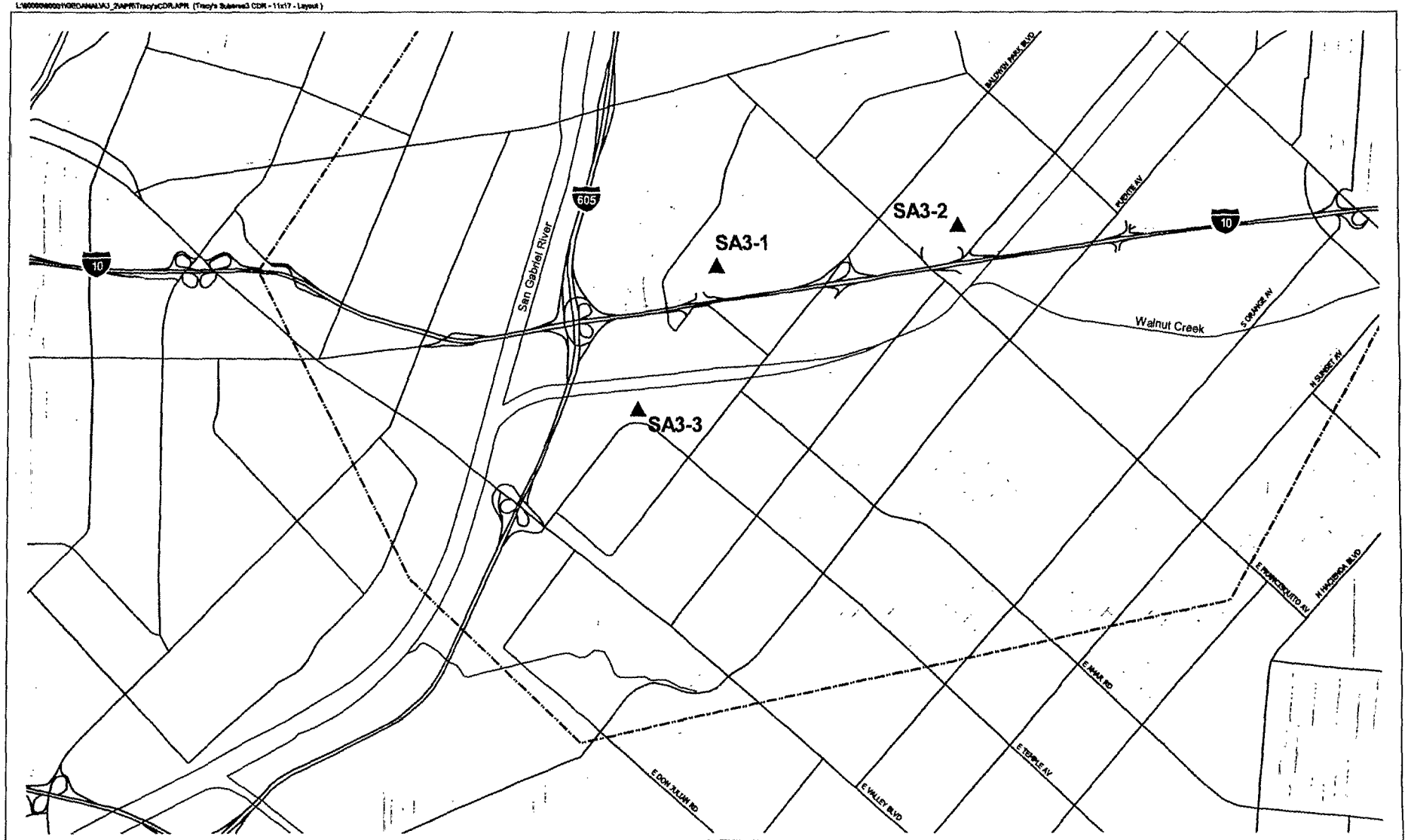
Engineering and Environmental Services

Subarea1 Extraction Well Locations
Conceptual Design Report
Baldwin Park Operable Unit
San Gabriel Basin, California

FIGURE 3-5

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | TLR | 04/00 | |




Explanation

- ▲ BPOUSP Subarea 3 Extraction Wells (Proposed)
- Surface Water Bodies
- Approximate Boundary of BPOU
- Main Roads
- Secondary Roads

N

Scale 1:24000 — 2000 0 2000 Feet

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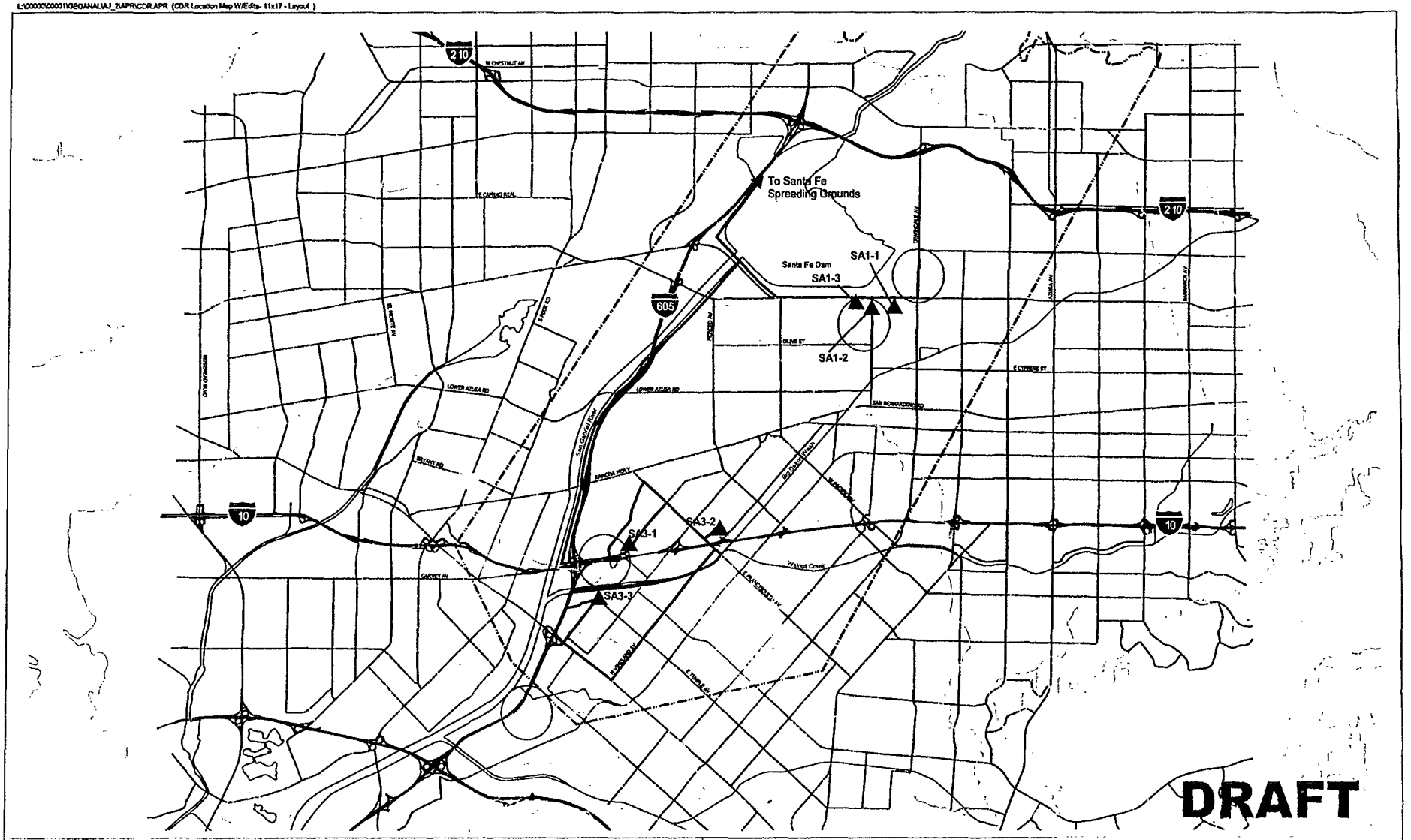
Environmental Services

Subarea3 Extraction Well Locations
Conceptual Design Report
Baldwin Park Operable Unit
San Gabriel Basin, California

FIGURE 3-6

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | TLR | 04/00 | |

L:\00000\00001\GEOANALYSI_2\APR\CDR.APR (CDR Location Map W/Edits- 11x17 - Layout )




## Explanation

- ▲ BPOUSP Extraction Wells (Proposed)
- Surface Water Bodies
- Approximate Boundary of BPOU
- Main Roads
- Secondary Roads
- Contour Elevation (100 foot contour intervals)
- Potential Pipeline Routing
- Approximate Water Treatment Plant Locations

N

Scale = 1:63,360 1 0 1 Miles

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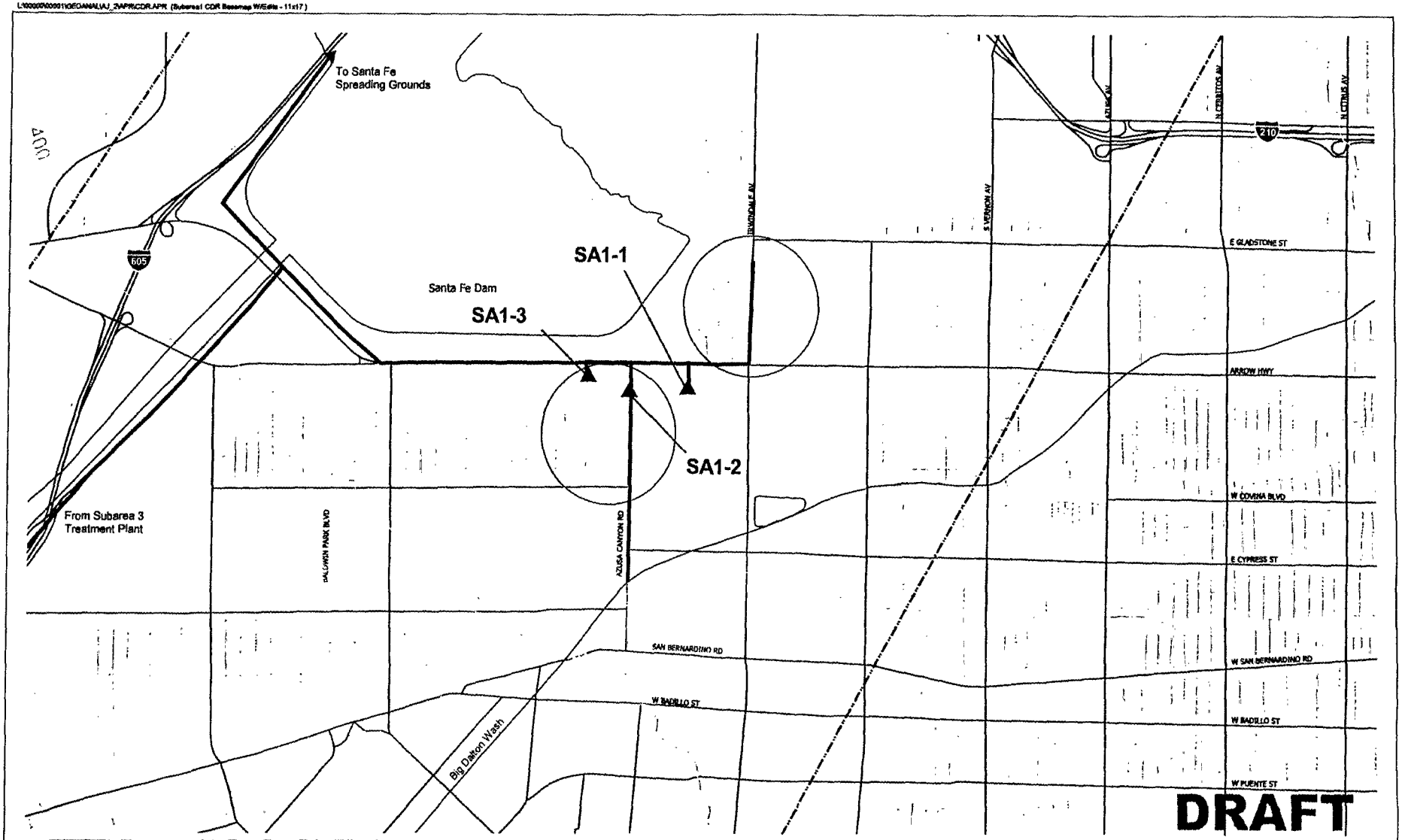
Environmental Services

Approximate Treatment Plant Locations
*Conceptual Design Report*
Baldwin Park Operable Unit
San Gabriel Basin, California

FIGURE 5-1

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | | 04/00 | |




Explanation

- ▲ BPOUSP Extraction Wells (Proposed)
- Surface Water Bodies
- Approximate Boundary of BPOU
- Main Roads
- Secondary Roads
- Contour Elevation (100 foot contour intervals)
- Potential Pipeline Routing
- Approximate Water Treatment Plant Locations

N

2000 0 2000 Feet

Scale = 1:24,000

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Environmental Services

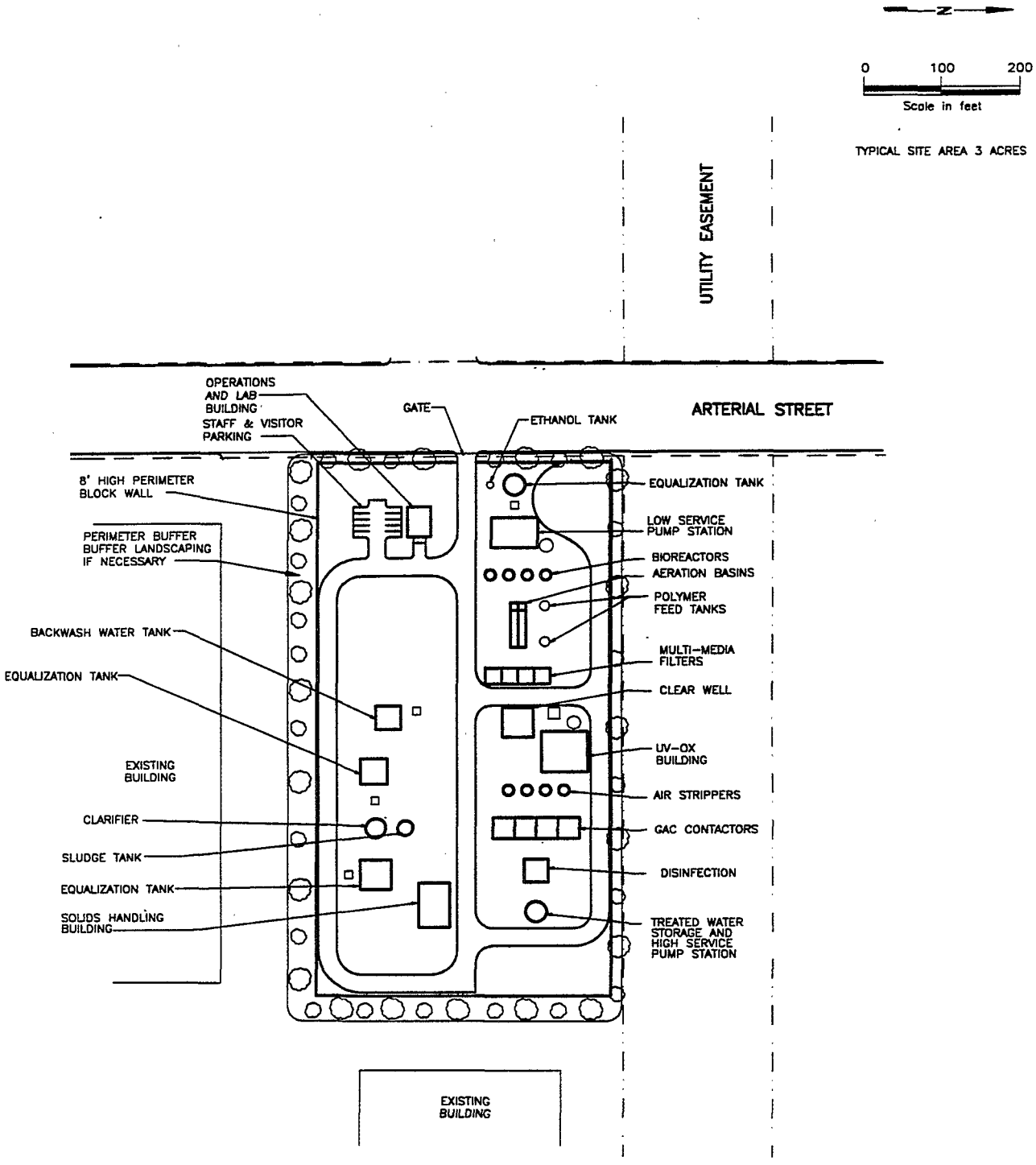
Approximate Treatment Plant Locations - Subarea 1

Conceptual Design Report
Baldwin Park Operable Unit
San Gabriel Basin, California

FIGURE 5-2

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | | 04/00 | |

40000/46717/CAD/46717024 04/17/00 LDZ




TYPICAL SA1 PLANT SITE

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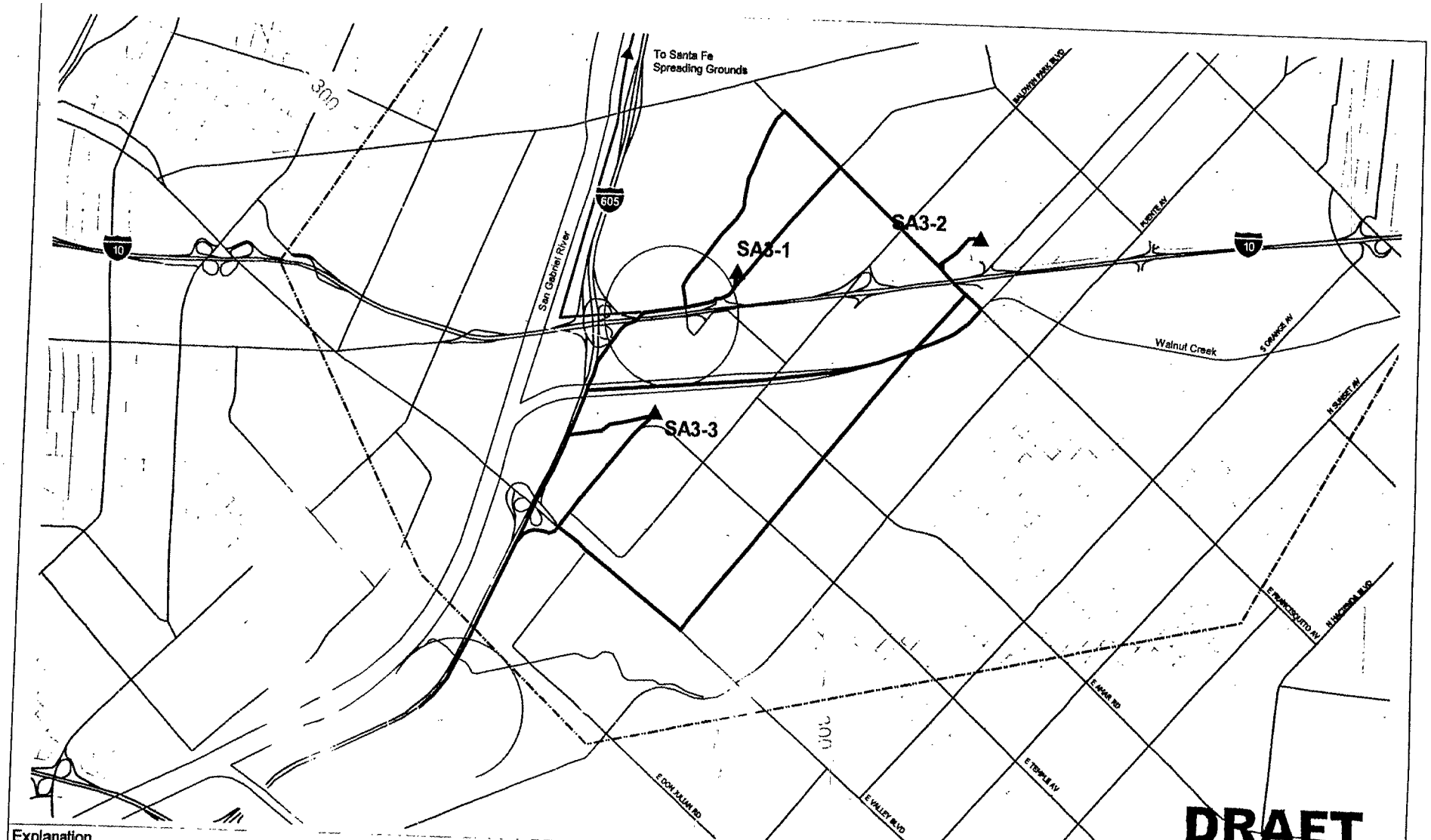
Engineering and Environmental Services

**Typical Site Plan**
**Subarea 1 Treatment Plant**
Conceptual Design Report
Baldwin Park OU, California

**Figure**
**5-3**

DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE




Explanation

- BPOU/P Extraction Wells (Proposed)
- Surface Water Bodies
- Approximate Boundary of BPOU
- Main Roads
- Secondary Roads
- Cont[illegible] 00 foot contour intervals)
- Potential Pipe[illegible] Routing
- Approximate Water Treatment Plant Locations

Scale = 1:24,000 (2000 0 2000 Feet)

N

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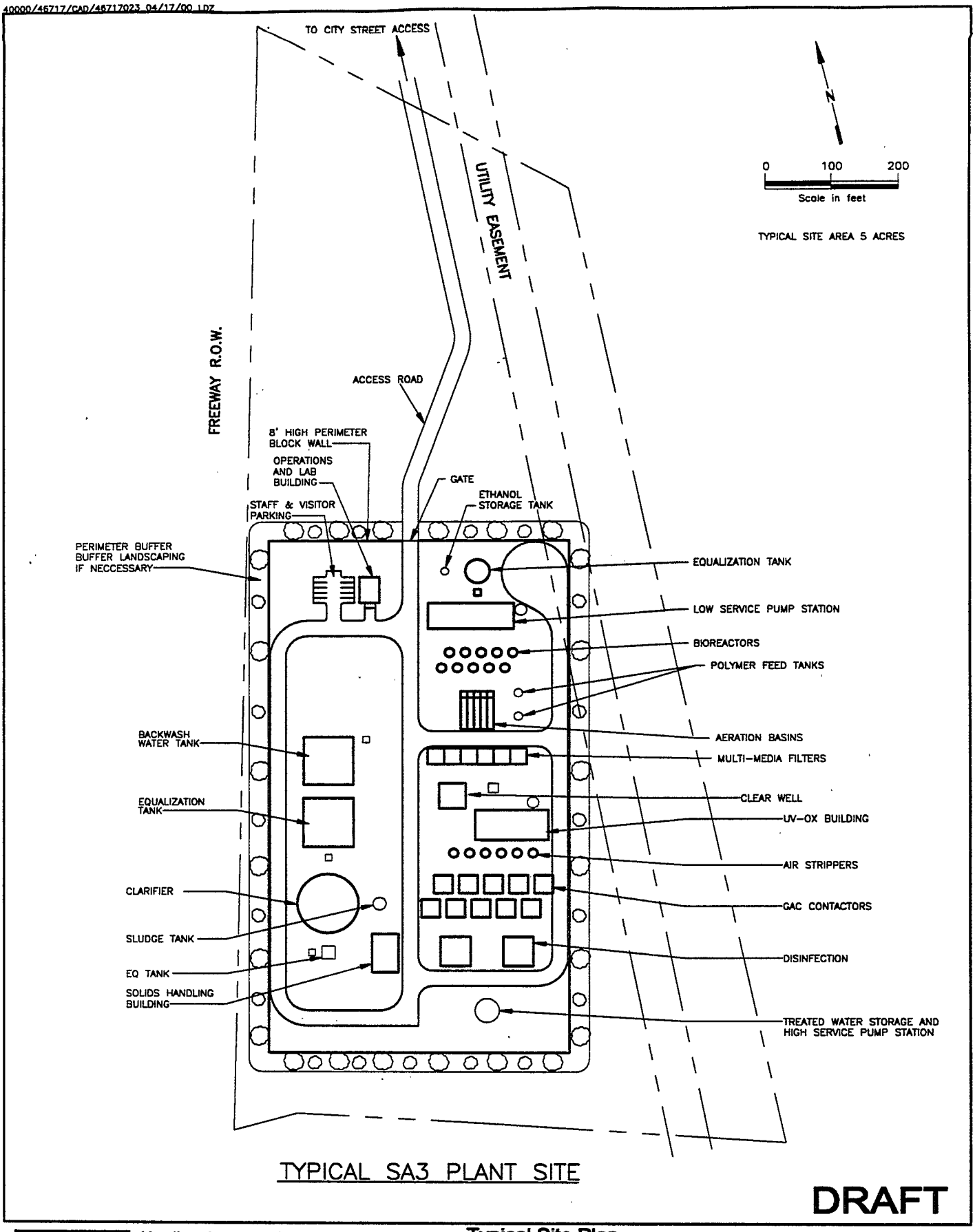
Approximate Treatment Plant Locations - Subarea 3
Conceptual Design Report
Baldwin Park Operable Unit
San Gabriel Basin, California

FIGURE 5-4

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717.202 | | 04/00 | |

40000/46717/CAD/46717023 04/17/00 LDZ




TYPICAL SA3 PLANT SITE

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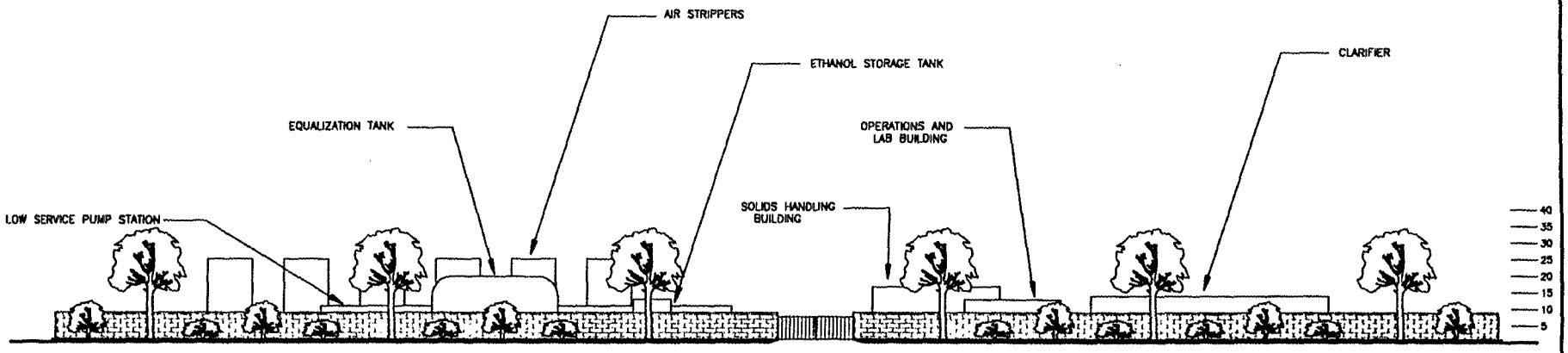
**Typical Site Plan**
**Subarea 3 Treatment Plant**
Conceptual Design Report
Baldwin Park OU, California

**Figure**
**5-5**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|

40000/46717/CAD/46717015 04/17/00 LDZ




ELEVATION

1 inch = 50 feet

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**Elevation of Main Entrance to Typical Treatment Plant**
Conceptual Design Report
Baldwin Park OU, California

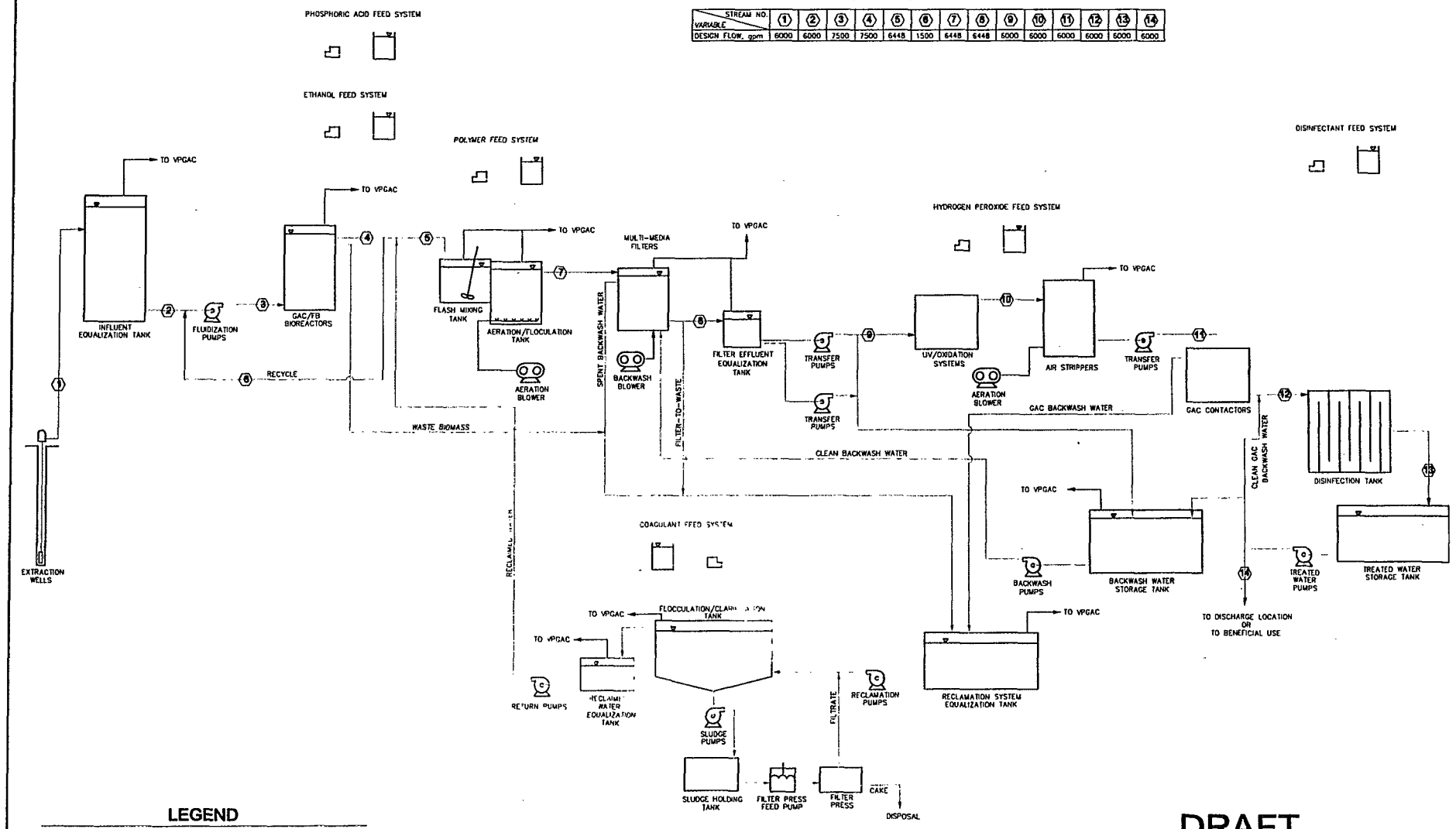
Figure
5-6

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| CWC | 46717.202 | | 04/00 | |

40000/46717/CAD/46717002 4/17/00 aj

## MAIN PROCESS FLOW RATES

| VARIABLE \ STREAM NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN FLOW, gpm | 6000 | 6000 | 7500 | 7500 | 6448 | 1500 | 6448 | 6448 | 6000 | 6000 | 6000 | 6000 | 6000 | 6000 |




## LEGEND

- Main Process Flow
- Reclamation System Flow
- Chemical Addition
- Air Flow
- Pump
- Blower
- Chemical Metering Pump
- Diaphragm Pump

**DRAFT**

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**Groundwater Treatment System**
**Process Flow Diagram - Subarea 1**
Conceptual Design Report
Baldwin Park OU, California

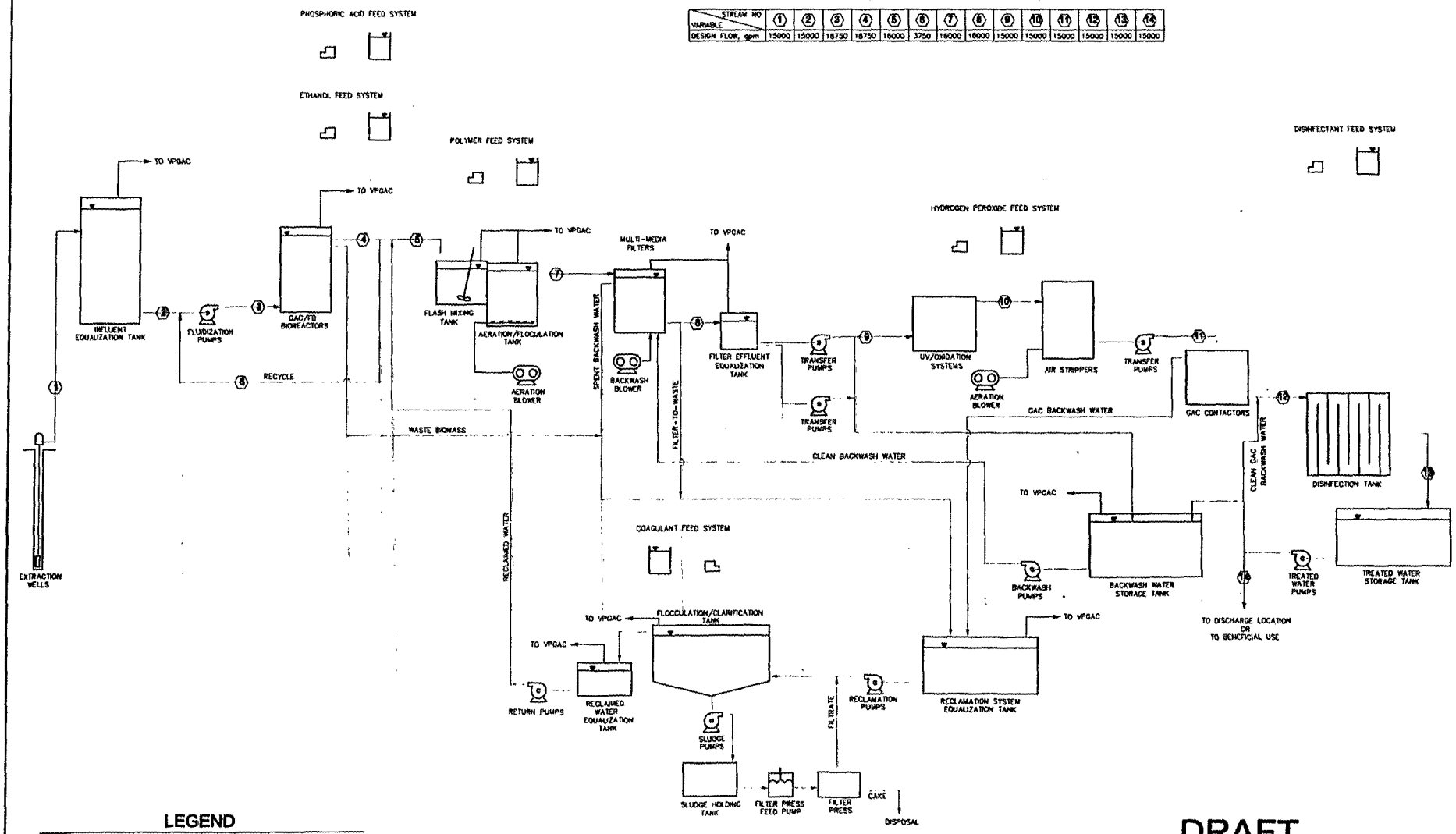
DRAWN CWC | JOB NUMBER 46717,202 | APPROVED | DATE 04/00

Figure 7-1

40000/46717/CAD/46717013 4/17/00 mj

## MAIN PROCESS FLOW RATES

| VARIABLE \ STREAM NO | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN FLOW, gpm | 15000 | 15000 | 18750 | 18750 | 16000 | 3750 | 16000 | 18000 | 15000 | 15000 | 15000 | 15000 | 15000 | 15000 |

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Groundwater Treatment System
Process Flow Diagram - Subarea 3
Conceptual Design Report
Baldwin Park OU, California

Figure 7-2

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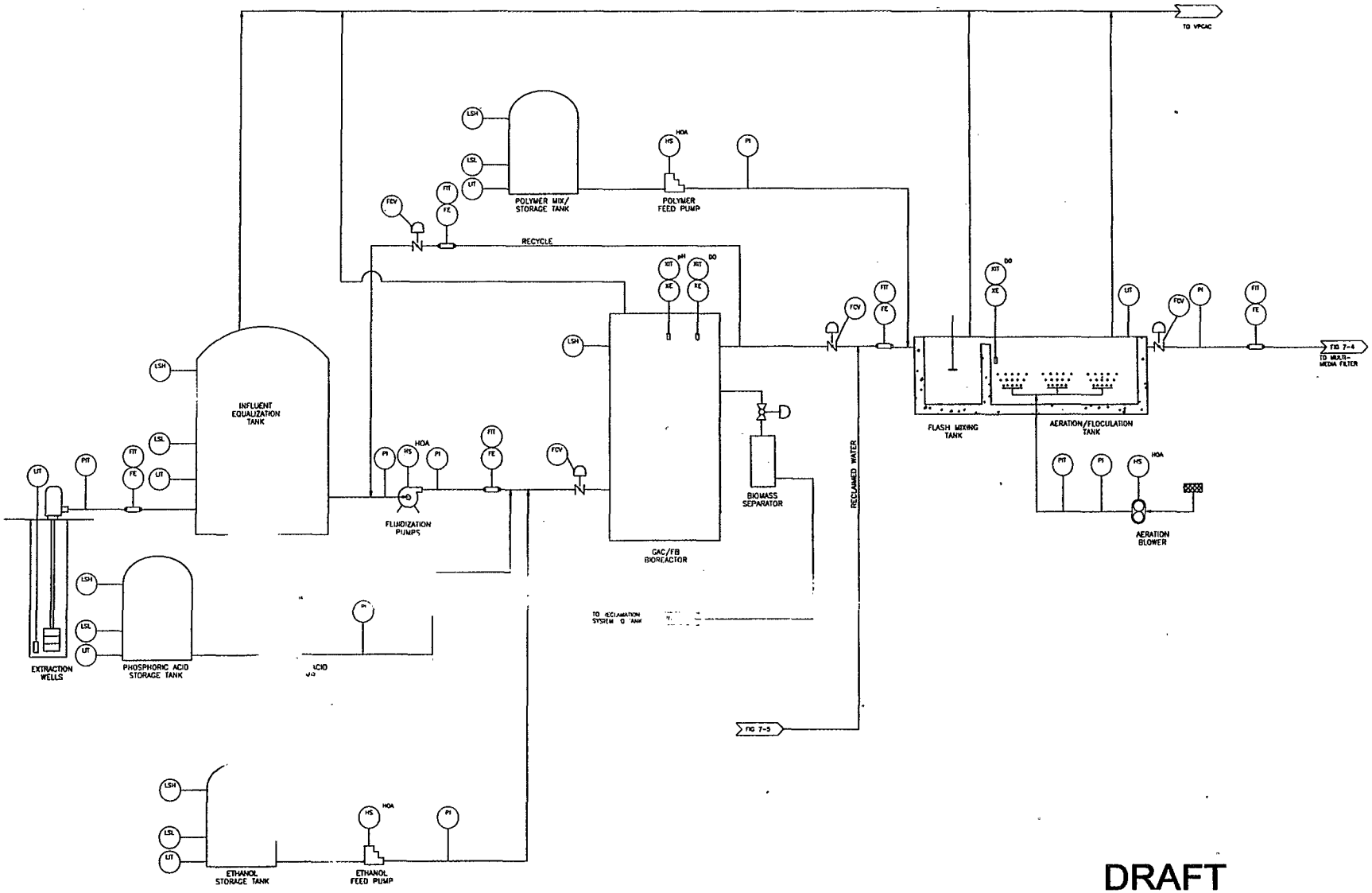
40000/46717/CAD/46717003 4/14/00 SLJ

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| | | | |
|---|---|---|---|
| Harding Lawson Associates<br>Engineering and Environmental Services | Groundwater Treatment System<br>Process and Instrumentation Diagram - Subarea 1<br>Conceptual Design Report<br>Baldwin Park OU, California | | Figure<br>7-3 |
| DRAWN CWC | JOB NUMBER 46717.202 | APPROVED | DATE 04/00 |

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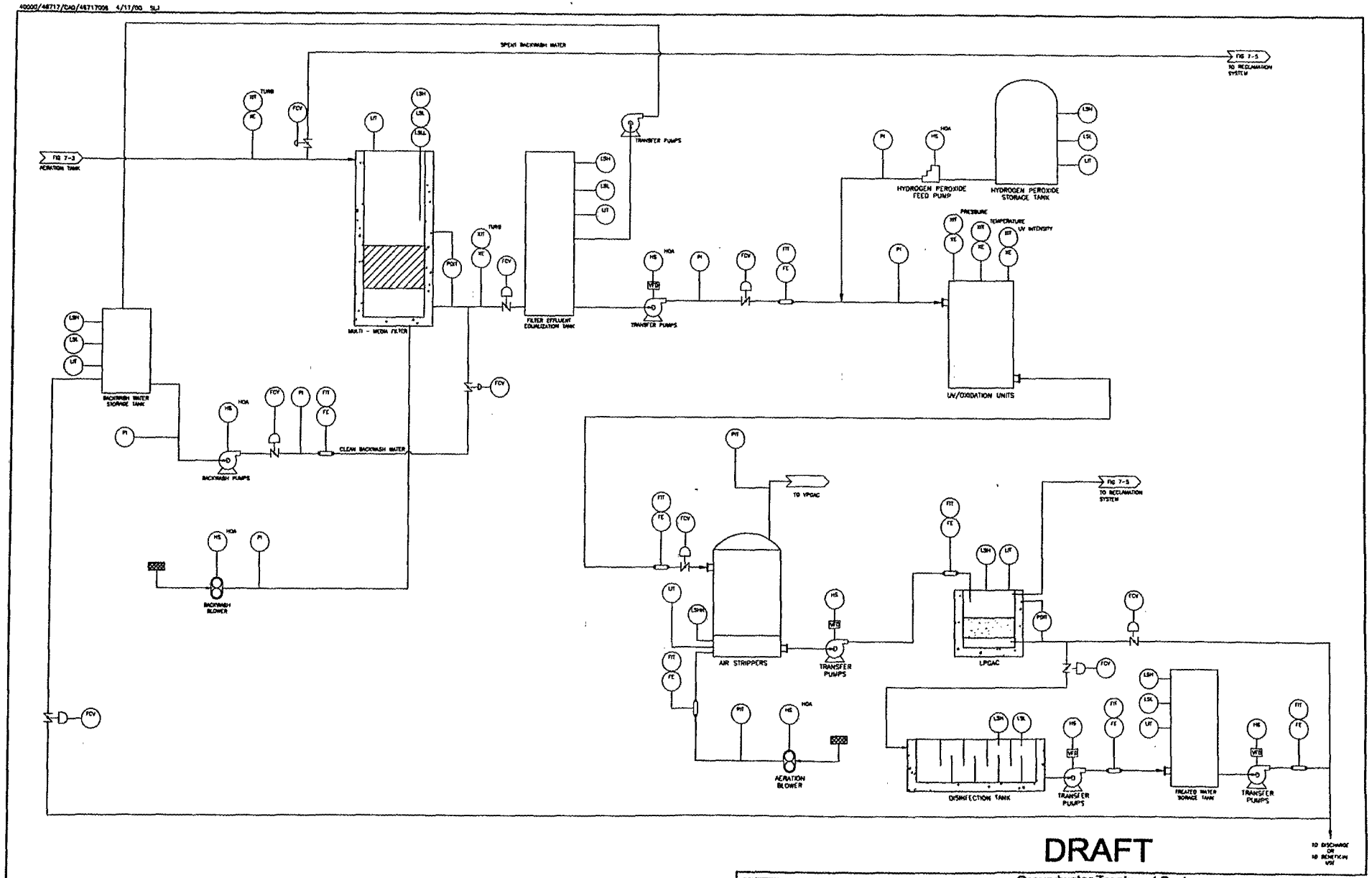


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Groundwater Treatment System
Process and Instrumentation Diagram - Subarea 1
Conceptual Design Report
Baldwin Park OU, California

Figure 7-4

| DRAWN | JOB NUMBER | APPROVED | DATE |
|---|---|---|---|
| CWC | 46717.202 | | 04/00 |

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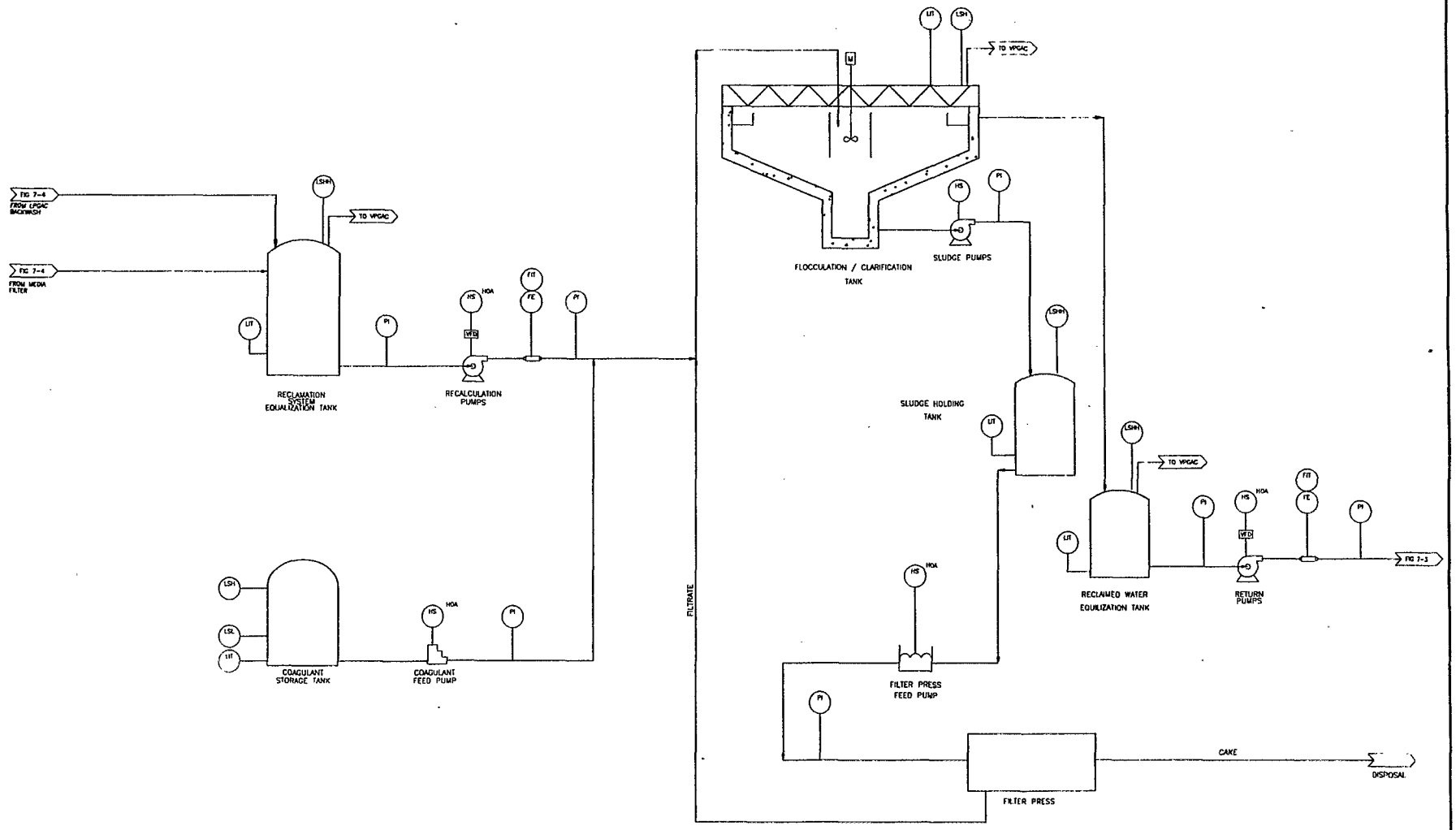


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**Groundwater Treatment System**
**Process and Instrumentation Diagram - Subarea 1**
Conceptual Design Report
Baldwin Park OU, California

Figure **7-5**

REVISED DATE

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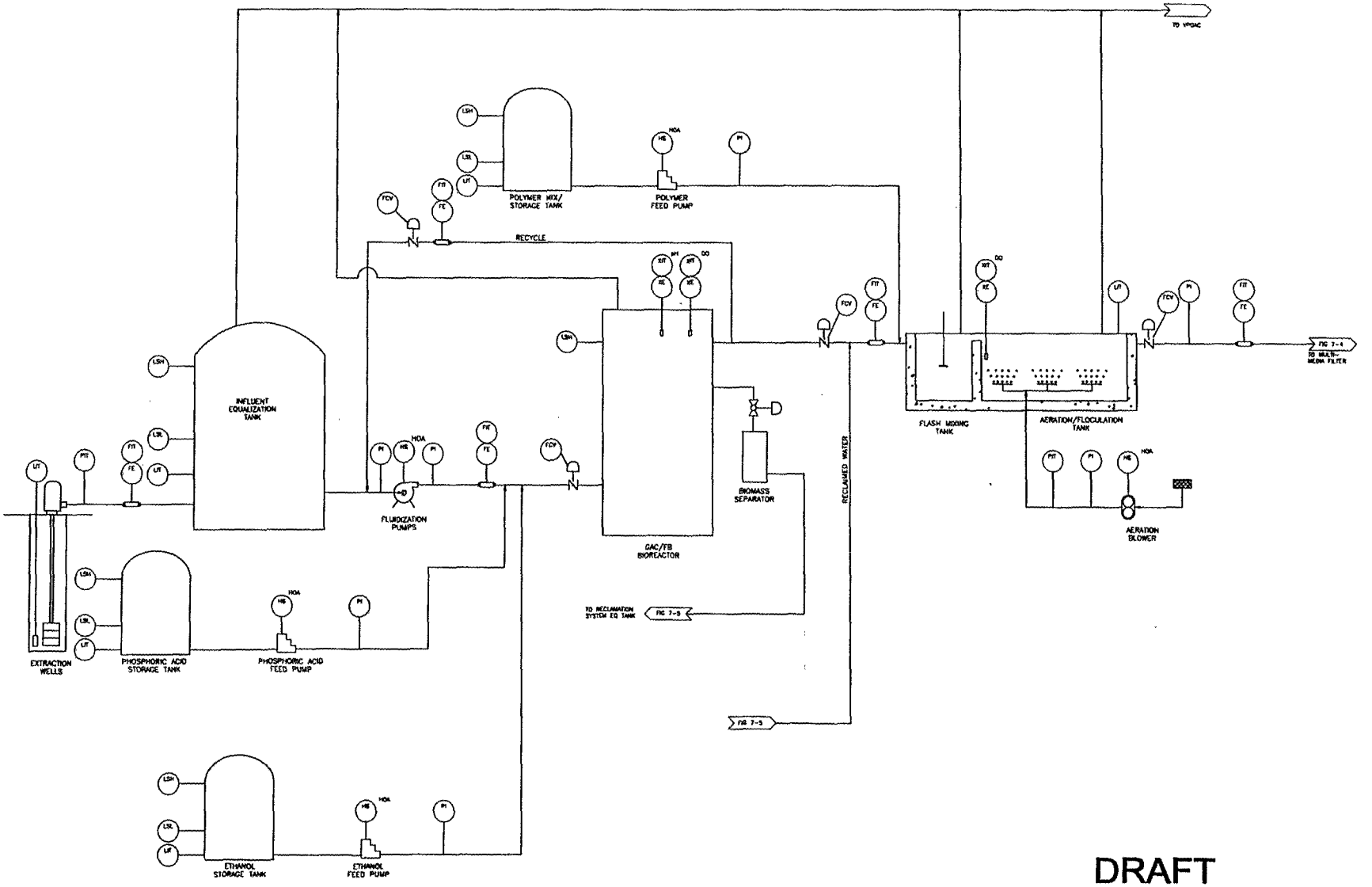


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Groundwater Treatment System
Process and Instrumentation Diagram - Subarea 3
Conceptual Design Report
Baldwin Park OU, California

Figure 7-6

| DRAWN | JOB NUMBER | APPROVED | DATE |
|---|---|---|---|
| CWC | 46717,202 | | 04/00 |

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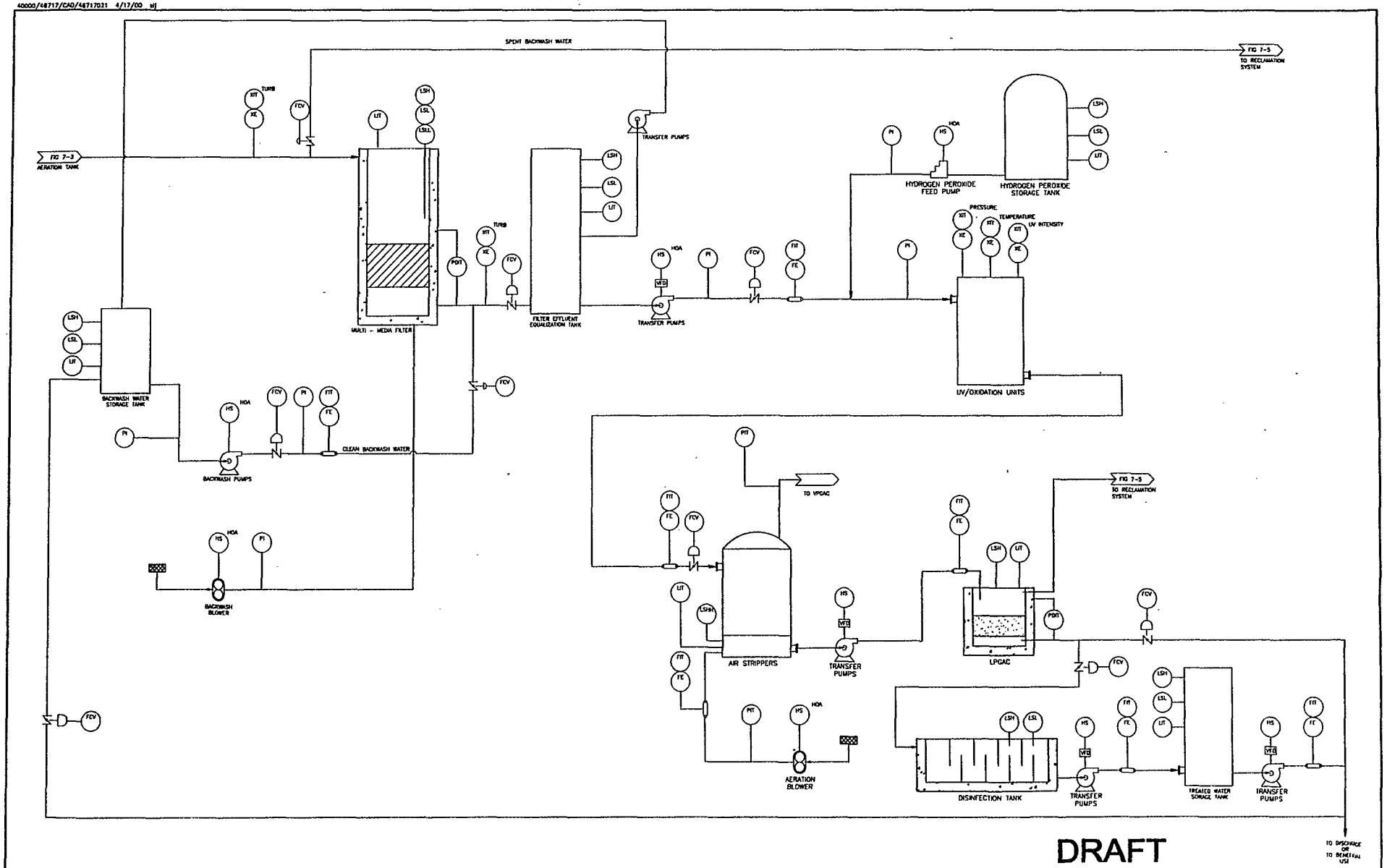


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Engineering and Environmental Services

**Groundwater Treatment System**
**Process and Instrumentation Diagram - Subarea 3**
Conceptual Design Report
Baldwin Park OU, California

**Figure 7-7**

| DRAWN | JOB NUMBER | APPROVED | DATE |
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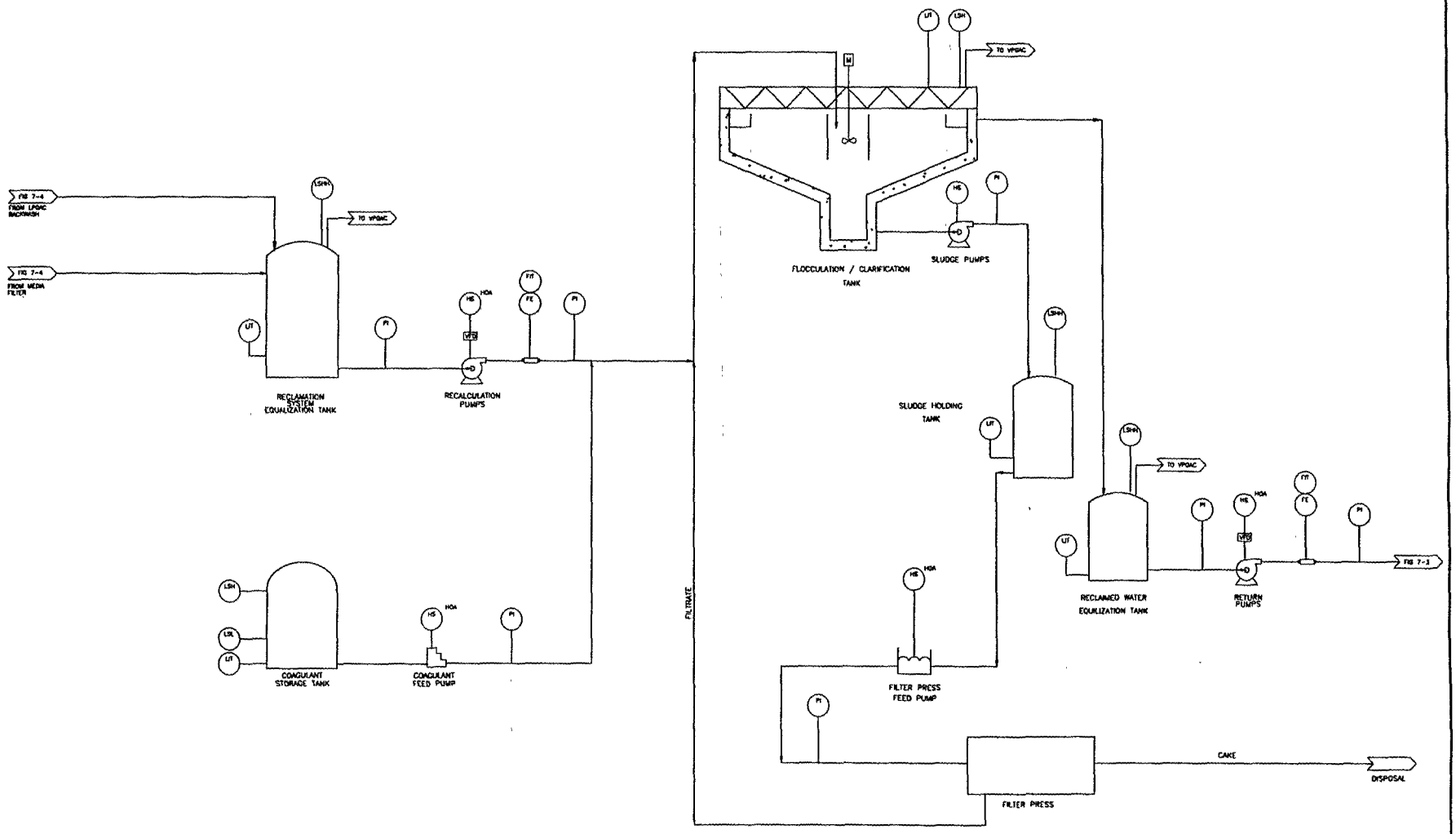


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| | | | |
|---|---|---|---|
| HLA | Harding Lawson Associates<br>Engineering and Environmental Services | Groundwater Treatment System<br>Process and Instrumentation Diagram - Subarea 3<br>Conceptual Design Report<br>Baldwin Park OU, California | Figure<br>7-8 |
| DRAWN CWC | JOB NUMBER 46717,202 | APPROVED | DATE 04/00 |

Baldwin Park Operable Unit
DRAFT CONCEPTUAL DESIGN REPORT
PROJECT SCHEDULE

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Good Faith Offer** | **0 days** | **Thu 9/9/99** | **Thu 9/9/99** |
| 2 | **Phase 2 Biological Treatability Study** | **252 days** | **Thu 9/23/99** | **Fri 9/8/00** |
| 3 | Procurement and Construction | 112 days | Thu 9/23/99 | Fri 2/25/00 |
| 4 | Start-Up Period | 10 days | Mon 2/28/00 | Fri 3/10/00 |
| 5 | Initial Operation | 40 days | Mon 3/13/00 | Fri 5/5/00 |
| 6 | Treatability Study Operation | 130 days | Mon 3/13/00 | Fri 9/8/00 |
| 7 | **Baseline Remedy Performance Monitoring** | **422 days** | **Tue 4/11/00** | **Wed 11/21/01** |
| 8 | Potentiometric Monitoring | 402 days | Tue 4/11/00 | Wed 10/24/01 |
| 13 | Water Quality Monitoring | 422 days | Tue 4/11/00 | Wed 11/21/01 |
| 18 | Multiport Monitoring Well Installation | 90 days | Wed 11/22/00 | Tue 3/27/01 |
| 19 | **California Department of Health Services Permitting** | **360 days** | **Mon 3/13/00** | **Fri 7/27/01** |
| 20 | Permit Review and Issue Period | 360 days | Mon 3/13/00 | Fri 7/27/01 |
| 21 | **Remedial Design** | **343 days** | **Thu 9/9/99** | **Mon 1/1/01** |
| 22 | **RD/RA Workplan** | **111 days** | **Thu 9/9/99** | **Thu 2/10/00** |
| 23 | Draft Plan | 25 days | Thu 9/9/99 | Wed 10/13/99 |
| 24 | EPA Review | 12 days | Mon 10/18/99 | Tue 11/2/99 |
| 25 | Draft Final Plan | 10 days | Wed 11/3/99 | Tue 11/16/99 |
| 26 | EPA Review | 58 days | Wed 11/17/99 | Fri 2/4/00 |
| 27 | Final Plan | 4 days | Mon 2/7/00 | Thu 2/10/00 |
| 28 | Conceptual Remedial Design Submittal | 53 days | Fri 2/11/00 | Tue 4/25/00 |
| 29 | EPA Review | 20 days | Wed 4/26/00 | Tue 5/23/00 |
| 30 | Revised | 20 days | Wed 5/24/00 | Tue 6/20/00 |
| 31 | Land Acquisition | 90 days | Thu 6/15/00 | Wed 10/18/00 |
| 32 | Permitting | 60 days | Thu 6/15/00 | Wed 9/6/00 |
| 33 | Qualification of Design-Build Contractors | 40 days | Wed 4/12/00 | Tue 6/6/00 |
| 34 | Notification of Selected Contractor | 0 days | Tue 6/6/00 | Tue 6/6/00 |
| 35 | Preliminary Remedial Design Submittal | 50 days | Mon 6/12/00 | Fri 8/18/00 |
| 36 | EPA Review | 20 days | Mon 8/21/00 | Fri 9/15/00 |
| 37 | Revised | 15 days | Mon 9/18/00 | Fri 10/6/00 |
| 38 | Prefinal Remedial Design Submittal | 45 days | Mon 8/21/00 | Fri 10/20/00 |
| 39 | EPA Review | 20 days | Mon 10/23/00 | Fri 11/17/00 |
| 40 | Final Design Submittal | 31 days | Mon 11/20/00 | Mon 1/1/01 |
| 41 | **Construction Phase** | **337 days** | **Thu 10/19/00** | **Fri 2/1/02** |
| 42 | Extraction Well Installation | 180 days | Thu 10/19/00 | Wed 6/27/01 |
| 43 | Extraction Well Development and Testing | 147 days | Tue 12/19/00 | Wed 7/11/01 |
| 44 | Water Line Installation | 180 days | Tue 1/2/01 | Mon 9/10/01 |
| 45 | Subarea 1 Plant Construction | 204 days | Tue 1/2/01 | Fri 10/12/01 |
| 46 | Subarea 1 Equipment Procurement | 195 days | Mon 11/20/00 | Fri 8/17/01 |
| 47 | Subarea 1 Equipment Installation | 90 days | Mon 8/20/01 | Fri 12/21/01 |
| 48 | Subarea 1 Startup | 30 days | Mon 12/24/01 | Fri 2/1/02 |
| 49 | Begin Subarea 1 Plant Operation | 0 days | Fri 2/1/02 | Fri 2/1/02 |
| 50 | Subarea 3 Plant Construction | 249 days | Tue 1/2/01 | Fri 12/14/01 |
| 51 | Subarea 3 Equipment Procurement | 195 days | Mon 11/20/00 | Fri 8/17/01 |
| 52 | Subarea 3 Equipment Installation | 90 days | Mon 8/20/01 | Fri 12/21/01 |
| 53 | Subarea 3 Startup | 30 days | Mon 12/24/01 | Fri 2/1/02 |
| 54 | Begin Subarea 3 Plant Operation | 0 days | Fri 2/1/02 | Fri 2/1/02 |

Tue 4/18/00

Figure 10-1

## DISTRIBUTION

Draft
Conceptual Design Report
Baldwin Park Operable Unit
San Gabriel Basin, California

April 18, 2000

Copy No.

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| Copy 2: | David Towell<br>CH2M Hill<br>1325 Airmotive Way, Suite 200<br>Reno, NV 89502 | Copy 7: | Lewis Maldonado<br>US EPA Region IX<br>75 Hawthorne Street<br>San Francisco, CA 94105-3901 |
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| Copy 4: | Bruce Jernigan<br>BPOUSP Consultant<br>14210 Rivergrove<br>Houston, Texas 77070 | Copies 9-15: | HLA Project Team |
| Copy 5: | Peter Taft<br>Munger, Tolles & Olsen<br>355 South Grand Avenue,<br>Suite 3500<br>Los Angeles, CA 90071 | Copy 16: | HLA Project File |

76150

Attachment 6

# Addendum to the Draft Conceptual Design Report Baldwin Park Operable Unit San Gabriel Basin, California

Submitted to

**U.S. Environmental Protection Agency Region IX**

Prepared for:

**Baldwin Park Operable Unit Settling Parties**

HLA Project No.: 50503 2.5

May 18, 2000

**Harding Lawson Associates**
Engineering and Environmental Services
707 Seventeenth Street Suite 2400
Denver, CO 80202 — (303) 292-5365

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2-3 Groundwater Treatment System, Process and Instrumentation Diagram – Subarea 3
2-4 Typical Site Plan - Subarea 3 Treatment Plant

# 1.0 INTRODUCTION

Harding Lawson Associates (HLA) is submitting this Addendum to the Draft Conceptual Design Report (CDR-A) to the U.S. Environmental Protection Agency, Region IX (EPA) on behalf of the Baldwin Park Operable Unit Settling Parties (BPOUSP), which includes Aerojet General Corporation (Aerojet), Azusa Gas Systems, Fairchild Holding Corporation, Hartwell Corporation, Huffy Corporation, J.H. Mitchell & Sons Distributors Inc., Oil and Solvent Processing Company, Screwmatic Inc., Whico Machine Inc., Wynn Oil Company, and Reichhold Inc. This CDR-A is part of the ongoing activities to be performed by the BPOUSP in order to design, construct, operate, maintain, monitor, and evaluate the remedy described in the Baldwin Park Operable Unit (BPOU) Record of Decision (ROD), as modified by the Explanation of Significant Differences (ESD). This addendum is intended to supplement the Draft CDR, (HLA, 2000a) which meet the requirements set forth in the *Remedial Design/Remedial Action* (RD/RA) Statement of Work (SOW) prepared by the EPA and BPOUSP.

This CDR-A is provided to introduce an alternative treatment train incorporating the ion exchange technology for the groundwater treatment system (GTS) in Subarea 3. The ion exchange alternative is being considered because this treatment technology removes perchlorate and because approval by DHS of this process for use on a potable water source may be finalized sooner than that of the biological reduction process presented in the draft CDR dated April 18, 2000. The information provided in the Draft CDR (HLA, 2000a) regarding historical perspective, ongoing design activities, groundwater extraction, design basis, land acquisition, raw water collection, treated water delivery and use, and project schedule remains unchanged and is applicable to this alternative.

## 1.1 Organization of Addendum

The remainder of this CDR-A contains the following elements:

- Section 2.0 summarizes discusses each unit treatment process and summarizes the design characteristics of the Subarea 3 Treatment Plant.

- Section 3.0 summarizes the references used during the preparation of this CDR-A.
- Section 4.0 presents the acronyms used in this CDR-A.

# 2.0 CONCEPTUAL TREATMENT SYSTEM DESIGN

The treatment train utilizing the ion exchange (IX) technology proposed for the Subarea 3 GTS, like the treatment train proposed in the Draft CDR (HLA, 2000a), is designed to progressively remove contaminants from the water using a series of unit operations. The unit operations are sequenced to provide maximum removal efficiencies, while minimizing potential interferences with downstream processes. The sequence of treatment operations will enable the treatment systems to meet effluent goals, while minimizing costs and waste production. The treatment train is designed to be a multibarrier systems with respect to both chemical and biological contaminants. The ultimate objective of the treatment system is to reliably treat the extracted groundwater to produce potable water meeting all applicable state and federal requirements for chemical and biological contaminants, turbidity, color, odor, and residual disinfectant concentration.

## 2.1 Overview of Treatment Train

Based on the extraction rates predicted by groundwater modeling presented in the Draft CDR (HLA, 2000a), a 15,000 gallons per minute (gpm) system will be constructed in Subarea 3.

This alternative treatment train for the Subarea 3 Treatment Plant includes influent equalization, air stripping and offgas treatment, ion exchange, ultraviolet/oxidation (UV/OX), disinfection, and effluent equalization. Figure 2-1 presents a conceptual process flow diagram (PFD), and Figures 2-2 and 2-3 present conceptual piping and instrumentation diagrams (P&IDs) for the Subarea 3 Treatment Plant.

### 2.1.1 Influent Equalization

Extracted groundwater will be pumped to an influent equalization tank, which will allow for equalization of flow and contaminant concentrations. This process will enable the treatment system to accommodate fluctuations in flow and contaminant loading from individual wells without disrupting other treatment processes.

### 2.1.2 Air Stripping and Offgas Treatment

The air stripping and offgas treatment system is designed to remove volatile organic compounds (VOCs) upstream of the ion exchange system to prevent the possibility of degradation of the ion exchange resin due to contact with VOCs. Air stripping is a process by which VOCs are removed from the liquid phase and transferred into the vapor phase. This process takes advantage of the tendency of compounds with relatively low solubility in water and relatively high vapor pressure to exist in the vapor phase rather than the liquid phase. The air strippers contact air to contaminated water in a countercurrent configuration, and maximize the surface area of the air/water interface to maximize the rate of transfer of these compounds from the water into the air. The air strippers are cylindrical towers filled with packing media, which distribute the water into droplets and maximize mass transfer between the liquid phase (water) and the vapor phase (air). The stripping air is blown into the base of each tower, flows up through the tower, exits at the top of the tower. Stripped VOCs are transferred into the air stream and exit the stripper system with the air. The air exiting the air strippers flows through vapor-phase granular activated carbon (VPGAC) adsorbers where VOCs in the air stream are adsorbed onto the granular activated carbon (GAC) media.

### 2.1.3 Ion Exchange

Ion exchange is a physical-chemical process by which ions are transferred from a solid to a liquid phase or vice versa. Ions held by electrostatic forces to charged functional groups on the surfaces of a solid are exchanged for ions of like charge in a solution in which the solid is being contacted. Ion exchange resins are generally categorized as anionic or cationic, depending on whether they exchange positive or negative ions. Anionic resins exchange a negative ion such as chloride ($Cl^-$) for another negative ion. Cationic resins exchange a positive ion such as sodium ($Na^+$) for another positive ion.

The ion exchange system will remove nitrate, sulfate, and perchlorate from the groundwater. The treatment plant will utilize fixed-bed ion exchange adsorbers to remove these anions. The groundwater

will be pumped through vessels containing a weak base anion exchange resin. This type of resin has a stronger affinity for nitrate and perchlorate ions than for chloride ions. The nitrate and perchlorate ions present in the groundwater displace chloride ions affixed to the resin beds.

The ion exchange resin will require periodic regeneration with a concentrated sodium chloride solution, followed by rinsing with softened water. The spent brine from the regeneration of the resin contains high concentrations of nitrate and perchlorate. The spent brine must be either disposed of or treated and reused. For the purposes of this conceptual design, it is assumed that the spent brine will be disposed of by pumping into the County Sanitation Districts (CSD) brine disposal line operated by the Los Angeles County Sanitation District.

### 2.1.4 Ultraviolet/Chemical Oxidation

The UV/OX system will oxidize n-nitrosodimethylamine (NDMA) and 1,4-dioxane using a combination of ultraviolet (UV) light and hydrogen peroxide. The UV light reacts with the hydrogen peroxide to form hydroxyl radicals, which are extremely reactive. The hydroxyl radicals will rapidly react with the contaminants remaining in the groundwater. In general, reaction with UV light, hydrogen peroxide, or hydroxyl radicals will cleave a contaminant molecule into two or more breakdown products which, in turn, react with the oxidants in successive steps, resulting in the end products nitrogen gas ($N_2$), carbon dioxide ($CO_2$), water ($H_2O$), and chloride ion ($Cl^-$).

This system is positioned after the ion exchange system in the treatment train so that nitrate, which interferes with the UV/OX process, is removed from the water before it enters the UV/OX system. Nitrate absorbs UV light at approximately the same wavelength that is output by the UV lamps proposed for this system (200 to 300 nanometers) and converts it into heat. This leaves fewer photons available for photolysis and increases the UV power required.

The UV/OX system proposed is a conventional high-energy system. A low-energy UV/OX system that uses lower wattage UV lamps than those used in conventional high-energy UV/OX systems is currently being evaluated as part of the Phase 2 Treatability Study. If this low-energy system is proven to be effective and the technology is approved for use with drinking water systems, it will be evaluated for use in the full-scale treatment system.

It is anticipated that inclusion of the UV/OX system in the treatment train will qualify for one order of magnitude reduction of Giardia cysts and viruses under the California Department of Health Services (DHS) Surface Water Treatment Rule.

### 2.1.5 Disinfection

The disinfection system will introduce sodium hypochlorite into the treated water to provide a source of chlorine. Contact time will be provided in a baffled tank, which will force the water through a circuitous path. The disinfection system will be designed to provide sufficient contact time and residual concentration to qualify for one order of magnitude reduction of Giardia cysts and viruses under the California DHS Surface Water Treatment Rule.

### 2.1.6 Effluent Equalization

The equalization of plant effluent is provided with holding time in the treated water storage tank. In addition, the tank will provide equalization for the operation of the high-service pump station delivering the treated water to its end use.

## 2.2 Subarea 3 Groundwater Treatment System – Ion Exchange Alternative

The Subarea 3 groundwater treatment system will have a hydraulic capacity of 15,000 gpm. The treatment train includes influent equalization, air stripping with GAC offgas treatment, ion exchange, UV/OX, disinfection, and treated water storage.

### 2.2.1 Influent Equalization

#### *System Components*

The influent equalization system includes the influent equalization tank and its associated instrumentation and fittings.

#### *Design Criteria*

The influent equalization tank will have a capacity of 150,000 gallons and a hydraulic residence time of 10 minutes and will have 1 feet of freeboard at design capacity. This tank will be vented to atmosphere through a VPGAC adsorber. The design criteria for this tank are summarized in Table 2.1.

#### *Vessel Construction*

The influent equalization tank will have dimensions of 37 feet in diameter and 20 feet in height, and will be constructed of welded carbon steel.

#### *Mechanical Equipment*

There are no pumps, blowers, or other mechanical equipment associated with this system.

#### *Instrumentation*

Control of the influent equalization system will be based on the level in the tank. A level indicator/transmitter will transmit a level signal for control purposes. High and low level switches will also be provided as backup to the level indicator/transmitter. The influent equalization tank will be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

### 2.2.2 Air Stripping and Offgas Treatment

#### *System Components*

The components of the air stripping and offgas treatment system include air stripper columns, air stripper blowers, air stripper feed pumps, transfer pumps, and VPGAC adsorbers.

#### *Design Criteria*

The air stripping system will be designed to reduce the concentrations of trichloroethene (TCE) from 38.81 to >5 micrograms per liter (µg/l), methylene chloride from 5.73 µg/l to >5 µg/l, carbon tetrachloride (CTC) from 3.23 µg/l to >0.5 µg/l, perchloroethylene (PCE) from 16.21 µg/l to >5 µg/l, benzene from 1.2 µg/l to >1 µg/l, and 1,2- dichloroethane (1,2-DCA) from 2.17 µg/l to >0.5 µg/l. The hydraulic loading rate in the air strippers will be 20 gallons per minute per square foot (gpm/ $ft^2$), and the air to water ratio will be 30:1. The air strippers will be designed to operate in forced draft mode. Six air strippers will be installed, with five being active at any time.

The offgas treatment system will be designed to remove 99.9 percent of VOCs from the air exiting the air strippers. The pressure drop through the VPGAC offgas treatment system is 14 inches $H_2O$.

The design criteria for this system are summarized in Table 2.1.

#### *Tanks and Vessels*

The air stripping towers will be 14 feet in diameter and 25 feet in height, and will be constructed of fiberglass-reinforced plastic (FRP). The vessels will have a water distributor above the top of the packing material, and a liquid re-distributor midway through the packing column. The vessels will also have an air distributor below the air inlet.

The VPGAC vessels will have a capacity of 13,600 pounds of GAC, dimensions of 16 feet in length by 8 feet in width by 8 feet in height, and will be constructed of welded carbon steel with a coal tar epoxy interior liner.

### *Mechanical Equipment*

Each air stripper will be equipped with a blower capable of producing approximately 12,000 cubic feet per minute (cfm) at a discharge pressure of approximately 16 inches of $H_2O$.

Each air stripper will be fed by a centrifugal-type feed pump with a capacity of 3,000 gpm at 20 feet of head. Each feed pump will be equipped with a 40 horsepower (hp) motor and variable-speed drive.

The sump on each air stripper will be equipped with a centrifugal-type transfer pump with a capacity of 3,000 gpm at 49 feet of head. Each feed pump will be equipped with a 100 hp motor and variable-speed drive.

### *Instrumentation*

Influent flow to each air stripper will be controlled using a flow control valve. Instrumentation for the air stripping and offgas treatment system will include:

- Influent flow indicator transmitter
- Influent flow control valve
- Sump level indicator transmitter
- Sump high level switch
- Sump low level switch
- Blower pressure indicator transmitter
- Blower flow indicator transmitter
- VPGAC pressure indicator transmitter.

### 2.2.3 Ion Exchange

***System Components***

The ion exchange system will include 5 modules, each comprising approximately 30 ion exchange vessels. Each module will continuously process water through a portion of the vessels contained in the module, while simultaneously regenerating and rinsing a portion of the remaining vessels. Three tanks will be provided for mixing and storing brine for regeneration of the IX vessels. Each brine mixing/storage tank will be equipped with a brine pump. A tank will be provided for storage of spent brine. The spent brine tank will be equipped with a brine disposal pump. A tank and pump will be provided for storage and transfer of rinse water. A tank and pump will be provided for storage and transfer of spent rinse water. A reverse osmosis system will be provided for producing rinse water.

***Design Criteria***

The ion exchange system will be designed to reduce the concentration of pechlorate ($ClO_4^-$) from approximately 100 to 200 μg/l to < 18 μg/l, and the concentration of nitrate from 10 to 20 mg/l to < 1 mg/l. The ion exchange system will have a forward flow capacity of 15,000 gpm at a liquid loading rate of approximately 14 gpm/ft$^2$. The rate of generation of spent brine will be approximately 1 percent of the system forward flow. The design criteria for this system are summarized in Table 2.1.

***Vessel Construction***

The ion exchange vessels will have dimensions of 3 feet in diameter with 5-foot sideshell height, and will be constructed of welded carbon steel with a corrosion resistant lining. There will be a total of approximately 150 of these vessels.

The brine mixing/storage tanks will each have a capacity of 114,000 gallons, dimensions of 32 feet in diameter and 20 feet in height, and will be constructed of welded carbon steel with a corrosion resistant lining.

The spent brine tank will have a capacity of 114,000 gallons, dimensions of 32 feet in diameter and 20 feet in height, and will be constructed of welded carbon steel with a corrosion resistant lining.

The rinse water storage tank will have a capacity of 36,000 gallons, dimensions of 21 feet in diameter and 15 feet in height, and will be constructed of welded carbon steel with a corrosion resistant lining.

The spent rinse water tank will have a capacity of 36,000 gallons, dimensions of 32 feet in diameter and 20 feet in height, and will be constructed of welded carbon steel with a corrosion resistant lining.

***Mechanical Equipment***

The IX system will be equipped with three brine pumps, each with a capacity of 1,000 gpm at 40 feet of head, and driven by a 30 hp motor.

The brine disposal pumps will be designed based on the final location of the treatment system and the pressure required at the point of entry to the brine line.

The IX system will be equipped with five rinse water pumps, each with a capacity of 100 gpm at 40 feet of head, and driven by a 3 hp motor.

The IX system will be equipped with two spent rinse water pumps, each with a capacity of 500 gpm at 40 feet of head, and driven by a 15 hp motor.

The IX system will be equipped with a reverse osmosis system, including, permeators, membranes, and two piston-type positive displacement pumps.

***Instrumentation***

Each IX system will be equipped with the following instrumentation:

- Inlet flow control valve
- Inlet flow meter
- pH element/pH indicator transmitter
- High pressure switch
- Differential pressure indicator/transmitter

The brine mixing/feed tanks, spent brine storage tank, rinse water tank, and spent rinse water tank will each be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

### 2.2.4 Ultraviolet/Chemical Oxidation

***System Components***

The UV/OX system includes UV/OX reactors and power supply modules, hydrogen peroxide storage tanks, and hydrogen peroxide feed pumps. Water will flow through the UV/OX reactors under pressure from the ion exchange vessels.

***Design Criteria***

The UV/OX system will be designed to reduce the concentration of NDMA from about 0.2 μg/l to 2 parts per trillion (ppt). 1,4-dioxane will also be oxidized by the UV/OX system. The estimated UV power

required to meet the treatment goals is 1,800 kilowatts (kW). The UV/OX system will be designed to treat 15,000 gpm. The UV/OX system will be comprised of seven reactors including one spare.

The hydrogen peroxide feed system will be designed to provide a dosage of 15 milligrams per liter (mg/l) at design flow. The hydrogen peroxide storage tank will be designed to contain a 30-day supply of product. A hydrogen peroxide solution at a concentration of 50 percent by weight will be used.

The design criteria for this system are summarized in Table 2.1.

### *Tanks and Vessels*

The UV/OX reactors will be 5 feet in diameter and will be constructed of welded stainless steel. The hydrogen peroxide storage tank will have a capacity of 19,500 gallons with dimensions of 16 feet in diameter and 15 feet high, and will be constructed of welded stainless steel.

### *Mechanical Equipment*

Hydrogen peroxide will be fed to each UV/OX reactor by an individual motor driven, double diaphragm type chemical metering pump.

### *Instrumentation*

Control of the UV/OX system is based on monitoring temperature, pressure, and UV intensity in each reactor, and flow through each reactor. Each UV/OX reactor will be equipped with the following instrumentation:

- Inlet flow indicator transmitter
- Pressure indicator transmitter
- Temperature indicator transmitter
- UV intensity indicator transmitter.

The hydrogen peroxide storage tank will be equipped with the following instrumentation:

- Level indicator transmitter
- High level switch
- Low level switch.

### 2.2.5 Disinfection

#### *System Components*

The Disinfection system includes disinfection tanks, sodium hypochlorite storage tank, and sodium hypochlorite feed pumps, and transfer pumps.

#### *Design Criteria*

The disinfection system will provide an average chlorine dose of 3 mg/l. The contact time will be 15 minutes. The sodium hypochlorite storage tank will be designed for a 7 day storage capacity. The design criteria for this system are summarized in Table 2.1.

#### *Tanks and Vessels*

The disinfection tanks will be 45 feet by 45 feet by 10 feet deep and will be constructed from reinforced concrete.

The sodium hypochlorite storage tank will have a capacity of 38,000 gallons, dimensions of 20 feet in diameter and 16 feet in height, and will be constructed of stainless steel.

#### *Mechanical Equipment*

Sodium hypochlorite will be fed to each disinfection contactor by an individual motor driven, double diaphragm type chemical metering pump.

The disinfection tanks will be equipped with centrifugal-type transfer pumps with a capacity of 7,500 gpm at 25 feet of head. Each feed pump will be equipped with a 100 hp motor and variable-speed drive.

#### *Instrumentation*

The disinfection system will include the following instrumentation:

- Level Switch High
- Level Switch Low

### 2.2.6 Treated Water Storage System

The effluent equalization tank will have a capacity of 150,000 gallons and a hydraulic residence time of 10 minutes. The design criteria for this tank are summarized in Table 2.1.

#### *Vessel Construction*

The effluent equalization tank will have dimensions of 37 feet in diameter and 20 feet in height and will be constructed of welded carbon steel. The tank will have 1 foot of freeboard at design capacity.

#### *Mechanical Equipment*

Treated water pumps are discussed in Section 8.0 of the Draft CDR (HLA, 2000a).

#### *Instrumentation*

Control of the treated water storage system will be based on level in the tank. The treated water storage tank will be equipped with the following instrumentation:

- Level indicator transmitter
- Low level switch
- High level switch.

## 2.3 Control System Description

Each individual system in the Subarea 3 Treatment Plant will be controlled by local programmed logic controllers (PLCs). Digital and analog signals from field instruments will be transmitted to the local PLC for each system. A personal computer based graphical operator interface will be provided at each system.

In addition to the local control systems, a plant-wide control system at each subarea will communicate with the local control systems, and allow operators to monitor process variables and alarm conditions, and modify set points.

## 2.4 Plant Layout

The conceptual design phase plant layout considers a logical "flow" through the plant in an attempt to avoid unnecessary and confusing yard piping and excessive in-plant pumping; ensure access to buildings and equipment for operation and maintenance; and provide sufficient space for construction activities.

The treatment train described above can be laid out in a variety of configurations depending on available property for potential plant sites; one possible configuration is shown in Figure 2-4. This particular layout requires approximately 8 acres of land and takes into account the considerations stated above.

### 2.4.1 Plant Site – Laboratory/Utility Building

The Subarea 3 plant site will have a one-story building of approximately 1,200 square feet ($ft^2$) and 12 feet to top of parapet. The building will provide space for: wash room/water closet, small laboratory, control room, multi-use breakroom, and tool storage. Heating, ventilation, and air conditioning (HVAC) equipment will be roof-mounted. The structure will be of non-combustible construction: concrete masonry bearing walls and steel deck roof supported by bar joists. The exterior grade will be 6 inches below finish floor and will have minimal landscaping since it will not be exposed to public view. Parking will provided for at least of six vehicles.

## 2.5 Permitting

Permitting requirements have previously been presented in Section 5.2 of the Draft CDR (HLA, 2000a). In addition to the requirements presented for well facilities, treatment plant construction and operation, pipeline construction, and recharge water discharge, the IX alternative would require connection and disposal permits with the Los Angeles County Sanitation District to connect and pump the brine solution into the Los Angeles Basin Brine Disposal Line. Table 2.2 presents a list of the permits associated with pipeline construction required in addition to those presented in Table 5.5 of the Draft CDR (HLA,2000a).

# 3.0 ACRONYMS

| | |
|---|---|
| µg/l | Micrograms per liter |
| 1,2-DCA | 1,2-dichloroethane |
| Aerojet | Aerojet-General Corporation |
| BPOU | Baldwin Park Operable Unit |
| BPOUSP | Baldwin Park Operable Unit Settling Parties |
| CDR | Conceptual Design Report |
| CDR-A | Conceptual Design Report Addendum |
| cfm | Cubic feet per minute |
| $Cl^-$ | Chloride ion |
| $ClO_4^-$ | Perchlorate |
| $CO_2$ | Carbon dioxide |
| CTC | Carbon tetrachloride |
| DHS | State of California Department of Health Services |
| EPA | United States Environmental Protection Agency Region IX |
| ESD | Explanation of Significant Differences |
| FRP | Fiberglass-reinforced plastic |
| ft | Feet |
| $ft^2$ | Square feet |
| GAC | Granular activated carbon |
| gpm | Gallons per minute |
| $gpm/ft^2$ | Gallons per minute per square foot |
| GTS | Groundwater treatment system |
| $H_2O$ | Water |
| HLA | Harding Lawson Associates |

| | |
|---|---|
| Hp | Horsepower |
| HVAC | Heating, Ventilation, and Air Conditioning |
| in | Inch |
| IX | Ion exchange |
| kW | Kilowatt |
| lbs | Pounds |
| mg/l | Milligrams per liter |
| $N_2$ | Nitrogen gas |
| $Na^+$ | Sodium |
| NDMA | N-nitrosodimethylamine |
| PCE | Perchloroethene (tetrachloroethene) |
| PLC | Programmed Logic Control |
| ppt | Parts per trillion |
| RD/RA | Remedial design/remedial action |
| ROD | Record of Decision |
| SOW | Scope of Work |
| Subarea 3 | Southern portion of the plume |
| TCE | Trichloroethene |
| UV | Ultraviolet |
| UV/OX | Ultraviolet oxidation |
| VOCs | Volatile organic compounds |
| VPGAC | Vapor phase granular activated carbon |

# 4.0 REFERENCES

Harding Lawson Associates. 2000a. *Draft Conceptual Design Report, Baldwin Park Operable Unit, San Gabriel Basin, California.* April 18.

# TABLES

## Table 2-1
## Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative

| Description | Value | Unit |
|---|---|---|
| System Flow Rate | 15000 | gpm |
| **Influent Equalization Tank** | | |
| *Equalization Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 150,000 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 20 | ft |
| Tank Diameter | 37 | ft |
| Volume per Tank | 152,809 | gal |
| Tank Diameter to Depth Ratio | 1.9 | Dia:D |
| **Air Stripping System** | | |
| *Air Stripper Feed Pumps (Pump to top of Air Stripper)* | | |
| Height of Water in Eq Tank (Low Level) | 6.0 | ft |
| Height of Air Strippers (High Point) | 25.0 | ft |
| Required Flow Rate | 15000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 5 | |
| Diameter of each Pipeline | 14 | in |
| Velocity in Pipeline | 6.25 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 10.6 | ft per 1000 ft |
| Length of Each Pipeline | 100 | ft |
| Total Head (Neglects Minor Losses) | 20.06 | ft |
| Flow Rate per Pump | 3000 | gpm |
| Pump Efficiency | 70% | |
| Required Horsepower per pump | 32.6 | Hp |
| Nominal Pump Horsepower per pump | 40.0 | Hp |
| *Air Strippers* | | |
| Column Diameter | 14 | ft |
| Liquid Loading Rate | 19.488 | gpm/sf |
| Flow Rate per tower | 3000 | gpm |
| Number of Columns | 5.0 | each |
| Number of Spare Columns | 1 | each |
| Total Number of Air Stripping Columns | 6.0 | each |
| Height of Airstripper | 25 | ft |

**Table 2-1**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative**

| Description | Value | Unit |
|---|---|---|
| *Vapor-Phase GAC* | | |
| Air:Water Ratio | 30 | :1 |
| Air flow per tower | 12032 | cfm |
| Max flow rate per unit | 12000 | cfm |
| Operational % of maximum flow rate | 85% | |
| Flow Rate per unit | 10200 | cfm |
| Required Number of Units | 6 | |
| Length of Unit | 16.5 | ft |
| Width of Unit | 8 | ft |
| Height of Unit | 8 | ft |
| Footprint (per unit) | 132 | sf |
| *Transfer Pumps (Pumps through Ion Exchange and UV/OX)* | | |
| Height of Water in sump of Air Stripper (Low Level) | 2.0 | ft |
| Height of Water in Disinfection System | 0.0 | ft |
| Required Flow Rate | 15000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 5 | |
| Diameter of each Pipeline | 14 | in |
| Velocity in Pipeline | 6.25 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 10.6 | ft per 1000 ft |
| Length of Each Pipeline | 400 | ft |
| Head Loss through Ion Exchange | 10 | psi |
| Head Loss through UV/OX | 10 | psi |
| Total Head (Neglects Minor Losses) | 48.46 | ft |
| Flow Rate per Pump | 3000 | gpm |
| Pump Efficiency | 70% | |
| Required Horsepower per pump | 78.7 | Hp |
| Nominal Pump Horsepower per pump | 100.0 | Hp |
| **Ion Exchange System** | | |
| *Ion Exchange Contactors* | | |
| Column Diameter | 3 | ft |
| Liquid Loading Rate | 14 | gpm/sf |
| Flow Rate per column | 99 | gpm |
| Number of Columns | 151.6 | each |
| Number of Columns per System | 30.0 | |
| Total Number of Ion Exchange Systems | 5.0 | each |
| Height (Sidewall) of Ion Exchange Columns | 5 | ft |

**Table 2-1**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative**

| Description | Value | Unit |
|---|---|---|
| *Regeneration System* | | |
| Brine Concentration | 7 | percent |
| Brine Usage | 216,000 | gallons/day |
| Brine (7%) Density | 9.00 | lb/gal |
| NaCl Usage | 136,080 | lbs/day |
| *Brine Mixing/Storage Tanks* | | |
| Tank Holding Time | 12 | hours |
| Tank Volume | 108,000 | gal |
| Number of Tanks | 3 | |
| Tank Depth (Include 1 foot freeboard) | 20 | ft |
| Tank Diameter | 32 | ft |
| Volume per Tank | 114,300 | gal |
| Tank Diameter to Depth Ratio | 1.6 | Dia:D |
| *Spent Brine Tank* | | |
| Tank Holding Time | 12 | hours |
| Tank Volume | 108,000 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 20 | ft |
| Tank Diameter | 32 | ft |
| Volume per Tank | 114,300 | gal |
| Tank Diameter to Depth Ratio | 1.6 | Dia:D |
| *Brine Pumps* | | |
| Height of Liquid in Brine Tank (Low Level) | 2.0 | ft |
| Height of Water in Spent Brine Tank (High Level) | 19.0 | ft |
| Required Flow Rate | 1000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 5 | |
| Diameter of each Pipeline | 10 | in |
| Velocity in Pipeline | 4.09 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 0.4 | ft per 1000 ft |
| Length of Each Pipeline | 200 | ft |
| Head Loss through Ion Exchange | 10 | psi |
| Total Head (Neglects Minor Losses) | 40.17 | ft |
| Flow Rate per Pump | 1000 | gpm |
| Pump Efficiency | 60% | |
| Required Horsepower per pump | 25.4 | Hp |
| Nominal Pump Horsepower per pump | 30.0 | Hp |

**Table 2-1**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative**

| Description | Value | Unit |
|---|---|---|
| *IX Rinsewater Pumps* | | |
| Height of Liquid in Rinsewater Tank (Low Level) | 2.0 | ft |
| Height of Water in Brine Tank (High Level) | 19.0 | ft |
| Required Flow Rate per IX Module | 100 | gpm |
| Number of Pumps (I.e. number of pipelines) | 5 | |
| Diameter of each Pipeline | 4 | in |
| Velocity in Pipeline | 2.55 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 0.4 | ft per 1000 ft |
| Length of Each Pipeline | 200 | ft |
| Head Loss through Ion Exchange | 10 | psi |
| Total Head (Neglects Minor Losses) | 40.19 | ft |
| Flow Rate per Pump | 100 | gpm |
| Pump Efficiency | 60% | |
| Required Horsepower per pump | 2.5 | Hp |
| Nominal Pump Horsepower per pump | 3.0 | Hp |
| *Rinsewater Tank* | | |
| Tank Holding Time | 8 | hours |
| Tank Volume | 36,000 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 15 | ft |
| Tank Diameter | 21 | ft |
| Volume per Tank | 36,271 | gal |
| Tank Diameter to Depth Ratio | 1.4 | Dia:D |
| *Spent Rinsewater Tank* | | |
| Tank Holding Time | 8 | hours |
| Tank Volume | 36,000 | gal |
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 15 | ft |
| Tank Diameter | 21 | ft |
| Volume per Tank | 36,271 | gal |
| Tank Diameter to Depth Ratio | 1.4 | Dia:D |
| *Spent Rinsewater Pumps* | | |
| Height of Liquid in Spent Rinsewater Tank (Low Level) | 2.0 | ft |
| Height of R.O. System | 2.0 | ft |

**Table 2-1**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative**

| Description | Value | Unit |
|---|---|---|
| Required Flow Rate | 500 | gpm |
| Number of Pumps (I.e. number of pipelines) | 1 | |
| Diameter of each Pipeline | 6 | in |
| Velocity in Pipeline | 5.67 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 23.9 | ft per 1000 ft |
| Length of Each Pipeline | 200 | ft |
| Feed Pressure to R.O. System | 15 | psi |
| Total Head (Neglects Minor Losses) | 39.42 | ft |
| Flow Rate per Pump | 500 | gpm |
| Pump Efficiency | 60% | |
| Required Horsepower per pump | 12.4 | Hp |
| Nominal Pump Horsepower per pump | 15.0 | Hp |
| **UV/Oxidation System** | | |
| *UV/Oxidation System (High-Energy Alternative)* | | |
| VOC Concentration | 0 | ug/l |
| NDMA Concentration | 0.21 | ug/l |
| 1,4-Dioxane Concentration | 4.05 | ug/l |
| UV Power Supplied/UV Tower | 1858 | kW |
| Number of UV Towers Required (Including 1 extra) | 6 | |
| Diameter of Units | 5 | ft |
| Flowrate per Unit | 3000 | gpm |
| *UV/Oxidation System (High-Energy Alternative) - Power Supply units* | | |
| Number of Units Required | 6 | |
| Length of Unit | 8 | ft |
| Width of Unit | 4 | ft |
| Footprint | 32 | $ft^2$ |
| *Hydrogen Peroxide Feed System* | | |
| Peroxide Dose | 5 | mg/l |
| Mass Loading | 901 | lb/day |
| Percent Peroxide by Weight | 50% | |
| Peroxide (50%) Density | 8.34 | lb/gal |
| Volumetric Loading | 216 | gal/day |
| *Hydrogen Peroxide Feed Tank* | | |
| Tank Holding Time | 30 | days |
| Tank Volume | 6,480 | gal |

**Table 2-1**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative**

| Description | Value | Unit |
|---|---|---|
| Number of Tanks | 1 | |
| Tank Depth (Include 1 foot freeboard) | 10 | ft |
| Tank Diameter | 12 | ft |
| Volume per Tank | 7,614 | gal |
| Tank Diameter to Depth Ratio | 1.2 | Dia:D |
| **Disinfection System** | | |
| *Sodium Hypochlorite Feed System* | | |
| Chlorine Dose | 3 | mg/l |
| Chlorine Mass Loading | 540.4 | lb/day |
| Available Chlorine in Feed Solution | 1% | |
| Sodium Hypochlorite Mass Loading | 54,043.5 | lb/day |
| Sodium Hypochlorite Specific Gravity | 1.2 | |
| Sodium Hypochlorite Solution Density | 10.01 | lb/gal |
| Sodium Hypochlorite Volumetric Loading | 5,400 | gal/day |
| Feed Tank Holding Time | 7 | days |
| Feed Tank Volume | 37,800 | gal |
| Feed Pump Flow Rate | 14,194 | ml/min |
| *Chlorine Mixing/Contact Tank* | | |
| Contact Time | 15 | minutes |
| Required Tank Volume | 225,000 | gallons |
| Number of Tanks | 2 | |
| Tank Length to Depth Ratio | 4.5 | L:D |
| Tank Depth (includes 1 foot freeboard) | 10.1 | ft |
| Tank Length and Width | 45.3 | ft |
| Volume per Tank | 138,717 | gal |
| *Transfer Pumps* | | |
| Height of Water in Disinfection Tank (Low Level) | -5.0 | ft |
| Height of Treated Water Storage Tank (High Level) | 19.0 | ft |
| Required Flow Rate | 15000 | gpm |
| Number of Pumps (I.e. number of pipelines) | 2 | |
| Diameter of each Pipeline | 24 | in |
| Velocity in Pipeline | 5.32 | ft per sec |
| C-Factor for Pipeline | 120 | |
| Head Loss per 1000 feet of Each Pipeline | 4.2 | ft per 1000 ft |
| Length of Each Pipeline | 150 | ft |
| Total Head (Neglects Minor Losses) | 24.63 | ft |
| Flow Rate per Pump | 7500 | gpm |

**Table 2-1**
**Draft Conceptual Design Criteria - Subarea 3 Treatment Plant - IX Alternative**

| Description | Value | Unit |
|---|---|---|
| Pump Efficiency | 70% | |
| Required Horsepower per pump | 100.0 | Hp |
| Nominal Pump Horsepower per pump | 100.0 | Hp |
| **Treated Water System** | | |
| *Treated Water Storage Tank* | | |
| Tank Holding Time | 10 | minutes |
| Tank Volume | 150,000 | gallons |
| Number of Tanks | 1 | |
| Tank Depth | 20 | ft |
| Tank Diameter | 37 | ft |

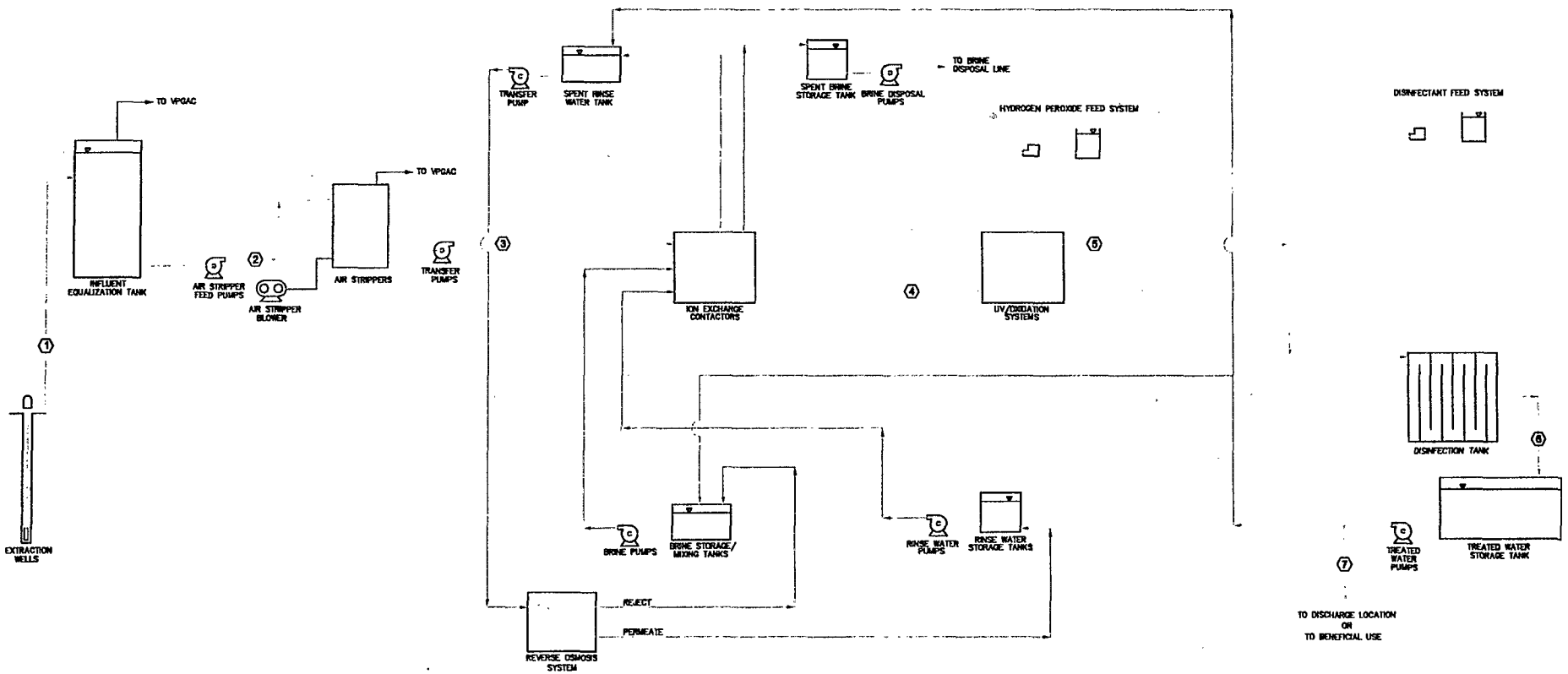
**Table 2-2: Pipeline Construction**
**List of Required Permits**

| Permitting Agency | Permit or Requirement |
|---|---|
| Los Angeles County Sanitation District | Permit to connect pipeline to and discharge brine into the County Sanitation District brine disposal line. |

# FIGURES

## MAIN PROCESS FLOW RATES

| VARIABLE \ STREAM NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| DESIGN FLOW, gpm | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 14,850 |




## LEGEND

- Main Process Flow
- Regeneration System Flow
- Chemical Addition
- Air Flow
- Pump
- Blower
- Chemical Metering Pump

# DRAFT

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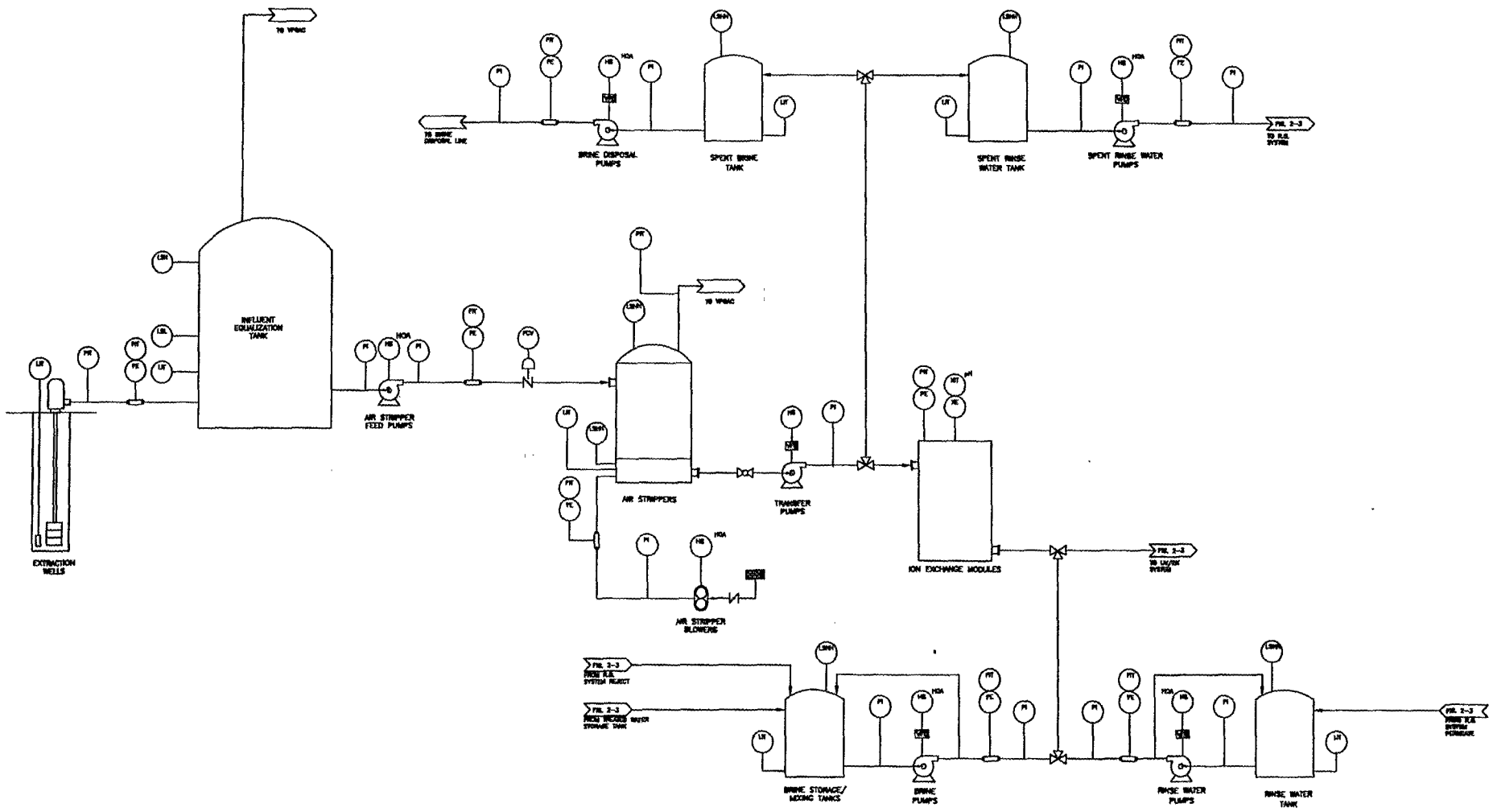
**Groundwater Treatment System**
***Process Flow Diagram - Subarea 3***
Conceptual Design Report Addendum
Baldwin Park OU, California

Figure **2-1**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| CWC | 50503.2.5 | | 05/00 | |

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Groundwater Treatment System
Process and Instrumentation Diagram - Subarea 3
Conceptual Design Report Addendum
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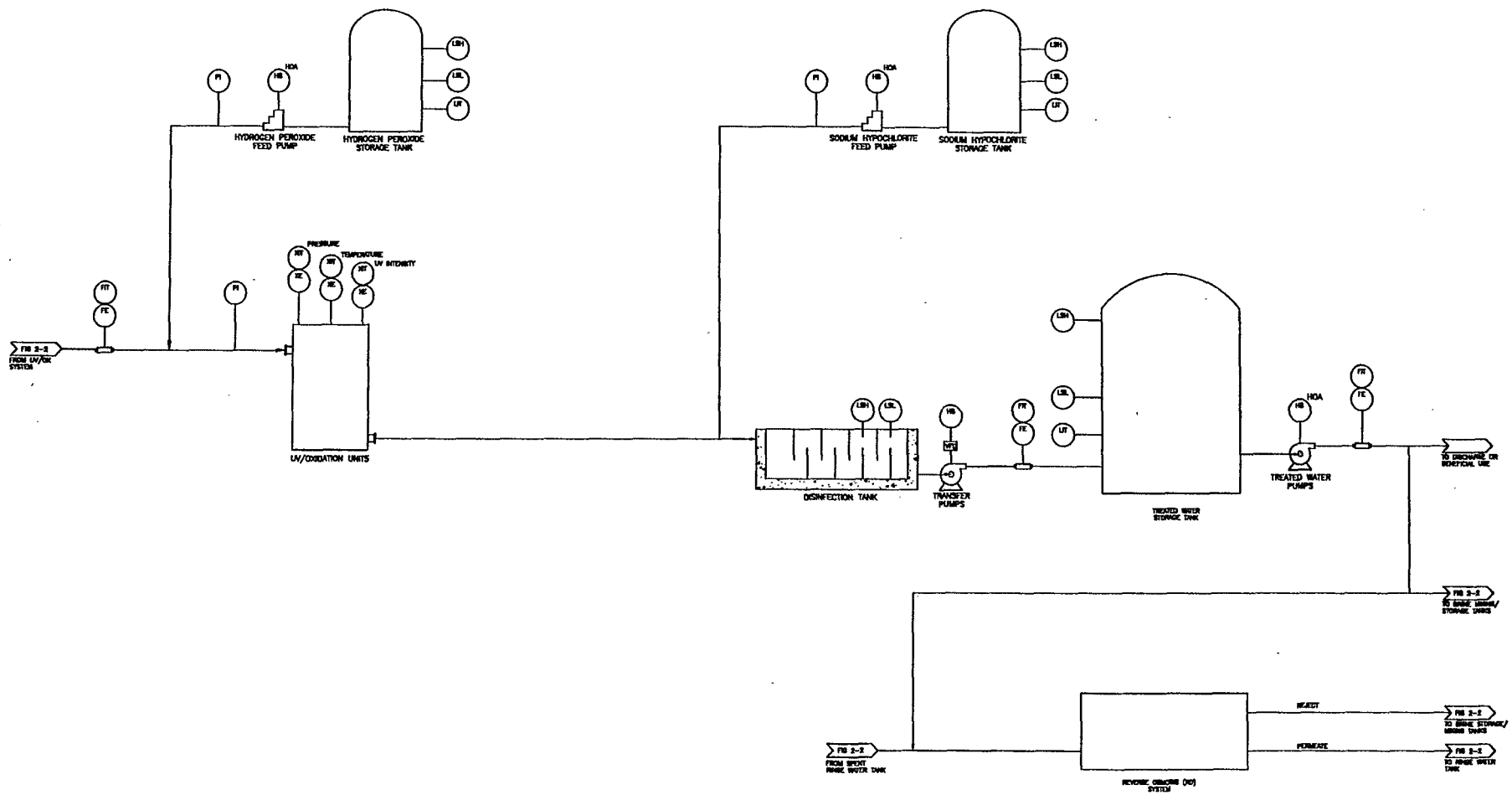
Figure 2-2

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| CWC | 50503.2.5 | | 05/00 | |

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Groundwater Treatment System
Process and Instrumentation Diagram - Subarea 3
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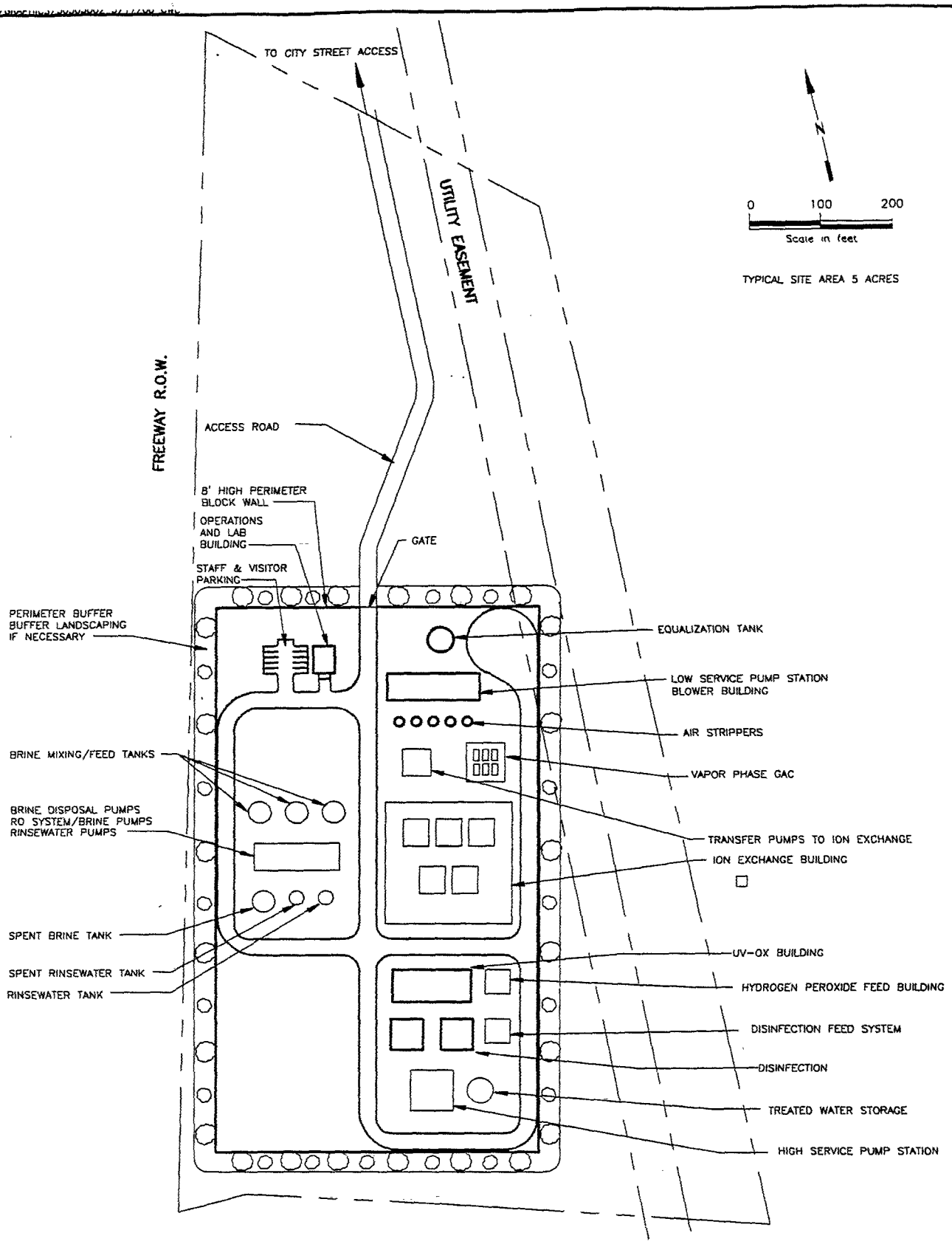
Figure 2-3

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| CWC | 50503.2.5 | | 05/00 | |




TYPICAL SA3 ION EXCHANGE PLANT SITE

**DRAFT**

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**Typical Site Plan**
**Subarea 3 Treatment Plant**
Conceptual Design Report Addendum
Baldwin Park OU, California

**Figure**
**2-4**

**DISTRIBUTION**

**Addendum to the**
**Draft Conceptual Design Report**
**Baldwin Park Operable Unit**
**San Gabriel Basin, California**

May 18, 2000

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76150

UNITED STATES ENVIRONMENTAL PROTECTION A
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Attachment 7

June 29, 2000

Baldwin Park Operable Unit Offering Parties
c/o Donald E. Vanderkar
Aerojet General Corporation
Box 13222
Sacramento, CA 95813

Subject: EPA Comments on Draft Conceptual Design Report and Addendum, Baldwin Park Operable Unit, San Gabriel Valley Superfund Sites

Dear Mr. Vanderkar:

In accordance with the commitment made in a letter dated September 17, 1999, the Baldwin Park Operable Unit offering Parties submitted to EPA a Draft Conceptual Design Report for the Baldwin Park Operable Unit dated April 18, 2000 and Draft Addendum to the Conceptual Design Report dated May 18, 2000.

Please address the enclosed comments and prepare a revised Conceptual Design Report.

Sincerely,

Wayne Praskins
EPA Project Manager

Enclosures

cc: John Catts, Harding Lawson Associates

# EPA Comments on Draft Conceptual Design Report
# Baldwin Park Operable Unit
## (Plan dated 4/18/00; EPA comments dated 6/29/00)

| No. | Location | Comment |
|---|---|---|
| 1. | | The Offering Parties and the Main San Gabriel Basin Watermaster have discussed arrangements that, if implemented, would significantly change portions of the Conceptual Design. Possible changes include: use of ion exchange technology for perchlorate removal; use of existing groundwater extraction, treatment, and distribution facilities; construction of multiple treatment facilities in Subarea 3; giving significant responsibility to Watermaster and/or individual water purveyors for design and construction, and delivery of the treated water to local water purveyors.<br><br>The potential use of ion exchange has been addressed in the first addendum to the Conceptual Design Report.<br><br>A second addendum to the Conceptual Design Report should be prepared that presents a conceptual design for a joint PRP-Watermaster project. The addendum should present the physical elements of a joint project (i.e., extraction locations; treatment facility locations; predicted treatment facility influent water quality; recipients of the treated water; treated water delivery locations, pressures, and rates; existing equipment to be used as part of the remedy; land acquisition); describe responsibilities and qualifications of entities and personnel expected to direct or play a significant role in the project; describe any schedule changes, and describe any changes in contracting strategy. |
| 2. | p.1-1, 1st par, last sentence | Please clarify that the *Remedial Design/Remedial Action* (RD/RA) Statement of Work (SOW) referred to in the report is draft. |
| 3. | p.1-1, 2nd par, last sentence | Please clarify in the report that some aspects of the project changed after the Work Plan was approved, and that where the Conceptual Design and Work Plan differ, the Conceptual Design supersedes the Work Plan. |
| 4. | p.1-4, Section 1.3 | The section heading and 1st sentence of the section erroneously refer to the Work Plan, rather than the Conceptual Design. |
| 5. | p.2-2, 2nd par | The text erroneously refers to "this Work Plan." |
| 6. | p.3-1, 2nd par, last sentence | In future submittals, please define the NDMA plumes by concentrations of 20 ppt or 0.020 ug/l, rather than 0.05 ug/l. This concentration is the current DHS action level. |

| No. | Location | Comment |
|---|---|---|
| 7. | p.3-3, Sec. 3.1.4 | The process used to estimate Subarea 1 influent concentrations is improved over that presented in the RD/RA Work Plan, but we still believe that a modified set of wells and monitoring zones would be more representative of future contaminant concentrations in the planned extraction wells. We recommend that the following data points be used to estimate Subarea 1 influent concentrations:<br><br>**SA1-3:** Wells 08000060, 08000070, MW5-11 (zones 1,2,3), and MW5-17 (zones 2,3)<br><br>**SA1-1 and SA1-2:** Wells MW5-3 (zones 5-9), MW5-13 (zones 1,2,3), MW5-18 (zones 2,3) |
| 8. | p.3-3, Sec. 3.1.4 and Tables 3-2, 3-3, 3-5, 3-6 | Are influent alkalinity and pH known? If so, please specify. |
| 9. | Pg 3-5, 2nd par | There appears to be an error in the 2nd sentence. Please clarify and/or correct. |
| 10. | p. 3-6, last bullet | Please add a discussion of the impacts of higher than expected influent concentrations. Separate analyses may be needed for each treatment train. The discussion should address the robustness of the treatment train and identify critical contaminants, critical contaminant concentrations, and the potential impact of exceeding a critical concentration (e.g., exceeding a water quality or air emission requirement). |
| 11. | Pg 4-1, Sec. 4.1, 2nd sentence | Please clarify what is meant by the statement that the ARARs from the ROD "have been evaluated further." |
| 12. | Pg 4-1, Sec. 4.1, 3rd sentence | CERCLA states that offsite actions must comply with all substantive or administrative requirements in effect at the time the action occurs (including obtaining permits), not that they must comply with ARARs. Please clarify the text. |
| 13. | p.4-2, Section 4.1.2 | The requirements identified in Section 4.1.2 are presented as a "general summary" of ARARs for the BPOU, whereas the requirements presented in Table 4.1 are described as a list of "Potential ARARs." Rather than presenting a summary or potential list of ARARs, the document should present a clear and complete list of ARARs for the BPOU. To avoid confusion, we suggest that the table be deleted and Section 4.1.2 be revised or supplemented as needed to provide a complete list. |

| No. | Location | Comment |
|---|---|---|
| 14. | Pg 4-3, 2nd bullet | The 1st sentence does not describe an ARAR. Please clarify or delete. |
| 15. | p.4-4, Sec. 4.2, 2nd Par., 1st sentence | The Remedial Objectives should be modified to refer to additional contaminants along with VOCs, as described in the ESD. |
| 16. | p. 4-4, Last par., 1st sentence | The text says that a capture zone should be established in Subarea 1 to encompass <u>most</u> known or suspected source areas and depths. The remedial objective should be stated less ambiguously as is done in the draft Statement of Work, by referring to a list of source areas and/or by referring to a figure depicting the source areas. |
| 17. | p. 4-5, 2nd Par., 1st sentence | Please specify the concentrations that would be "unacceptable." |
| 18. | p. 5-2, section 5.1.1 | Is the text correct that no Subarea 1 facilities are planned for the city of Azusa or for unincorporated portions of LA County? |
| 19. | p. 5-5, 1st par | Even though no permits are required for onsite activities, efforts will need to be made to coordinate with local and State agencies and ensure that substantive requirements are met |
| 20. | p. 5-5, section 5.2.1 | There is an extra "in" in the last line. |
| 21. | p. 5-8, section 5.2.3 | Aren't agreements or easements needed even if pipeline alignments are located within existing street rights-of-way? |
| 22. | p. 5-10, section 5.2.3.13 | There appear to be a couple of typographical errors in the 1st sentence:<br>"...and issue..."<br>"...channel, if affected." |
| 23. | Section 6 (and Tables 6-3 and 6-4) | For the conveyance systems, the specified design criteria include pipe materials and sizes. Assuming a design-build contracting strategy, will some of these decisions be made by the design-build contractor? |
| 24. | p. 6-4, section 6.1.4 | Please add another factor that addresses impacts during construction on residents or businesses adjacent to the proposed routing. |

| No. | Location | Comment |
|---|---|---|
| 25. | Sections 7.2. and 7.3 (and Tables) | For the treatment processes, the specified design criteria include tank dimensions, tank materials, pump and blower types, motor types, motor sizes, air stripper air to water ratio, air stripper packing type and height, and pump efficiencies and horsepower.<br><br>Assuming a design-build contracting strategy, will some of these decisions be made by the design-build contractor? |
| 26. | Sections 7.2.2 and 7.3.2 (and Tables) | Is solids retention time (i.e., mean cell residence time) in the bioreactor known? If so, please specify. |
| 27. | Sections 7.2.2 and 7.3.2 (and Tables) | What is the basis for the planned recycle rate of 20%. |
| 28. | Sections 7.2.3 and 7.3.3 (and Tables) | Is recycling reclaimed water back to the flash mix tank acceptable to the DHS? If not, what are other disposal or use options? |
| 29. | Sections 7.2.4 and 7.3.4 (and Tables) | If the polymer dose is specified, the type of polymer should also be specified. |
| 30. | Sections 7.2.4 and 7.3.4 (and Tables) | Is the specified polymer mix/storage tank holding time of 5 days too long?. For many polymers, aged solutions are problematic. |
| 31. | Sections 7.2.6 and 7.3.6 (and Tables) | If air stripper height will be specified, is the specified height of 25' the packing height or the overall height of the air stripper? One of our CH2M Hill reviewers estimates that no more than 11' of packing height is needed. He assumed that the TCE, PCE, and DCE concentrations are reduced by the UV/OX unit to less than 5 ug/l, that the air strippers will only need to treat compounds that are ineffectively destroyed by UV/Oxidation (e.g., carbon tetrachloride, chloroform), that the two chemicals would be reduced to non-detectable levels, that the air/water ratio is 30:1, and the liquid loading rate is 35 gpm per square foot.<br><br>Assumed influent concentrations were:<br><br>Subarea 1 Influent / Subarea 3 Influent / Drinking Water Standards<br>Chloroform 4.0 / 3.1 / 80<br>Carbon Tetrachloride 3.5 / 1.9 / 0.5 |

| No. | Location | Comment |
|---|---|---|
| 32. | Sections 7.2.6 and 7.3.6 (and Tables) | Have the benefits of heating the stripper off gas to adjust relative humidity prior to vapor phase carbon treatment been considered? |
| 33. | Sections 7.2.7 and 7.3.7 (and Tables) | Has a final decision been made to use gravity downflow GAC contactors instead of pressurized GAC vessels? If so, why? |
| 34. | Sections 7.2.7 and 7.3.7 (and Tables) | One of our CH2M Hill reviewers notes that the bed depth to width dimensions for the downflow GAC contactors are unusual, increasing the risk of channeling problems. |
| 35. | Sections 7.2.8 and 7.3.8 (and Tables) | Why is 1% chlorine feed solution specified for disinfection? One of our CH2M Hill reviewers notes that standard industrial strength bleach is typically 12%. |
| 36. | Sections 7.2.8 and 7.3.8 (and Tables) | Should additional design criteria be specified for the chlorine mixing/contact tank.? (e.g., serpentine pattern, minimum length/width ratio) |
| 37. | Sections 7.2.8 and 7.3.8 (and Tables) | Are there log removal requirements that would apply to the chlorine mixing/contact tank? If so, please add to the design criteria. |
| 38. | Sections 7.2.10 and 7.3.10 (and Tables) | Have VFD pumps been considered for the filter effluent equalization tank, given the relatively small size of this tank? |
| 39. | Sections 7.2.10 and 7.3.10 (and Tables) | One of our CH2M Hill reviewers suggests that alternatives to inorganic coagulants (e.g. ferric chloride) in the reclamation system be considered. He notes that inorganic coagulants form more voluminous solids that are harder to de-water compared to solids formed using organic flocculants. |
| 40. | Sections 7.2.10 and 7.3.10 (and Tables) | One of our CH2M Hill reviewers suggests that consideration be given to adding the flocculent before the filter press, and that the specified filter press cycle frequency of 0.5 cycles/day be increased to prevent anaerobic conditions. |
| 41. | Sections 7.2.10 and 7.3.10 (and Tables) | One of our CH2M Hill reviewers suggests that VFDs be considered for the reclaimed water equalization tank return pumps because of the relatively small size of the equalization tank. |

| No. | Location | Comment |
|---|---|---|
| 42. | Table 3-2 | The table lists 21 contaminants of concern. To ensure that the list is complete, please review the attached list of chemicals detected in groundwater in the Baldwin Park area and indicate for each chemical whether the chemical has been analyzed for at any of the multiport wells.<br><br>If so, indicate: i) the sampling location(s); ii) analytical method used; iii) the method detection limit (MDL) and/or practical quantitation limit (PQL) achieved; and iv) an applicable standard or other level of toxicological concern (e.g., MCL, PRG, action level).<br><br>Note any chemicals that: *have not* been analyzed for <u>or</u> have been analyzed for using a method whose reporting limit exceeds the level of toxicological concern <u>or</u> for which you were unable to locate a standard or level of toxicological concern. |
| 43. | p.7-33, section 7.3.5 (and Table 3.6) | There are minor inconsistencies between the design criteria specified in the text and the tables. The UV/Ox design criteria on page 7-33 requires removal of TCE from 46 ug/L to <5 ug/L and PCE from 15 ug/L to <5 ug/L, but Table 3.6 shows TCE at 38.8 ug/L and PCE at 16.2 ug/L. Please correct and review the table and text for other inconsistencies. |
| 44. | p.7-35, section 7.365 (and Tables) | Is the specified design criteria of 99.9 percent VOC removal in the air stripper off-gas system achievable? Will chemicals that are easily stripped but poorly adsorbed by vapor phase GAC result in lower percent removal? (e.g., methylene chloride) |
| 45. | Table 3-5 | Data are missing from the Total VOCs row. |
| 46. | Table 3-6, Page 3 of 3 | Why divide up the data up into shallow and deep categories? We suggest deleting the shallow and deep categories, and presenting only the totals. |
| 47. | Tables 6-2, 6-3, 7-1, 7-2 | What is the basis for the specified head losses of about 9-11 ft per 1000 ft of pipe, which is specified in Tables 6-2, 6-3, and several places in Tables 7-1 and 7-2? One of our CH2M Hill reviewers notes that losses in the range of 3 to 7 ft per 1,000 ft more typical. |
| 48. | Figure 1-1 | The location of the BPOU shown in this figure is incorrect. |
| 49. | Figures 7-3 and 7-6 | Should the VFDs for the fluidization pumps be shown in the figures? |

# EPA Comments on Draft Addendum to the Conceptual Design Report
## Baldwin Park Operable Unit
### (Addendum dated 5/18/00; EPA comments dated 6/29/00)

| No. | Location | Comment |
|---|---|---|
| 50. | | The addendum provides an alternative treatment train incorporating ion exchange for Subarea 3. Given the uncertainty over the timing for approval of the biological treatment process, the Conceptual Design should be revised to include an alternative treatment train employing ion exchange in Subarea 1 as well. |
| 51. | p. 2-1, section 2 (and drawings) | We strongly recommend that a biologically active liquid phase GAC system (LGAC) be added to the alternative treatment train for several reasons:<br><br>1)LGAC will provide an additional barrier for those chemicals already known to be present in the groundwater (e.g., VOCs, perchlorate).<br><br>2) LGAC will remove a variety of chemicals that the other treatment processes will not remove, providing an extra barrier in the event that new chemicals are discovered in the groundwater or safe levels of known chemicals decrease.<br><br>3) LGAC will remove any AOP byproducts, which could cause biogrowth problems in downstream pipelines even after chlorination.<br>4) LGAC will remove any residual hydrogen peroxide from the UV/OX process, which could hinder residual chlorine stability. |
| 52. | p.2-2, section 2.1.2 | The text says that the air strippers will be located ahead of the ion exchange (IX) system to prevent the possibility of degradation of the ion exchange resin due to contact with VOCs. Given the low levels of VOCs (< 50 ug/l), is the risk of resin degradation real? If not, would it make more sense to order the processes as follows (IE => UV/OX => Air Stripping), and take advantage of removing a significant portion of the VOCs by placing the UV/OX before the air stripper? |
| 53. | p.2-4, 2nd and 3rd par | The text makes reference to the CA DHS Surface Water Treatment Rule. Is the rule applicable or relevant to the "alternative treatment train"? |
| 54. | p.2-5, section 2.2.1 (and PFD and P&ID) | Are separate influent equalization tanks necessary? Can basins constructed for each air stripper serve the same purpose? |
| 55. | p.2-6, 3rd par | See comment #44 regarding 99.9% design criterion for VPGAC removal. |

| No. | Location | Comment |
|---|---|---|
| 56. | pp. 2-6 and 2-7, section 2.2.2 | The document specifies a blower with a discharge pressure of approximately 16-inches of water, and a pressure drop through the VPGAC of 14 inches water. That leaves only 2 inches of head loss across the stripper. Are these values correct? |
| 57. | p.2-6, Tanks and Vessels | The document specifies use of 14-foot diameter stripping towers. One of our CH2M Hill reviewers points out that air stripping towers above 12-foot diameter are significantly more expensive due to difficulties in transportation or potential field erection. |
| 58. | p.2-7 and Table 2-1 | The document specifies an air stripper feed pump with a discharge head of 20 feet and a 25' air stripper height. Is this discharge head adequate? |
| 59. | p.2-7, Instrumenta-tion | Will the "VPGAC pressure indicator transmitter" report differential pressure? |
| 60. | p.2-8, section 2.2.3 (and Table 2-1, p. 3 of 7, Brine Pumps) | Is the 10 psi specified in Table 2-1 (p. 3 of 7, *Brine Pumps*) as "Head Loss through Ion Exchange" accurate? One of our CH2M Hill reviewers expects a much higher head loss for an IX system operating at 14 gpm/sq.ft.<br><br>If the head loss in the IE units is significantly greater than 10 psi, the required discharge head for the transfer pumps (from air stripper through IE and UV/OX) may need to be increased. It is currently specified at 49 feet (about 22 psi) . |
| 61. | pp.2-8 and 2-9 | The document states that the brine flow is about 1 percent of the treated water flow, which equates to about 150 gpm. Why do the three brine feed pumps each need to discharge at a substantially higher rate of 1,000 gpm each? |
| 62. | p.2-9 | Is the specified head of 40 feet adequate to pump spent rinse water through the RO unit? |
| 63. | p 2-10, 1st line | The document specifies that the RO system will include "permeators." What is a permeator? |
| 64. | p.2-10, 3rd bullet, (and Figure 2-2 ) | The drawing appears to specify pH monitoring on the IX vessels. What is its purpose? |

| No. | Location | Comment |
|---|---|---|
| 65. | p.2-11, "Tanks and Vessels" | The document specifies a stainless steel storage tank for the hydrogen peroxide. Have polyethylene storage tanks been considered, to reduce the potential safety hazards associated with use of a stainless steel tank for peroxide storage? |
| 66. | p.2-12 | The document specifies an average chlorine dosage of 3 mg/l for a 15 minute contact time. This would provide in excess of 3-log removal of viruses, rather than the 1-log removal indicated on page 2-4. Is 3-log removal necessary? |
| 67. | Table 2-1 | As in comment #25, which parameters do you intend to specify for the air strippers? (e.g., packing type, packing height) |
| 68. | Figure 2-1 | The figure does not show the transfer pumps which will move water from the disinfection tank to the treated water storage tank. |
| 69. | Figure 2-1 | Should the PFD show salt addition to the brine storage tank? |
| 70. | Figure 2-2 | The piping scheme, which implies that the spent brine, spent rinse water, and influent water will share one pipeline and 3-way valve, appears inconsistent with a continuously regenerated IX system. There appears to be a similar inconsistency with the treated effluent, brine, and rinse water. |
| 71. | P&ID | See comment #32 on air stripper dehumidification. |

## CHEMICALS DETECTED IN GROUNDWATER IN THE BPOU

1,1,1,2-TETRACHLOROETHANE
1,1,1-TRICHLOROETHANE(METHYL CHLOROFORM)
1,1,2,2-TETRACHLOROETHANE
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE
1,1,2-TRICHLOROETHANE(VINYL TRICHLORIDE)
1,1-DICHLOROETHANE (ETHYLIDENE CHLORIDE)
1,1-DICHLOROETHYLENE
1,2 DICHLOROPROPENE
1,2,3-TRICHLOROBENZENE
1,2,3-TRICHLOROPROPANE
1,2,4-TRIMETHYLBENZENE
1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)
1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)
1,2-DICHLOROETHANE (ETHYLENE DICHLORIDE)
1,2-DICHLOROETHENE(ACETYLENE DICHLORIDE)
1,2-DICHLOROPROPANE(PROPYLENE DICHLORIDE
1,3,5-TRIMETHYLBENZENE
1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)
1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)
1,4-DIOXANE (P. DIOXANE)
1-BROMO-2-CHLOROETHANE
2,2-DICHLOROPROPANE
2,4-DIMETHYLPHENOL (XYLENOL ISOMER)
2,4-DINITROPHENOL
2,6-DINITROTOLUENE
2-BUTANONE (METHYL ETHYL KETONE)
2-CHLOROETHYLVINYLETHER
2-CHLOROTOLUENE (O-CHLOROTOLUENE)
2-HEXANONE (METHYL N-BUTYL KETONE)
2-METHYLPHENOL
2-PROPANONE (ACETONE) (DIMETHYL KETONE)
4,4'-DDD
4,4'-DDT
4-CHLOROTOLUENE (P-CHLOROTOLUENE)
4-METHYL-2-PENTANONE (MET. ISOBUT. KET.)
4-METHYLPHENOL (P-CRESOL)
ALUMINUM
ANTIMONY
ARSENIC
ATRAZINE (AATREX)
BARIUM
BENZENE
BENZO(A)PYRENE
BENZO(B)FLUORANTHENE (3,4-BENZOFLUORANTH
BENZO(G,H,I)PERYLENE
BENZO(K)FLUORANTHENE
BERYLLIUM
BIS(1,1-DIMETHYLETHYL)PEROXIDE
BIS(2-CHLOROETHYL)ETHER

BIS(2-ETHYLHEXYL)PHTHALATE
BORON
BROMODICHLOROMETHANE
BROMOFORM (TRIBROMOMETHANE)
BUTYLBENZYL PHTHALATE (BBP)
CADMIUM
CARBON DISULFIDE
CARBON TETRACHLORIDE(TETRACHLOROMETHANE)
CHLORATE
CHLOROBENZENE (MONOCHLOROBENZENE)
CHLOROETHANE (ETHYL CHLORIDE)
CHLOROFORM (TRICHLOROMETHANE)
CHLOROMETHANE (METHYL CHLORIDE)
CHROMIUM (TOTAL)
CHROMIUM (VI)
CIS-1,2-DICHLOROETHYLENE
CIS-1,3-DICHLOROPROPENE
COBALT
COPPER
CYANIDE
DBCP (NEMAGON) DIBROMOCHLOROPROPANE
DI-N-BUTYLPHTHALATE (DIBUTYL PHTHALATE)
DI-N-OCTYL PHTHALATE (DIOCTYL PHTHALATE)
DIBENZO(A,H)ANTHRACENE
DIBROMOCHLOROMETHANE (CHLORODIBROMOMETHA
DICHLORODIFLUOROMETHANE (FLUOROCARBON-12
DICHLOROETHANE
DICHLOROFLUOROMETHANE
DIETHYL PHTHALATE (ETHYL PHTHALATE)(DEP)
DIMETHYLDISULFIDE (TIC)
ETHYLBENZENE (PHENYLETHANE)
FLUORIDE
FREON TF (TRICHLOROTRIFLUOROETHANE)
INDENO(1,2,3-C,D)PYRENE
ISOPHORONE
ISOPROPYLBENZENE (1-METHYLETHYLBENZENE)
ISOPROPYLTOLUENE
LEAD
M,P-XYLENE (3,4-DIMETHYLBENZENE)
MAGNESIUM (SAME AS MAGNESIUM DISSOLVED)
MANGANESE
MBAS (DETERGENTS) (SURFACTANTS)
MERCURY
METHYL TERT-BUTYL ETHER
METHYLENE CHLORIDE (DICHLOROMETHANE)
MOLYBDENUM
N-BUTYLBENZENE
N-NITROSODIMETHYLAMINE
N-PROPYLBENZENE (PROPYLBENZENE)
NAPHTHALENE (TAR CAMPHOR)
NICKEL

NITRATE
NITRITE (ASN)
O-XYLENE (1,2-DIMETHYL BENZENE)
ORTHOPHOSPHATE-P
P-CHLOROPHENOL(4-CHLORO-1-HYDROXYBENZENE
P-ISOPROPYLTOLUENE (P-CYMENE)
PERCHLORATE (CLO4)
PHENOL
PHENOLICS
POTASSIUM
RADON-222
SEC-BUTYLBENZENE
SELENIUM
SILVER
STYRENE (SAME AS VINYL BENZENE)
SULFATE
SULFIDES
TERT-BUTYLBENZENE
TETRACHLOROETHENE (PERCHLOROETHYLENE)
TETRAHYDROFURAN (THF)
THALLIUM
TOLUENE (METHYL BENZENE) (PHENYLMETHANE
TOTAL TRIHALOMETHANES (TTHM)
TOTAL XYLENES(M-XYLENE+O-XYLENE+P-XYLENE
TRANS-1,2-DICHLOROETHYLENE
TRANS-1,3-DICHLOROPROPENE
TRICHLOROETHYLENE(1,1,2-TRICHLOROETHENE)
TRICHLOROFLUOROMETHANE (FLUOROCARBON 11)
VANADIUM
VINYL ACETATE
VINYL CHLORIDE (CHLOROETHENE)
ZINC

76150

Attachment 8

# DRAFT FINAL
# Performance Standards Evaluation and Long-Term Remedy Evaluation Plan Baldwin Park Operable Unit San Gabriel Basin, California

Submitted to:

*U.S. Environmental Protection Agency*
*Region IX*

Prepared for:
*Baldwin Park Operable Unit Settling Parties*

HLA Project No. 46717 202

March 31, 2000

**Harding Lawson Associates**
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# 1.0 INTRODUCTION

Harding Lawson Associates (HLA) has prepared this Performance Standards Evaluation and Long-Term Remedy Evaluation Plan (Plan) for the Baldwin Park Operable Unit located in the San Gabriel Basin, California. This Plan was prepared on behalf of the Baldwin Park Operable Unit Settling Parties (BPOUSP) comprising Aerojet General Corporation, Azusa Gas Systems, Fairchild Holding Corporation, Hartwell Corporation, Huffy Corporation, J.H. Mitchell & Sons Distributors Inc., Oil and Solvent Processing Company, Screwmatic Inc., Whico Machine Inc., Wynn Oil Company, and Reichhold Inc. This Plan is intended to meet the requirements for both the Performance Standards Evaluation Plan and the Final Remedy Evaluation Plan set forth in the RD/RA Statement of Work (SOW) in preparation by EPA, Region IX and the BPOUSP. As such, this document contains two primary components, a Performance Standards Evaluation Plan (Section 2) and a Long-Term Remedy Evaluation Plan (Section 3).

The Performance Standards Evaluation Plan portion of this document contains a description of the performance standards by which the remedy will be operated and the details of monitoring and data evaluation, and groundwater modeling activities that will be performed to assure that the remedy operates as intended. The Performance Standards Evaluation Plan also describes procedures for corrective actions should the evaluation of monitoring data and modeling results suggest the remedy is not performing as intended.

It will take significant time before operation of the remedy will result in decreased concentrations of Chemicals of Concern (COCs) in monitoring wells downgradient of extraction systems. Water quality trends will probably be subtle and may require several years of monitoring data to confirm that concentrations are decreasing. In addition, long-term historical monitoring of groundwater quality in the BPOU suggests that water quality upgradient of the extraction systems will not change significantly over

time. Therefore, monitoring of water quality upgradient and downgradient of extraction systems is not included in the Performance Standards Evaluation Plan.

The collection and evaluation of these water quality data for upgradient and downgradient wells are more appropriately used to assess the long-term beneficial impact of the remedy on the BPOU. Therefore, the collection and interpretation of water quality data from wells located some distance either upgradient or downgradient from extraction wells is addressed within the Long-Term Remedy Evaluation Plan (Section 3).

## 1.1 History of Groundwater Contamination-Related Activities

Beginning in 1979, volatile organic compounds (VOCs) were detected in groundwater within the San Gabriel Basin (the basin). In May 1984, four areas of groundwater contamination were listed as San Gabriel Valley Areas 1-4 on EPA's National Priorities List based on available water quality data. Subsequent investigation by EPA and others revealed widespread VOC contamination in the basin. As a result, EPA subsequently divided the basin into seven Remedial Investigation (RI) areas to focus characterization on the extent of contamination and plan remedial actions. EPA later designated these RI areas as operable units. RI Area 5 was designated as the BPOU.

Since 1986, EPA, various potentially responsible parties, and numerous other agencies have compiled and evaluated groundwater quality data from the San Gabriel Basin. Initial field investigations conducted by EPA in the BPOU included the installation and sampling of one multiport monitoring well and the sampling of water supply wells. In 1990, EPA issued a Basinwide Technical Plan that described options for remediation of VOC plumes through the basin. In 1992, EPA published an Interim Remedial Investigation Report for the basin.

In 1993, EPA issued a Feasibility Study Report for the BPOU. This report evaluated various remedial alternatives for the remediation of groundwater in the BPOU. In 1994, EPA issued a Record of Decision (ROD) for the BPOU. The ROD identified 17 chemicals of concern, all of which were VOCs. EPA's selected remedy consisted of pumping and treating 19,000 gallons per minute of contaminated groundwater. In 1995, the Baldwin Park Steering Committee (BPOUSC) began to perform pre-remedial design activities including additional characterization of the extent of VOC contaminated groundwater and the development of a groundwater extraction plan. Eight multiport monitoring wells were installed and sampled and 26 existing water supply and monitoring wells were sampled to provide additional characterization of the extent of VOC contamination in the BPOU. The results of these pre-remedial design activities were submitted to EPA in the Draft Pre-Remedial Design Report, dated December 1996 (CDM, 1996). The groundwater extraction plan was revised on several occasions. Following review and comment by EPA, a Draft Final Pre-Remedial Design Report dated September 1997 (CDM, 1997) was issued.

In mid-1997, several constituents that were not previously considered as chemicals of concern in the ROD were discovered in groundwater within the BPOU. Consequently, EPA requested that the BPOUSC characterize the distribution of perchlorate, NDMA, and 1-4 dioxane as well as conduct further characterization of VOCs in groundwater within the BPOU. As a result, the BPOUSC installed and sampled four additional multiport monitoring wells and conducted groundwater sampling to evaluate the extent of VOCs, perchlorate, NDMA, and 1,4-dioxane in groundwater in the BPOU.

The results of these investigations and several groundwater extraction plan options were presented to EPA in an Addendum to the Pre-Remedial Design Report dated January 14, 1999 (HLA, 1999). Throughout 1999 these groundwater extraction plan options were refined, and some new extraction plan options formulated. These changes were made in response to comments from EPA and the Main San Gabriel

Basin Watermaster. This has resulted in a range of candidate groundwater extraction plans with total groundwater extraction rates ranging from 19,500 to 21,500 gallons per minute (gpm).

In May 1999 EPA issued an Explanation of Significant Difference (ESD), considered an amendment to the 1994 ROD. This ESD extends the southern portion of the BPOU plume, Subarea 3, to reflect the results of recent investigations, and adds perchlorate, NDMA, and 1,4 dioxane to the list of chemicals of concern.

In February 2000, the EPA approved a final version of the RD/RA Work Plan. This work plan is intended to guide implementation of the project and serve as an exhibit for the Consent Decree now under negotiation.

## 1.2 Overview of the Response Action

The BPOUSP have agreed to implement a BPOU Project that satisfies U.S. EPA's requirements for groundwater remediation. The BPOUSP will design, construct, and operate this project which comprises extraction of groundwater in two general areas, treatment of the extracted groundwater, and discharge of this groundwater to recharge basins, the San Gabriel River, Walnut Creek, recharge wells, or a drinking water supply.

A total of approximately 21,000 gpm of groundwater will be extracted, 6,000 gpm from the northern portion of the plume (Subarea 1), and 15,000 gpm from the southern portion of the plume (Subarea 3). Extracted groundwater will be treated using a series of proven unit processes designed to remove all chemicals of concern to levels considered acceptable for drinking water purposes. The treatment train will consist of biological reduction, multimedia filtration, UV/oxidation, air stripping, and liquid phase granular activated carbon. The treated groundwater will be supplied for direct potable use provided that appropriate agreements can be reached and operating permits can be obtained. Water not needed for

direct potable use will be recharged to the aquifer through discharge and infiltration at local spreading basins, the San Gabriel River channel, or through the use of injection/recharge wells.

The BPOUSP will work with the California Department of Health Services to ensure that the produced water can be used for potable purposes. If the potable use of the treated water is approved by DHS, and if negotiations with a customer for the treated water can be successfully concluded, the treated water may be delivered to a local or regional water purveyor.

# 2.0 PERFORMANCE STANDARDS EVALUATION PLAN

## 2.1 Elements of Performance Standards Evaluation Plan

This section is the Performance Standards Evaluation Plan component of the combined Performance Standards Evaluation and Long-Term Remedy Evaluation Plan. The Performance Standards Evaluation Plan contains the following elements as requested by EPA:

- Identification of performance standards and other project requirements
- A general description of the performance monitoring approach for the BPOU project
- Pre-remedial action baseline data collection activities to be implemented prior to the commencement of remedial actions
- Remedial action data collection activities to be implemented during remedial actions
- Performance reporting including a description of the evaluation and reporting of remedial system performance
- A performance monitoring schedule
- A description of contingency and compliance actions to be taken in the event that performance monitoring indicates non-compliance with performance standards.

This section provides a description of the Performance Standards and other project requirements for the BPOU project set forth in the RD/RA Statement of Work, currently in preparation by the U.S. EPA and the BPOUSP.

## 2.2 Identification of Performance Standards

The Performance Standards are drawn from the Remedial Objectives as specified in the ROD and ESD as follows:

> The remedial objectives of the Baldwin Park OU are to prevent future increases in, and begin to reduce, concentrations of trichloroethene, tetrachloroethene, carbon tetrachloride, and other VOCs in groundwater in the Baldwin Park area (hereafter referred to as contaminants or contaminated groundwater) by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection, and by removing contaminants from the aquifer.

The BPOU project involves the design, installation, operation, and maintenance of groundwater extraction systems at the downgradient end of two subareas of the BPOU. The two subareas are designated in the ROD and ESD as Subarea 1 (the upper area) and Subarea 3 (the lower area). Remedial objectives as they apply to the two subareas can be further described as:

***Subarea 1 Remedial Objectives:***

In Subarea 1, the movement of chemicals of concern in groundwater shall be limited by groundwater extraction at rates and locations that will establish the necessary groundwater flow field, such that the resultant capture zone encompasses most known or suspected source areas and depths within Subarea 1. Source areas and depths include locations believed, through direct measurement or indirect evidence, to contain a significant mass of soil (i.e., vadose zone) contamination, or continuing subsurface sources of dissolved-phase groundwater contamination. In Subarea 1, the remedial objectives are designed to prevent groundwater near source areas with higher concentrations of chemicals of concern from moving downgradient toward areas with lower concentrations. As part of the groundwater extraction process, chemical mass will be removed from Subarea 1 groundwater.

***Subarea 3 Remedial Objectives:***

In Subarea 3, the movement of chemicals of concern in groundwater shall be limited by groundwater extraction at rates and locations that will establish the necessary groundwater flow field, such that the resultant capture zone reduces the potential for groundwater containing unacceptable concentrations of PCE, TCE, CTC, perchlorate, NDMA, 1,4-dioxane or other chemicals of concern from moving into areas where these chemicals are not present at unacceptable concentrations. As part of the groundwater extraction process, chemical mass will be removed from Subarea 3 groundwater.

Two distinct Performance Standards have been derived from the Remedial Objectives cited above: (1) limit further migration of chemicals of concern in groundwater, and; (2) remove chemicals of concern from groundwater. If these Performance Standards are achieved then the remedy will prevent future increases in, begin to reduce concentrations, and prevent the spread of chemicals of concern from more contaminated areas to less contaminated areas. These two performance standards, as they apply to the BPOU, are described in more detail below.

***Performance Standard 1 – Limit Migration of Chemicals of Concern:***

The BPOU extraction plan was developed using an EPA-approved, three-dimensional, finite element, numerical groundwater flow model (DYNFLOW). The construction and calibration of this model rely on years of data collection activities in the BPOU, including water level measurements and water quality sampling. The model was calibrated using data from a 15-year period (1982 through 1997). Following calibration, the model was run in a forward/predictive manner to select locations and depths of groundwater extraction wells that would allow the remedy to achieve remedial objectives described above. Therefore the calibrated model is the best tool available to ensure that this Performance Standard, to limit migration of chemicals of concern, is met.

The BPOUSP will use groundwater monitoring and water level measurement data and an EPA-approved groundwater flow model, to validate that the results of the groundwater flow model accurately reflect the BPOU groundwater flow field, and that the remedy is therefore limiting migration of chemicals of concern. Specific interpretive work products that will be prepared and compared with model output will include well hydrographs, potentiometric surface maps, and capture plots developed using particle-tracking techniques. Should data collected as part of performance monitoring activities conflict with model predictions, then recalibration of the model will be performed. Should recalibration of the model be required, the same procedures and tolerances originally used to calibrate the model will be repeated. Once recalibration has occurred, model results will be used to evaluate whether modifications to pumping

rates and/or locations of extraction wells are necessary to better limit migration of chemicals of concern. The model will be used as the primary tool to guide compliance with this Performance Standard. More details regarding the use of the model and methods of evaluating model output can be found in Section 2.7.1.

***Performance Standard 2 – Removal of Chemical Mass:***

Extraction of groundwater will remove chemical mass from the aquifer. Treatment of the extracted groundwater, prior to recharge or use for public water supply, will prevent these chemicals from reentering the aquifer. Therefore this Performance Standard will be met through extraction and treatment of groundwater from the BPOU plume. Documentation of the removal of chemical mass will use measured flow rates from groundwater extraction wells, and results of water quality sampling and analysis for these same extraction wells. Using these data, the mass removal for each chemical of concern will be calculated on an annual basis. Cumulative chemical mass removed from the aquifer will also be reported. Section 2.7.2 describes data evaluation and reporting in more detail.

## 2.3 Other Project Requirements

EPA's ROD identifies a number of Applicable or Relevant and Appropriate Requirements (ARARs) for the BPOU. In addition, the BPOUSPs have developed a detailed list of federal, state, and local requirements which must be met to implement the BPOU project (e.g. easements, discharge permits). Although these project requirements and ARARs must be addressed during the implementation of the BPOU project, they are not considered Performance Standards as they do not directly relate to the remedial objectives defined by EPA. Consequently, compliance with the ARARs defined in the ROD, and the additional federal, state, and local requirements identified by the BPOUSPs are considered "other project requirements" in this Plan. A summary of these other project requirements is presented in Table 2-1. Project requirements have been segregated into categories related to the portion of the project

infrastructure to which they apply. These include extraction wells, raw water pipelines, treatment plants, treated water pipelines, and recharge facilities.

## 2.4 Approach to Performance Monitoring and Evaluation

This section describes the approach that will be taken to ensure that BPOU Performance Standards are met. This approach addresses only the Performance Standards set forth in Section 2.2 of this Plan. It does not address the other project requirements described in Section 2.3 or the evaluation of system performance as it relates to long-term water quality trends. Long-term water quality trends will be evaluated in the Long-Term Remedy Evaluation Plan. As such, the approach to performance monitoring and evaluation focuses on the operation of the proposed groundwater extraction system as it relates to:
(1) limiting further migration of groundwater contamination into less contaminated areas, and
(2) removing chemical mass from groundwater.

### 2.4.1 Summary of Performance Standards Monitoring Approach

The BPOUSPs approach to performance monitoring relies upon: (1) past and future groundwater monitoring activities performed by the Main San Gabriel Basin Watermaster (Watermaster);
(2) additional data collection by the BPOUSPs; and, (3) the use of an EPA-approved groundwater flow model, to predict the effectiveness of the groundwater extraction system. At any time should the BPOUSPs determine that Performance Standards are not being met, these same methods of data collection and modeling will be used to modify operation of the groundwater extraction system such that Performance Standards are achieved.

Watermaster monitoring activities have served as the baseline monitoring program from which additional monitoring needs have been defined. Watermaster has the responsibility to ensure that comprehensive water quality monitoring meets their court-decreed mission of managing basin water production and quality, provides for predictive vulnerability assessments, and provides for monitoring so that DHS

requirements for public water supplies are met. Watermaster performs routine water level monitoring for over 170 wells on semi-annual basis and water quality monitoring at over 200 wells on an annual basis (Watermaster, 1999).

In addition to Watermaster monitoring activities, the BPOUSP will install piezometers and additional multiport monitoring wells, perform additional data collection activities (water level and water quality monitoring), and will evaluate these data using a variety of widely accepted techniques including an EPA-approved groundwater flow model.

In summary, the approach to performance monitoring and evaluation consists of the following components:

- Potentiometric head measurements in piezometers, located adjacent to extraction wells, and water level measurements for other BPOU production wells (inactive) and monitoring wells. These data will be supplemented with potentiometric data collected from other wells monitored by the Watermaster. These data will be used as input to the groundwater model.
- Groundwater flow modeling and particle tracking to evaluate hydraulic performance of the extraction system as it relates to limiting further migration of groundwater contamination. Prior to remedial system startup, the groundwater flow model will be updated using hydraulic conductivity data obtained from aquifer testing, and current groundwater pumpage and recharge rates for the San Gabriel Basin. The model will then be recalibrated to current potentiometric data. Following model recalibration, the model will be updated quarterly and utilized to simulate the hydraulic performance of the BPOU groundwater extraction system.
- Water quality sampling of production and monitoring wells to provide information on the distribution of chemicals of concern in BPOU groundwater, specifically to produce plume maps.
- Integration of the results of groundwater modeling with current plume maps, and known source locations, to determine whether the groundwater extraction system is appropriately limiting migration of chemicals of concern.
- Water quality sampling and discharge measurements for extraction wells.
- Use of flow and water quality data from extraction wells to calculate the mass of chemicals of concern removed from the aquifer by the extraction and treatment system.

### 2.4.2 Basis for Performance Standards Monitoring Approach

The hydrogeology, historical water quality trends, and other factors affecting transport of chemicals of concern in the BPOU were considered in the development of the performance standards monitoring approach. These specific factors are as follows:

- The transmissivity of the aquifer in the BPOU is relatively high resulting in extraction well yields that are expected to exceed 3,000 gallons per minute while creating only minimal water-table drawdown in the vicinity of the extraction wells. As a result, detailed monitoring of the cone of depression in the vicinity of extraction wells is not a cost effective or practical means of evaluating extraction system performance in the BPOU. In addition, the hydraulic capture of extraction wells is only in part related to the cone of depression surrounding the well. This is because hydraulic capture is controlled not only by the hydraulic gradient but also by the resultant groundwater flow velocities in the vicinity of the extraction wells. Consequently, groundwater models that utilize velocity-based estimates of hydraulic capture are considered to be a more reliable and cost effective means of evaluating the hydraulic performance of extraction wells in the BPOU.

- Historical water quality trends in the BPOU do not indicate significant temporal fluctuations in groundwater quality. This is demonstrated by more than 15 years of water quality data for certain wells in the BPOU. Some of these wells are located directly downgradient of contaminant source areas in Subarea 1 and therefore would be expected to show the greatest temporal fluctuations in water quality. However, despite their downgradient proximity to contaminant sources, water quality data from these wells do not show temporal fluctuations that would significantly impact treatment system performance. On the basis of these observations, detailed monitoring of water quality upgradient of extraction wells in the BPOU is considered unnecessary to evaluate short-term performance of the remedy.

- The groundwater flow field and the extent of the groundwater plume in the BPOU has historically fluctuated in response to the variations in the location, depth, and quantity of groundwater pumpage by local water purveyors. Consequently, it is anticipated that the groundwater flow field and extent of the groundwater plume will stabilize after pumping conditions stabilize in association with extraction system operation.

- The full effects of the BPOU extraction system will not be fully realized for several years after the commencement of extraction system operations. There are several reasons for this situation. First, although groundwater moves at moderate velocities, it will take several years of groundwater monitoring data in order to establish definitive trends in groundwater monitoring wells even a short distance from either the Subarea 1 or Subarea 3 extraction systems. Second, the groundwater plume in the BPOU is approximately five miles long, groundwater monitoring wells are relatively expensive, and therefore it is not possible to install enough wells to track annual progress regarding trends in most monitoring or production wells. Therefore the interpretation of water quality data for purposes of determining long-term trends in water quality in downgradient wells will be addressed in Five Year Reviews as described in the Long-Term Remedy Evaluation Plan.

## 2.5 Baseline Data Collection

The Watermaster and the BPOUSP have collected potentiometric head and water quality monitoring data for more than five years to provide baseline data in support of remediation activities in the BPOU. Despite these data collection efforts, additional baseline data are required prior to remediation system start up. Groundwater extraction wells, piezometers, and additional multiport monitoring wells will be installed and baseline potentiometric head and water quality monitoring will be conducted to supplement monitoring activities performed by the Watermaster. Aquifer testing will also be performed on the extraction wells to evaluate transient near-field flow effects and to update aquifer transmissivity in BPOU groundwater flow model. The following sections outline the general scope and approach of the baseline data collection activities. Details pertaining to the actual field procedures to be used will be presented in a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) to be submitted to EPA at a later date.

### 2.5.1 Baseline Potentiometric Monitoring

Baseline potentiometric monitoring of selected wells will continue to be conducted by the BPOUSP and the Watermaster prior to remediation system start up to update the groundwater flow model. Currently the Watermaster performs semi-annual measurements in nine primary wells and semi-annual measurements on 170 wells in the San Gabriel Basin. Approximately 40 of these wells are within the BPOU as shown on Figure 2-1. At a minimum, potentiometric measurements in new extraction wells, existing monitoring wells, and piezometers will also be obtained for two consecutive quarters prior to extraction system startup. Wells to be used in the baseline potentiometric monitoring program are listed in Table 2-2 and are shown on Figure 2-1. Additional details on the methods and procedures for potentiometric monitoring will be presented in a Sampling and Analysis Plan to be submitted to EPA.

### 2.5.2 Baseline Water Quality Monitoring

Baseline water quality monitoring of selected production wells in the BPOU will continue to be conducted on an annual basis by the Watermaster prior to remediation system start up. Currently the Watermaster performs annual sampling of more than 200 active production wells in the San Gabriel Basin. Over 70 of these wells are within the BPOU as shown on Figure 2-2. In addition, new extraction wells and existing monitoring wells will also be sampled prior to extraction system startup. All water quality data described above will be used to create plume maps for chemicals of concern.

Well purging will be conducted prior to sampling using techniques outlined in the *Final Draft, Pre-Remedial Design Report, Baldwin Park Operable Unit* (CDM 1997). Samples collected from the extraction wells will represent a vertically averaged concentration over a large depth interval in the aquifer. Samples collected from the multiport monitoring wells will be representative of the discrete screened interval sampled. Wells to be used in the baseline water quality monitoring program are listed in Table 2-3 and are shown on Figure 2-2. Samples from production wells, groundwater extraction wells, and monitoring wells will be analyzed for volatile organic compounds (VOCs), perchlorate, N-nitrosodimethylamine (NDMA), 1,4-dioxane, and nitrate. Additional details on the methods and procedures for baseline water quality monitoring will be presented in a Sampling and Analysis Plan to be submitted to EPA.

### 2.5.3 Extraction Well Installation

The BPOUSP extraction system has been designed to limit the further migration of chemicals of concern by extracting groundwater from two subareas in the BPOU. Subarea 1, the northern portion of the plume, will contain three extraction wells pumping at a total of 6,000 gallons per minute (gpm). Subarea 3, the southern portion of the plume, will contain six extraction wells in three locations pumping at a total of 15,000 gpm. Table 2-4 indicates the approximate depths below ground surface at which the groundwater extraction wells will be screened.

A more detailed description of the extraction well system design can be found in the *Final Remedial Design/Remedial Action Workplan, Baldwin Park Operable Unit, San Gabriel Basin, California,* (HLA 1999). The proposed locations of the extraction wells are shown on Figure 2-1. The exact locations of the extraction wells will depend upon site access arrangements.

Extraction well screened intervals and other design parameters will be defined during project conceptual design. Extraction wells will be installed under the supervision of a California Registered Geologist. A lithologic borehole log will be prepared and geophysical logging will be conducted on the borehole prior to placement of the well screen. Upon completion of the well installations, well completion reports will be prepared and submitted to EPA. The well completion reports will include the borehole lithologic logs, borehole geophysical logs, well construction details, well survey coordinates and casing elevations, and a map showing the exact locations of the new wells. Additional details on the methods and procedures for the installation of extraction wells will be presented in a Sampling and Analysis Plan to be submitted to EPA.

### 2.5.4 Piezometer Installation

Piezometers will be utilized to monitor near-field transient hydraulic responses during aquifer testing and will also be used to monitor horizontal hydraulic gradients near extraction wells during system operation. Two piezometers will be installed near each groundwater extraction location in both Subareas 1 and 3. One piezometer will be installed in the shallow portion of the aquifer and the second piezometer will installed in the deeper portion of the aquifer. In the event that boring logs and geophysical logs from the extraction wells in Subarea 3 indicate significant heterogeneties with depth, an additional piezometer may be required to further monitor the vertical potentiometric head distribution at each extraction location. Table 2-4 presents the approximate screened interval of each piezometer and the screened interval of the adjacent extraction well. Approximate piezometer locations are shown on Figure 2-1.

Piezometers will be installed under the supervision of a California Registered Geologist following the installation of the extraction wells. A lithologic borehole log will be prepared and the screened interval based on the screened interval of the adjacent extraction well. In general, piezometers will be screened to correspond to the uppermost 50 feet and the lowermost 50 feet of the screened interval at each extraction location. Construction details for each piezometer, including lithologic logs and construction details, will be included with well completion reports for the corresponding adjacent extraction well. Additional details on the methods and procedures for the installation of piezometers will be presented in a Sampling and Analysis Plan to be submitted to EPA.

### 2.5.5 Aquifer Testing

Aquifer tests will be performed for each extraction well after well development to obtain information on aquifer hydraulic properties (i.e., aquifer transmissivity, hydraulic conductivity, and aquifer storativity), extraction well yield, and transient near-field drawdown of the potentiometric surface. The results of the analyses will be used to calibrate the numerical groundwater flow model to be used for subsequent evaluation of extraction system performance.

It is anticipated that each aquifer test will start with 24 hours of baseline potentiometric head measurements in the extraction well, nearby piezometers, and any observation wells that will be monitored during the test. The extraction well will stress the aquifer at the extraction well design rate for at least 48 hours or until drawdown stabilizes in both the extraction well and nearby piezometer. The aquifer recovery will be monitored until 95% recovery is obtained. The actual test length will depend upon obtaining adequate drawdown in the aquifer to enable calculation of the desired aquifer parameters. During the tests, well discharge will be measured with an in-line totalizing flow meter.

Additional details on the methods and procedures for each aquifer test will be presented in a Sampling and Analysis Plan to be submitted to EPA. Once the tests are completed and the appropriate data analysis techniques have been performed, a technical memorandum that includes the raw test data, data analyses, and a discussion of any other findings from the tests, will be submitted to EPA.

### 2.5.6 Extraction Well Sampling

All extraction wells will be sampled and samples analyzed for chemicals of concern near the conclusion of each aquifer test. These data will be used to validate projections of influent water quality at extraction well locations. These data will also be considered baseline once extraction system startup occurs and regular water quality sampling commences.

## 2.6 Performance Standards Monitoring

A performance standards monitoring program will be implemented during system operation to monitor remedial system performance relative to the performance standards set forth in Section 2.2 of this plan. As described in Section 2.4.1 of this Plan, the monitoring program relies heavily on past and future groundwater monitoring activities performed by the Watermaster, additional data collection by the BPOUSP, and the use of an EPA-approved groundwater flow model to predict the effectiveness of the groundwater extraction system.

The primary monitoring activities that will be performed to support the evaluation of Performance Standards are:

- Potentiometric (water level) measurements in piezometers and monitoring wells.
- Water quality sampling of production and monitoring wells.
- Water quality sampling and discharge measurements for extraction wells.

Specifically, data collection activities to support the monitoring and evaluation of extraction system performance in the BPOU includes:

- Semi-annual potentiometric monitoring of 40 production wells, and 6 conventional monitoring wells.
- Quarterly potentiometric monitoring of 9 extraction wells, 12 piezometers, and 16 multiport monitoring wells (13 existing and 3 proposed multiport wells).
- Annual BPOU-wide water quality sampling of 78 production wells, 4 conventional monitoring wells, and 10 multiport monitoring wells (7 existing and 3 proposed multiport wells).
- Semi-annual BPOU-wide water quality sampling of 5 multiport wells and 4 conventional monitoring wells.
- Quarterly water quality sampling and flow rate measurements from 9 extraction wells for the first two years of operations, with annual measurements thereafter.

A general description of data collection activities to be performed is presented below.

### 2.6.1 Extraction Well Monitoring

Water quality sampling and discharge measurements from extraction wells will be conducted to provide estimates of chemical mass removal rates. Groundwater samples will be collected from each extraction well quarterly and analyzed for VOCs, perchlorate, NDMA, 1,4-dioxane, and nitrate. Flow rates from each extraction well will be calculated using quarterly total flow measurements obtained from in-line totalizing flow meters to be installed on each extraction well. Flow rates will be calculated quarterly and used in conjunction with groundwater sampling results collected from the extraction wells to estimate contaminant mass removal rates. Cumulative mass removal will also be reported. Quarterly sampling and measurements will be performed during the first two years of operation, after two years, and if appropriate, the frequency of monitoring will be reduced to annually.

### 2.6.2 BPOU-Wide Potentiometric Monitoring

Potentiometric monitoring of extraction system performance will be conducted by measuring water levels in the extraction wells and nearby piezometers and monitoring wells as listed in Table 2-5. These wells

will be monitored on a monthly basis for the first year of extraction system operation and quarterly thereafter as indicated in Table 2-5. Water-level measurements of other monitoring and production wells listed in Table 2-5 will be performed on a quarterly or semi-annual basis as indicated. Potentiometric data from these wells will be used to compare measured and simulated potentiometric heads that control the hydraulic capture of extraction wells. The location of piezometers, monitoring wells, and production wells to be used for potentiometric performance monitoring are shown in Figure 2-1.

### 2.6.3 BPOU-Wide Water Quality Monitoring

Water quality monitoring across the entire BPOU will be used to create plume maps, which will be used in conjunction with results of groundwater modeling to evaluate remedy performance with respect to Performance Standard 1 (limit migration). This water quality monitoring will utilize existing monitoring and production wells as listed on Table 2-6 and shown on Figure 2-3. Table 2-6 also presents the sampling frequencies for each well in the BPOU-wide monitoring program. Groundwater samples will be analyzed for VOCs, perchlorate, NDMA, 1,4-dioxane, and nitrate. Samples collected from the multiport wells on a semi-annual basis will be collected from specific depth intervals that correspond to suspected plume depths. These multiport wells are noted on Table 2-6; the specific depth intervals are presented in Table 2-7.

## 2.7 Performance Standards Evaluation and Reporting

This section describes the reporting and interpretation of performance monitoring data relative to the performance standards described in Section 2.2 of this plan. Therefore, the objectives of the evaluation are to determine if the BPOU project is: 1) limiting further migration of chemicals of concern into areas with lower concentrations, and 2) removing chemical mass from groundwater. As described earlier in this plan, groundwater modeling is an important element in the demonstration of the first of these objectives, whereas measurements of water quality and flow rates from extraction wells will provide

empirical estimates of the chemical mass removal rates from each extraction to achieve the second objective.

### 2.7.1 Groundwater Modeling

Groundwater flow modeling will be performed quarterly, at least through the first few years of operation to evaluate the hydraulic performance of the Subarea 1 and Subarea 3 extraction systems. If the interpretation of water quality data and modeling suggests less frequent modeling is justified, the BPOUSP will request of EPA that the frequency of modeling be reduced. Simulated hydraulic head maps and particle containment plots will be developed quarterly to evaluate the effectiveness of the extraction systems at limiting the migration of contaminated groundwater. Simulated hydraulic heads will be compared to observed water-level maps described in Section 2.7.2 to ensure the model is accurately reflecting groundwater flow conditions in the BPOU. Well hydrographs will also be developed to compare observed and simulated hydraulic heads.

DYNFLOW, the currently used numerical groundwater flow model, is a three-dimensional, finite element, time-varying (transient) model of the entire San Gabriel Basin. Currently, the DYNFLOW model is calibrated with data from 1982 through 1997. This model, or another appropriate modeling code, will be used in the future for performance evaluation modeling. If another model is selected rather than the existing DYNFLOW model, the model will be calibrated in a manner consistent with the calibration of the DYNFLOW model and submitted to EPA for their review and approval.

Regardless of the modeling code selected for performance evaluation modeling, model pumpage and recharge fluxes will be updated quarterly to account for actual recharge and basin production conditions. In addition, the model grid will be refined to include additional nodes around the extraction well locations or telescopic refinement techniques may be developed and used to simulate hydraulic conditions in the vicinity of the extraction wells. In addition, model hydraulic properties will be updated and the model

recalibrated using hydraulic conductivity and storativity estimates obtained from aquifer tests at each extraction well location.

Computer modeling of extraction system performance will generally consist of the following activities:

- Quarterly simulations of basin-wide groundwater flow conditions, for at least the first few years of operation. Simulated and observed basin-wide potentiometric data will be compared on potentiometric maps and well hydrographs. Comparison of potentiometric maps will serve to ensure that the basin-wide model is representative of groundwater flow patterns in the San Gabriel Basin. Simulated and observed potentiometric data will be compared both qualitatively and quantitatively. Qualitative comparisons will consist of visual examination of well hydrographs to ensure that the model accurately represents quarterly water-level fluctuations and long-term trends. Quantitative analysis of potentiometric data will consist of a statistical comparison of simulated and observed water-level data at each of the 9 primary wells in the Watermaster's water-level monitoring network. The statistical comparison of potentiometric data will include the calculation of minimum and maximum head difference between simulated and observed water-level data, as well as correlation coefficients and root mean square (RMS) errors between simulated and observed water-level data.

- Quarterly simulations of groundwater flow conditions in the localized area surrounding the Subarea 1 and Subarea 3 extraction systems, for at least the first few years of operation. These localized simulations will be conducted by either refining the basin-wide model grid in the vicinity of the extraction wells or by developing localized telescopic mesh refinement models of groundwater flow near the Subarea 1 and Subarea 3 extraction systems. Similar to the basin-wide simulations of groundwater flow, localized simulations will rely on comparisons of potentiometric maps, well hydrographs, and statistical comparisons of simulated and observed water-level data to ensure that the model accurately represents groundwater flow conditions in the localized area near the extraction systems. Quantitative analysis of potentiometric data will consist of a statistical comparison of simulated and observed water-level data at piezometers and multiport monitoring wells located near the Subareas 1 and 3 extraction wells. The statistical comparison of potentiometric data will include the calculation of minimum and maximum head differences between observed and simulated water-level data as well as calculations of correlation coefficients, and root mean square (RMS) errors between simulated and observed water-level data.

- Quarterly particle tracking simulations will be performed following the demonstration that the model accurately reflects groundwater flow conditions both on a basin-wide and localized scale as described above. These particle tracking simulations will illustrate the capture envelope for each extraction well relative to the lateral extent of the groundwater plume in the vicinity of the Subarea 1 and Subarea 3 extraction systems. Particle tracking simulations will be prepared for at least three discrete depth intervals in the aquifer to demonstrate that the extraction system is limited the migration of chemicals in groundwater. The number of depth intervals evaluated using particle tracking simulations may be reduced following EPA approval, in the event that the evaluation of performance data suggests that system performance can be appropriately evaluated with particle tracking of fewer depth intervals.

### 2.7.2 Supporting Data Evaluation

Performance standards data evaluation activities associated with the monitoring of remedial system performance in the BPOU are primarily focused on supporting computer model simulations of extraction system performance and the estimation of chemical mass removal from extraction wells. Supporting data evaluation activities that will be performed on a quarterly basis are as follows:

- Contaminant mass removal estimates will be calculated for each extraction well using quarterly average flow rates and quarterly sampling results from the extraction wells.
- Groundwater plume maps and chemical cross sections will be updated annually to evaluate any changes in the extent of groundwater contamination within the BPOU. Plume maps will be constructed for TCE, PCE, CTC, NDMA, and perchlorate for at least three depth intervals in the aquifer. The number of depth intervals evaluated may be reduced following EPA approval, in the event that the evaluation of performance data suggests that system performance can be appropriately monitored with fewer depth intervals.
- BPOU-wide water-level elevation maps will be developed and updated quarterly to assist in evaluating changes in groundwater flow patterns in the BPOU.

### 2.7.3 Performance Reporting

Performance reporting for the BPOU project will consist primarily of three components as follows:

- Non-compliance notification
- Progress reporting
- Performance evaluation reporting

A brief description of each of these reporting components is presented below.

#### 2.7.3.1 Non-Compliance Notification

The data evaluation techniques described above, along with any numerical modeling analyses, will be used to evaluate compliance with Performance Standards. The performance data will be evaluated as described in Sections 2.7.1 and 2.7.2 to determine if any significant changes or trends can be discerned. Any indications of noncompliance with the performance standards will result in notification to the EPA

within five (5) days of discovery. Following notification of EPA of non-compliance, the BPOUSP will meet with EPA within 10 days to discuss appropriate corrective actions.

#### 2.7.3.2 Progress Reports

Quarterly Progress Reports will be submitted to satisfy the requirements of the RD/RA SOW. The reports will include summaries of the activities performed for baseline data collection and remedial system performance monitoring, such as water level measurements, water quality sampling, and extraction well monitoring. It will also briefly describe results of groundwater modeling performed during the quarter, will compare measured and predicted evaluations of groundwater flow conditions, and describe the effectiveness of hydraulic capture. If after few years of system operations, EPA and the BPOUSP agree that quarterly reports are not necessary these reports will be discontinued.

#### 2.7.3.3 Performance Evaluation Reports

Performance Evaluation Reports will be submitted on an annual basis and will include an evaluation of remedial system performance for each of the four quarters of the year. Performance evaluation reports will include the items listed in Sections 2.7.1 and 2.7.2, the results of quarterly computer modeling, and a description of any refinements to the groundwater flow models used to evaluate system performance.

# 3.0 LONG-TERM REMEDY EVALUATION PLAN

## 3.1 Elements of the Long-Term Remedy Evaluation Plan

This section is the Long-Term Remedy Evaluation Plan component of the combined Performance Standards Evaluation and Long-Term Remedy Evaluation Plan. The Long-Term Remedy Evaluation Plan contains the following elements as requested by EPA:

- Identification of goals for long-term remedy evaluation
- A description of the monitoring approach for evaluating long-term remedy performance
- A performance monitoring schedule
- A remedy evaluation reporting schedule
- A description of contingency and compliance actions to be taken in the event that remedy evaluation indicates long-term goals are not being met

## 3.2 Identification of Goals for Long-Term Remedy Evaluation

This section provides a description of the evaluation of the remedy for the BPOU project set forth in the RD/RA Statement of Work, currently in preparation by the U.S. EPA and the BPOUSP.

The long-term goals for the BPOU project can be drawn from the Remedial Objectives as specified in the Record of Decision (ROD) and Explanation of Significant Differences (ESD) as follows:

> The remedial objectives of the Baldwin Park OU are to prevent future increases in, and begin to reduce, concentrations of trichloroethene, tetrachloroethene, carbon tetrachloride, and other VOCs in groundwater in the Baldwin Park area (hereafter referred to as contaminants or contaminated groundwater) by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection, and by removing contaminants from the aquifer.

If the remedy operates as designed then remedial objectives will be satisfied. By limiting migration of chemicals of concern and removing chemical mass, the mass of chemicals in the aquifer will be reduced, and groundwater quality will improve. The purpose of the work described in this plan is to monitor and

interpret data over the long term to evaluate the degree to which remedial objectives have been accomplished, and the continued need for BPOU groundwater extraction and treatment system. Long-term water quality conditions for the two subareas will differ significantly over time. Expected conditions in the two subareas are described in more detail below.

***Subarea 1:***

In general, Subarea 1 groundwater contains higher concentrations of chemicals of concern than groundwater in Subarea 3. A long-term goal of installing the Subarea 1 groundwater extraction and treatment system in its proposed location, which will limit downgradient migration of chemicals of concern and remove chemical mass, is to allow groundwater quality downgradient of the Subarea 1 extraction system to improve over time. The time that the Subarea 1 extraction system will need to operate is dependent upon the location of upgradient sources, the mass of chemicals remaining in the vadose zone, the mass of chemicals present in groundwater, and local groundwater flow conditions.

***Subarea 3:***

Extraction of groundwater in Subarea 3 will remove chemical mass from the aquifer. The Subarea 1 extraction and treatment system will limit the movement of chemicals of concern from Subarea 1 through Subarea 2 to Subarea 3. Although there are certainly sources of chemicals south of the Subarea 1 extraction system, concentration of chemicals of concern in groundwater should decrease over time, assuming no future contributions to the aquifer from events or sources unknown at this time. Assuming the flux of chemicals of concern originating in Subarea 2 and Subarea 3 is small, the time that the Subarea 3 extraction system will need to operate will be dependent upon the mass of chemicals present in groundwater, and local groundwater flow conditions. Therefore concentrations of chemicals in Subarea 3 extraction wells over time will either reach a low but level concentration (asymptote), or drop below the detection limit. In either case the Subarea 3 extraction and treatment system is no longer serving a useful purpose and could be turned off and decommissioned. Based upon the concentrations present in groundwater, the characteristics of aquifer materials, and historical groundwater flow velocities it is

expected that groundwater in Subareas 2 and 3 will cleanup faster than groundwater in Subarea 1. Therefore the Subarea 3 extraction system will likely be turned off before the Subarea 1 extraction system.

## 3.3 Long-Term Remedy Evaluation Monitoring

A long-term remedy evaluation monitoring program will be implemented to monitor long-term remedial system performance relative to the goals for remedy evaluation set forth in this plan, and to provide the means to determine when the remedy is no longer providing benefit and can be shut down. The monitoring program relies heavily on performance standard monitoring activities described in the Performance Standards Evaluation Plan presented in Section 2. However, specific activities intended to support the evaluation of the long-term remedial system performance will also be performed as listed below:

- Installation and development of two new multiport monitoring wells, MW5-24 and MW5-25, located downgradient of the Subarea 1 extraction system. Approximate locations for these multiport wells are shown on Figure 2-3 and proposed construction details are shown in Table 2-8. Additional details on the methods and procedures for the installation of extraction wells will be presented in a Sampling and Analysis Plan to be submitted to EPA.
- Installation and development of one or more additional multiport monitoring wells located downgradient of the Subarea 3 extraction system. The necessity for this well or wells will be determined after the collection of baseline data as described in Section 2.5. The general area for additional multiport wells, as proposed by EPA, is shown on Figure 2-3.
- Water quality sampling of selected monitoring wells located both upgradient and downgradient of the Subarea 1 and 3 extraction systems on an annual basis as shown in Table 2-6. Groundwater samples will be analyzed for VOCs, perchlorate, NDMA, 1,4-dioxane, and nitrate. These data will be collected on a quarterly basis for at least the first few years of the project. Dependent upon the consistency of results the frequency of monitoring may be reduced to annual.

## 3.4 Long-Term Remedy Performance Evaluation

This section describes the reporting and interpretation of monitoring data relative to long-term remedy performance. Therefore, the goals of the evaluation are to determine whether: (1) water quality in Subarea 2 and 3, downgradient of the Subarea 1 extraction system but upgradient of the Subarea 3

extraction system is improving over time; (2) concentrations in Subarea 3 extraction wells are decreasing over time; (3) water quality in Subarea 1, upgradient of extraction wells, is improving over time, and (4) concentrations in Subarea extraction wells are decreasing over time. Although it is expected that Subareas 2 and 3 will cleanup before Subarea 1, time-concentration analyses for chemicals of concern will be the primary measure of long-term remedy performance.

Additionally, as described earlier in this plan, groundwater modeling and particle tracking is an important element in the evaluation of long-term remedy performance. The model will be used with other data interpretation techniques to validate observed concentration trends for chemicals of concern.

## 3.5 Long-Term Remedy Performance Reporting

Performance reporting for the BPOU project will consist of two components as follows:

- Non-compliance Notification
- Five-Year Remedy Reviews

A brief description of each of these reporting components is presented below.

### 3.5.1 Non-Compliance Notification

The data evaluation techniques described above, along with any numerical modeling analyses, will be used to evaluate progress toward long-term remedy performance goals. Monitoring data will be evaluated as described above, to determine if trends in concentrations of chemicals of concern in monitoring and production wells can be identified, and if these trends are aligned with long-term goals of the remedy. Any indication that the remedy is not performing as designed with respect to long-term performance goals will result in notification to the EPA within five (5) days of discovery. Following notification of EPA of non-compliance, the BPOUSP will meet with EPA within 10 days to discuss appropriate corrective actions.

### 3.5.2 Five-Year Reviews

Five-year Reviews will be a more in-depth evaluation of long-term remedy performance than will be presented in Annual Progress Reports. This approach was developed because it is unlikely that water quality trends as they pertain to long-term remedy performance will be observable on an annual basis. A five year evaluation period however should provide the base of data necessary to establish trends where they exist. The Five-Year Review will include a compilation of the results from each of the preceding annual progress reports, and will also provide a more detailed and comprehensive evaluation of these data. The Five-Year Review will include a summary of data collected over the five year period, the results of annual computer modeling, a description of any refinements to the groundwater flow models used to evaluate system performance, and time concentration plots for key monitoring and production wells.

## 4.0 REFERENCES


Camp Dresser and McKee (CDM), 1996. *Draft, Pre-Remedial Design Report, Pre-Remedial Design Groundwater Monitoring Program, Baldwin Park Operable Unit.* December.

CDM, 1997. *Final Draft, Pre-Remedial Design Report, Pre-Remedial Design Groundwater Monitoring Program, Baldwin Park Operable Unit.* September.

Harding Lawson Associates (HLA), 1999. *Draft Addendum to the Pre-Remedial Report, Pre-Remedial Design Groundwater Monitoring Program,. Baldwin Park Operable Unit,* January 14.

HLA, 2000. *Final Remedial Design/Remedial Action Workplan. Baldwin Park Operable Unit*, February 10.

Main San Gabriel Basin Watermaster, 1999. *Five-Year Quality and Supply Plan*, November.

# TABLES

## Table 2-1. Other Project Requirements
## Substantive Requirements, Permits, Agreements, and Reviews List

**EXTRACTION WELLS**

SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- California State Engineer
  **Well Permit**
- Main San Gabriel Basin Watermaster
  **Extraction Agreement – 2 to 3 months required**

REVIEWS

- Los Angeles County Department of Health Services
  Application for Well Construction
- Los Angeles Water Quality Control Board
  Notification of Well Construction

**RAW WATER PIPELINE CONSTRUCTION**

SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- Baldwin Park – Engineering
  **Utility Permit**

  Traffic Control / Lane Closure Permit
  Right-of-Way Permit
  Utility Permit
  Dust Control Permit
  Public Improvement Bond (public works repair)
- City of Baldwin Park – Planning
  **Design review**

  Public Works Permit
  Environmental Impact Report
- California Department of Transportation – Hydraulics (Hwy I10 Crossing)
  Encroachment Permit - 4 to 6 weeks required
  Maintenance Access Easement
- Los Angeles Water Quality Control Board
  **Construction Groundwater Dewatering Permit – 2 to 4 weeks**

- Metro Link (MTA) - Engineering
  License Agreement – 6 to 10 weeks
  Right-of-Way Encroachment Permit
  Right-of –Entry Agreement
- Union Pacific Railroad – Real Estate
  Permit to be on railroad property for utility survey

Application for crossing
Exhibit "A"

- U.S. Army Corps of Engineers – Regulatory Department

**Engineering review**

Construction or Crossing – Section 404 Permit
Permit to cross Walnut Creek Wash – Right of Entry Permit

- City of Irwindale

Conditional Use Permit – City Council Vote – 1 to 3 months
Building Permit – 4 to 6 weeks
Design review – 2 to 3 weeks
Public Works Permit – 1 to 2 weeks
Environmental Impact Report

REVIEWS

No additional reviews identified

**TREATMENT PLANT CONSTRUCTION**

SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- City of Baldwin Park – Engineering

**Building Permit - 2 to 3 weeks required**

Site Plan Review

**Utility Permit - 2 to 3 weeks required - 2 to 3 weeks required**

Traffic Control / Lane Closure Permit - 2 to 3 weeks required
Right-of-Way Permit - 2 to 3 weeks required
Rough Grading Permit
Public Works Permit
Utility Permit - 2 to 3 weeks required
Dust Control Permit - 2 to 3 weeks required
Public Improvement Bond (public works repair) - 2 to 3 weeks required
NPDES Permit (required before building permit)
Conditional Use Permit (City Council Permit if change of zoning is needed)
Environmental Impact Report (covers archeological issues as well – but none are currently known of).

- City of Baldwin Park – Planning

**Design review**

**Zoning Permit – 1 to 3 months**
Public Works Permit

**Table 2-1 (continued)**

**Environmental Impact Report**

- California Department of Health Services
  Operating permit
- Los Angeles Water Quality Control Board
  Construction Dewatering Permit
- South Coast Air Quality Management
  Vapor Control Permit – 6 to 8 weeks required
- Water Resources Control Board

Wastewater Treatment Plan Certification only – not applicable

- City of Irwindale
  Conditional Use Permit – City Council Vote – 1 to 3 months
  Building Permit – 4 to 6 weeks
  Design review – 2 to 3 weeks
  Public Works Permit – 1 to 2 weeks
  Environmental Impact Report

REVIEWS

- California Department of Health Services – Drinking Water Program
  No permit required

**Table 2-1 (continued)**

## TREATED WATER LINE CONSTRUCTION

SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- Baldwin Park – Engineering

**Utility Permit**

Traffic Control / Lane Closure Permit
Right-of-Way Permit
Utility Permit
Dust Control Permit
Public Improvement Bond (public works repair)

- City of Baldwin Park – Planning

**Design review**

Public Works Permit
Environmental Impact Report

- California Department of Fish and Game

**Streambed Alteration Permit**

- California Department of Transportation – Hydraulics (Hwy I605 & I10 Crossing)

Encroachment Permit - 4 to 6 weeks required
Maintenance Access Easement

- City of Duarte

Traffic Control / Lane Closure Permit
Right-of-Way Permit
Dust Control Permit
Public Improvement Bond (public works repair)
Public Works Permit

- Los Angeles Water Quality Control Board

**Construction Groundwater Dewatering Permit – 2 to 4 weeks**

**NPDES Permit – Required 180 days prior to being on-line**

- Metro Link (MTA) - Engineering

License Agreement – 6 to 10 weeks
Right-of-Way Encroachment Permit
Right-of –Entry Agreement

- Union Pacific Railroad – Real Estate

Permit to be on railroad property for utility survey
Application for crossing
Exhibit "A"

**Table 2-1 (continued)**

- U.S. Army Corps of Engineers – Regulatory Department

**Engineering review**

Construction or Crossing – Section 404 Permit
Permit to cross Walnut Creek Wash – Right of Entry Permit

- City of Irwindale

Conditional Use Permit – City Council Vote – 1 to 3 months
Building Permit – 4 to 6 weeks
Design review – 2 to 3 weeks
Public Works Permit – 1 to 2 weeks
Environmental Impact Report

REVIEWS - No additional reviews identified

**Table 2-1 (continued)**

## SAN GABRIEL RIVER DISCHARGE

### SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- California Department of Fish and Game – Environmental Services

**Streambed Alternation Agreement – 30 to 45 days required**

- Army Corps of Engineers – Regulatory Department
  Section 401 Permit – for discharge – 2 months required
  Section 402 Permit – 2 to 3 months required

**Section 404 Permit – 2 months required**

  Right-of-Entry Permit – 30 to 45 days
- Los Angeles County Public Works Department – Hydraulic Water Conservation District – Operations Division
  Submit Plans and hydrologic studies to Construction Division for review (Merged with Flood Control District in 1985) also sent to water quality control division for additional review. Permit required is a connecting permit (permit is similar to connecting to a trunk line storm drain)
- Los Angeles Water Quality Control Board
  NPDES Permit (National Pollutant Discharge Elimination System)

### REVIEWS

- Army Corps of Engineers – Regulatory Department
  Engineering Review
- California State Engineer

**Augmentation Plan**

- San Gabriel Basin Watermaster

**Engineering review**

  Replacement cost for water lost from the basin (evaporative loss or flow out of basin)
- San Gabriel Mosquito Abatement

**Consultation and review only**

- San Gabriel River and Mountains Conservancy

**Approved by Governor 10/7/99 – Involvement unknown**

- San Gabriel River Watermaster
  Review by Watermaster Consultants
- Upper Los Angeles River Area Watermaster
  Review only – Coordinate with Water Quality Control Board

**Table 2-1 (continued)**

**SANTA FE SPREADING GROUNDS DISCHARGE**

SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- California State Engineer – Augmentation Plan
- Los Angeles Department of Pubic Works – Land Development
- Los Angeles Department of Pubic Works – Hydraulic Water Conservation District Operations

**Construction Division review – Connecting Permit**

- Los Angeles Water Quality Control Board
  NPDES Permit (National Pollutant Discharge Elimination System)
- U.S. Army Corps of Engineers
  Section 401 Permit – Clean Water Act
  Section 402 Permit – Clean Water Act
  Right of Entry Permit

REVIEWS

- Los Angeles Department of Pubic Works – Water Quality Division

**Engineering review**

- San Gabriel Basin Watermaster

**Engineering review**

Replacement cost for water lost from the basin (evaporative loss or flow out of basin)

- San Gabriel Mosquito Abatement

**Consultation and review only**

- San Gabriel River and Mountains Conservancy

**Approved by Governor 10/7/99 – Involvement unknown**

- San Gabriel River Watermaster
  Review by Watermaster Consultants
- Upper Los Angeles River Area Watermaster
  Review only – Coordinate with Water Quality Control Board

**Table 2-1 (continued)**

**WALNUT CREEK WASH DISCHARGE**

SUBSTANTIVE REQUIREMENTS/PERMITS/AGREEMENTS

- California State Engineer – Augmentation Plan
- Los Angeles Department of Pubic Works – Land Development
- Los Angeles Department of Pubic Works – Hydraulic Water Conservation District Operations

**Construction Division review – Connecting Permit**

- Los Angeles Water Quality Control Board
  NPDES Permit (National Pollutant Discharge Elimination System)
- U.S. Army Corps of Engineers
  Discharge to Wash – Section 401 Permit – Clean Water Act
  Section 402 Permit – Clean Water Act
  Construction or Crossing – Section 404 Permit
  Right of Entry Permit

REVIEWS

- Los Angeles Department of Pubic Works – Water Quality Division

**Engineering review**

- San Gabriel Basin Watermaster

**Engineering review**

Replacement cost for water lost from the basin (evaporative loss or flow out of basin)

- San Gabriel Mosquito Abatement

**Consultation and review only**

- San Gabriel River and Mountains Conservancy

**Approved by Governor 10/7/99 – Involvement unknown**

- San Gabriel River Watermaster
  Review by Watermaster Consultants
- Upper Los Angeles River Area Watermaster
  Review only – Coordinate with Water Quality Control Board

**MISCELLANEOUS**

- U.S. Bureau of Reclamation

**No permits required, only applies to federal water**

- Local Water Purveyors
  Coordination of Construction / Connection plans

## Table 2-2: Baseline Potentiometric Monitoring Program

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **BPOUSP Extraction Wells** | | | |
| SA1-1 | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-2 | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-3 | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-1 (2 wells) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-2 (2 wells) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-3 (2 wells) | NA | Six consecutive months prior to startup | BPOUSP |
| **BPOUSP Piezometers** | | | |
| SA1-1PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-1PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-2PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-2PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-3PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA1-3PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-1PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-1PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-2PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-2PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-3PS (New) | NA | Six consecutive months prior to startup | BPOUSP |
| SA3-3PD (New) | NA | Six consecutive months prior to startup | BPOUSP |
| **Multiport Monitoring Wells** | | | |
| EPA MW5-1 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-03 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-05 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-08 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-11 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-13 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-15 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-17 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-18 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW519 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-20 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-22 | NA | Two consecutive quarters prior to startup | BPOUSP |
| MW5-23 | NA | Two consecutive quarters prior to startup | BPOUSP |
| **Other Monitoring Wells** | | | |
| AJMW-1 | W11AJMW1 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-2 | W11AJMW2 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-3 | W11AJMW3 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-4 | W11AJMW4 | Two consecutive quarters prior to startup | BPOUSP |
| AJMW-5 | W11AJMW5 | Two consecutive quarters prior to startup | BPOUSP |
| ALRC MW-1 | W11AZW01 | Two consecutive quarters prior to startup | BPOUSP |
| ALRC MW-8 | W11AZW08 | Two consecutive quarters prior to startup | BPOUSP |
| OSCO MW-2 | W11OSMW2 | Two consecutive quarters prior to startup | BPOUSP |
| LA County Santa Fe | 8000070 | Two consecutive quarters prior to startup | Watermaster |
| Baldwin Park Key Well | Z1000006 | Two consecutive quarters prior to startup | Watermaster |

## Table 2-2 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells - Owner** | | | |
| Valley County Water District | 01900028 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900029 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900031 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900032 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900034 | Semi-annual until startup | Watermaster |
| Valley County Water District | 01900035 | Semi-annual until startup | Watermaster |
| California American Water Company Duarte | 01900354 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01900358 | Semi-annual until startup | Watermaster |
| Valley View Mutual Water Company | 01900365 | Semi-annual until startup | Watermaster |
| California American Water Company Duarte | 01900497 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01900829 | Semi-annual until startup | Watermaster |
| Glendora, City of | 01900831 | Semi-annual until startup | Watermaster |
| Covina Irrigating Company | 01900881 | Semi-annual until startup | Watermaster |
| Covina Irrigating Company | 01900885 | Semi-annual until startup | Watermaster |
| Champion Mutual Water Company | 01900908 | Semi-annual until startup | Watermaster |
| California Domestic Water Company | 01901181 | Semi-annual until startup | Watermaster |
| La Puente Valley County Water District | 01901460 | Semi-annual until startup | Watermaster |
| Glendora, City of | 01901524 | Semi-annual until startup | Watermaster |
| Suburban Water Systems | 01901598 | Semi-annual until startup | Watermaster |
| Sterling Mutual Water Company | 01902096 | Semi-annual until startup | Watermaster |
| Azusa Valley Water Company | 01902113 | Semi-annual until startup | Watermaster |
| Azusa Valley Water Company | 01902114 | Semi-annual until startup | Watermaster |
| Azusa Valley Water Company | 01902115 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01902457 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 01902518 | Semi-annual until startup | Watermaster |
| Owner Not Reported* | 01902533 | Semi-annual until startup | Watermaster |
| Azusa, City of | 01902536 | Semi-annual until startup | Watermaster |
| Azusa, City of | 01902537 | Semi-annual until startup | Watermaster |
| Azusa, City of | 01902538 | Semi-annual until startup | Watermaster |
| City of Industry | 01902581 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 01902947 | Semi-annual until startup | Watermaster |
| California American Water Company Duarte | 01903018 | Semi-annual until startup | Watermaster |
| Suburban Water Systems | 01903067 | Semi-annual until startup | Watermaster |
| Conrock Company (also called Portland Cement) | 01903088 | Semi-annual until startup | Watermaster |

## Table 2-2 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Valley County Water District | 08000039 | Semi-annual until startup | Watermaster |
| Conrock Company (also CALMAT) | 08000063 | Semi-annual until startup | Watermaster |
| Los Angeles, County of | 08000070 | Semi-annual until startup | Watermaster |
| California Domestic Water Company | 08000100 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 08000112 | Semi-annual until startup | Watermaster |
| San Gabriel Valley Water Company | 71903093 | Semi-annual until startup | Watermaster |

* The well owner was not included in the information supplied by the Watermaster.

## Table 2-3: Baseline Water Quality Monitoring Program

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **BPOUSP Extraction Wells** | | | |
| SA1-1 | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA1-2 | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA1-3 | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA3-1 (2 wells) | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA3-2 (2 wells) | NA | Two consecutive quarters prior to startup | BPOUSP |
| SA3-3 (2 wells) | NA | Two consecutive quarters prior to startup | BPOUSP |
| **Multiport Monitoring Wells** | | | |
| EPA MW5-1 | NA | Semi-annual until startup | BPOUSP |
| MW5-03 | NA | Semi-annual until startup | BPOUSP |
| MW5-05 | NA | Semi-annual until startup | BPOUSP |
| MW5-08 | NA | Semi-annual until startup | BPOUSP |
| MW5-11 | NA | Semi-annual until startup | BPOUSP |
| MW5-13 | NA | Semi-annual until startup | BPOUSP |
| MW5-15 | NA | Semi-annual until startup | BPOUSP |
| MW5-17 | NA | Semi-annual until startup | BPOUSP |
| MW5-18 | NA | Semi-annual until startup | BPOUSP |
| MW519 | NA | Semi-annual until startup | BPOUSP |
| MW5-20 | NA | Semi-annual until startup | BPOUSP |
| MW5-22 | NA | Semi-annual until startup | BPOUSP |
| MW5-23 | NA | Semi-annual until startup | BPOUSP |
| MW5-24 | NA | Semi-annual until startup | BPOUSP |
| **Other Monitoring Wells** | | | |
| AJMW-1 | W11AJMW1 | Semi-annual until startup | BPOUSP |
| AJMW-2 | W11AJMW2 | Semi-annual until startup | BPOUSP |
| AJMW-3 | W11AJMW3 | Semi-annual until startup | BPOUSP |
| ALRC MW-1 | W11AZW01 | Semi-annual until startup | BPOUSP |
| ALRC MW-8 | W11AZW08 | Semi-annual until startup | BPOUSP |
| OSCO MW-2 | W11OSMW2 | Semi-annual until startup | BPOUSP |
| LA County Santa Fe | 8000070 | Annual until startup | Watermaster |
| Baldwin Park Key Well | Z1000006 | Annual until startup | Watermaster |
| **Production Wells – Owner** | | | |
| Valley County Water District | 01900027 | Annual until startup | Watermaster |
| Valley County Water District | 01900028 | Annual until startup | Watermaster |
| Valley County Water District | 01900032 | Annual until startup | Watermaster |
| Burbank Development Company | 01900093 | Annual until startup | Watermaster |
| United Rock Products Corporation | 01900106 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 01900354 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 01900358 | Annual until startup | Watermaster |
| Valley View Mutual Water Company | 01900363 | Annual until startup | Watermaster |

## Table 2-3 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Valley View Mutual Water Company | 01900364 | Annual until startup | Watermaster |
| Glendora, City of | 01900827 | Annual until startup | Watermaster |
| Glendora, City of | 01900829 | Annual until startup | Watermaster |
| Glendora, City of | 01900830 | Annual until startup | Watermaster |
| Covina Irrigating Company | 01900881 | Annual until startup | |
| Covina Irrigating Company | 01900882 | Annual until startup | |
| Covina Irrigating Company | 01900883 | Annual until startup | Watermaster |
| Covina Irrigating Company | 01900885 | Annual until startup | Watermaster |
| California Domestic Water Company | 01901181 | Annual until startup | Watermaster |
| La Puente Valley County Water District | 01901460 | Annual until startup | Watermaster |
| Livingston-Graham | 01901492 | Annual until startup | Watermaster |
| Livingston-Graham | 01901493 | Annual until startup | Watermaster |
| Suburban Water Systems | 01901598 | Annual until startup | Watermaster |
| Suburban Water Systems | 01901599 | Annual until startup | Watermaster |
| Sterling Mutual Water Company | 01902096 | Annual until startup | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 01902115 | Annual until startup | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 01902116 | Annual until startup | Watermaster |
| Polopolus et. Al. | 01902169 | Annual until startup | Watermaster |
| Owl Rock Products Company | 01902241 | Annual until startup | Watermaster |
| Azusa Agricultural Water Company (Azusa Light and Water) | 01902457 | Annual until startup | Watermaster |
| Azusa Agricultural Water Company (Azusa Light and Water) | 01902458 | Annual until startup | Watermaster |
| United Rock Products Corporation | 01902532 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 01902533 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 01902535 | Annual until startup | Watermaster |
| Champion Mutual Water Company | 01902816 | Annual until startup | Watermaster |
| La Puente Valley County Water District | 01902859 | Annual until startup | Watermaster |
| Conrock Company (Calmat Company) | 01902920 | Annual until startup | Watermaster |
| Woodland, Richard | 01902949 | Annual until startup | Watermaster |
| Woodland, Richard | 01902950 | Annual until startup | Watermaster |

## Table 2-3 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Woodland Farms (6W Farms. Inc.) | 01902951 | Annual until startup | Watermaster |
| Dawes, Mary K. | 01902952 | Annual until startup | Watermaster |
| California Domestic Water Company | 01902967 | Annual until startup | Watermaster |
| Speedway 605 Inc. | 01902968 | Annual until startup | Watermaster |
| Sonoco Products Company | 01902971 | Annual until startup | Watermaster |
| Livingston-Graham | 01903006 | Annual until startup | Watermaster |
| California Domestic Water Company/Duarte | 01903018 | Annual until startup | Watermaster |
| United Rock Products Corporation | 01903062 | Annual until startup | Watermaster |
| Suburban Water Systems | 01903067 | Annual until startup | Watermaster |
| California Domestic Water Company | 01903081 | Annual until startup | Watermaster |
| Conrock Company (Calmat Company) | 01903088 | Annual until startup | Watermaster |
| Owl Rock Products Company | 01903119 | Annual until startup | Watermaster |
| Davidson Optronics Inc. | 08000013 | Annual until startup | Watermaster |
| Miller Brewing Company | 08000034 | Annual until startup | Watermaster |
| Southern California Edison Company | 08000046 | Annual until startup | Watermaster |
| Southern California Edison Company | 08000047 | Annual until startup | Watermaster |
| La Puente Valley County Water District | 08000062 | Annual until startup | Watermaster |
| Conrock Company (Calmat Company) | 08000063 | Annual until startup | Watermaster |
| Los Angeles, City of | 08000070 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 08000072 | Annual until startup | Watermaster |
| Miller Brewing Company | 08000075 | Annual until startup | Watermaster |
| Miller Brewing Company | 08000076 | Annual until startup | Watermaster |
| Azusa, City of (Azusa Light and Water) | 08000086 | Annual until startup | Watermaster |
| Suburban Water Systems | 08000095 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000097 | Annual until startup | Watermaster |
| California Domestic Water Company | 08000100 | Annual until startup | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 08000103 | Annual until startup | Watermaster |
| San Gabriel Valley Water Company | 08000112 | Annual until startup | Watermaster |
| Champion Mutual Water Company | 08000121 | Annual until startup | Watermaster |

## Table 2-3 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Sterling Mutual Water Company | 08000132 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 08000139 | Annual until startup | Watermaster |
| California American Water Company/Duarte | 08000140 | Annual until startup | Watermaster |
| AZ-Two Inc. (Southdown) | 11900038 | Annual until startup | Watermaster |
| Sonoco Products Company | A1902786 | Annual until startup | Watermaster |
| Valley County Water District | 01902356 | Annual until startup | Watermaster |
| California Domestic Water Company | 01903057 | Annual until startup | Watermaster |
| Woodland Farms (6W Farms, Inc.) | 01903072 | Annual until startup | Watermaster |
| Suburban Water Systems | 08000069 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000078 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000096 | Annual until startup | Watermaster |
| Industry Waterworks Systems | 08000097 | Annual until startup | Watermaster |

## Table 2-4: Proposed Piezometer Construction Details

| Subarea | Extraction Well | Extraction Well Screen Interval (ft bgs) | Proposed Piezometer | Piezometer/Multiport Well Screen Interval (ft bgs) |
|---|---|---|---|---|
| 1 | SA1-1 | 275 to 675 | SA1-1PS | 275 to 325 |
| 1 | | 275 to 675 | SA1-1PD | 625 to 675 |
| 1 | SA1-2 | 275 to 675 | SA1-2PS | 275 to 325 |
| 1 | | 275 to 675 | SA1-2PD | 625 to 675 |
| 1 | SA1-3 | 275 to 675 | SA1-3PS | 275 to 325 |
| 1 | | 275 to 675 | SA1-3PD | 625 to 675 |
| 3 | SA3-1 | 400 to 700 | SA3-1PS | 400 to 450 |
| 3 | | 700 to 1,000 | SA3-1PD | 825 to 875 |
| 3 | SA3-2 | 400 to 700 | SA3-2PS | 400 to 450 |
| 3 | | 700 to 1,000 | SA3-2PD | 825 to 875 |
| 3 | SA3-3 | 400 to 700 | SA3-3PS | 400 to 450 |
| 3 | | 700 to 1,000 | SA3-3PD | 825 to 875 |

ft bgs Feet below ground surface

## Table 2-5: BPOU-Wide Potentiometric Monitoring Program

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **BPOUSP Extraction Wells** | | | |
| SA1-1 | NA | Quarterly | BPOUSP |
| SA1-2 | NA | Quarterly | BPOUSP |
| SA1-3 | NA | Quarterly | BPOUSP |
| SA3-1 (2 wells) | NA | Quarterly | BPOUSP |
| SA3-2 (2 wells) | NA | Quarterly | BPOUSP |
| SA3-3 (2 wells) | NA | Quarterly | BPOUSP |
| **BPOUSP Piezometers** | | | |
| SA1-1PS (New) | NA | Quarterly | BPOUSP |
| SA1-1PD (New) | NA | Quarterly | BPOUSP |
| SA1-2PS (New) | NA | Quarterly | BPOUSP |
| SA1-2PD (New) | NA | Quarterly | BPOUSP |
| SA1-3PS (New) | NA | Quarterly | BPOUSP |
| SA1-3PD (New) | NA | Quarterly | BPOUSP |
| SA3-1PS (New) | NA | Quarterly | BPOUSP |
| SA3-1PD (New) | NA | Quarterly | BPOUSP |
| SA3-2PS (New) | NA | Quarterly | BPOUSP |
| SA3-2PD (New) | NA | Quarterly | BPOUSP |
| SA3-3PS (New) | NA | Quarterly | BPOUSP |
| SA3-3PD (New) | NA | Quarterly | BPOUSP |
| **Multiport Monitoring Wells** | | | |
| EPA MW5-1 | NA | Quarterly | BPOUSP |
| MW5-03 | NA | Quarterly | BPOUSP |
| MW5-05 | NA | Quarterly | BPOUSP |
| MW5-08 | NA | Quarterly | BPOUSP |
| MW5-11 | NA | Quarterly | BPOUSP |
| MW5-13 | NA | Quarterly | BPOUSP |
| MW5-15 | NA | Quarterly | BPOUSP |
| MW5-17 | NA | Quarterly | BPOUSP |
| MW5-18 | NA | Quarterly | BPOUSP |
| MW5-19 | NA | Quarterly | BPOUSP |
| MW5-20 | NA | Quarterly | BPOUSP |
| MW5-22 | NA | Quarterly | BPOUSP |
| MW5-23 | NA | Quarterly | BPOUSP |
| MW5-24 (Proposed) | NA | Quarterly | BPOUSP |
| MW5-25 (Proposed) | NA | Quarterly | BPOUSP |
| MW5-26 (Proposed) | NA | Quarterly | BPOUSP |
| **Other Monitoring Wells** | | | |
| AJMW-1 | W11AJMW1 | Semi-annual | BPOUSP |
| AJMW-2 | W11AJMW2 | Semi-annual | BPOUSP |
| AJMW-3 | W11AJMW3 | Semi-annual | BPOUSP |
| AJMW-4 | W11AJMW4 | Semi-annual | BPOUSP |
| AJMW-5 | W11AJMW5 | Semi-annual | BPOUSP |
| ALRC MW-1 | W11AZW01 | Quarterly | BPOUSP |
| ALRC MW-8 | W11AZW08 | Quarterly | BPOUSP |
| OSCO MW-2 | W11OSMW2 | Quarterly | BPOUSP |

## Table 2-5 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Other Monitoring Wells (continued)** | | | |
| LA County Santa Fe | 8000070 | Semi-annual | Watermaster |
| Baldwin Park Key Well | Z1000006 | Weekly | Watermaster |
| **Production Wells - Owner** | | | |
| Valley County Water District | 01900028 | Semi-annual | Watermaster |
| Valley County Water District | 01900029 | Semi-annual | Watermaster |
| Valley County Water District | 01900031 | Semi-annual | Watermaster |
| Valley County Water District | 01900032 | Semi-annual | Watermaster |
| Valley County Water District | 01900034 | Semi-annual | Watermaster |
| Valley County Water District | 01900035 | Semi-annual | Watermaster |
| California American Water Company Duarte | 01900354 | Semi-annual | Watermaster |
| Owner Not Reported* | 01900358 | Semi-annual | Watermaster |
| Valley View Mutual Water Company | 01900365 | Semi-annual | Watermaster |
| California American Water Company Duarte | 01900497 | Semi-annual | Watermaster |
| Owner Not Reported* | 01900829 | Semi-annual | Watermaster |
| Glendora, City of | 01900831 | Semi-annual | Watermaster |
| Covina Irrigating Company | 01900881 | Semi-annual | Watermaster |
| Covina Irrigating Company | 01900885 | Semi-annual | Watermaster |
| Champion Mutual Water Company | 01900908 | Semi-annual | Watermaster |
| California Domestic Water Company | 01901181 | Semi-annual | Watermaster |
| La Puente Valley County Water District | 01901460 | Semi-annual | Watermaster |
| Glendora, City of | 01901524 | Semi-annual | Watermaster |
| Suburban Water Systems | 01901598 | Semi-annual | Watermaster |
| Sterling Mutual Water Company | 01902096 | Semi-annual | Watermaster |
| Azusa Valley Water Company | 01902113 | Semi-annual | Watermaster |
| Azusa Valley Water Company | 01902114 | Semi-annual | Watermaster |
| Azusa Valley Water Company | 01902115 | Semi-annual | Watermaster |
| Owner Not Reported* | 01902457 | Semi-annual | Watermaster |
| San Gabriel Valley Water Company | 01902518 | Semi-annual | Watermaster |
| Owner Not Reported* | 01902533 | Semi-annual | Watermaster |
| Azusa, City of | 01902536 | Semi-annual | Watermaster |
| Azusa, City of | 01902537 | Semi-annual | Watermaster |
| Azusa, City of | 01902538 | Semi-annual | Watermaster |
| City of Industry | 01902581 | Semi-annual | Watermaster |
| San Gabriel Valley Water Company | 01902947 | Semi-annual | Watermaster |
| California American Water Company Duarte | 01903018 | Semi-annual | Watermaster |
| Suburban Water Systems | 01903067 | Semi-annual | Watermaster |

## Table 2-5 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Sampling Agency |
|---|---|---|---|
| **Production Wells – Owner (continued)** | | | |
| Conrock Company (also Ca. Portland Cement | 01903088 | Semi-annual | Watermaster |
| Valley County Water District | 08000039 | Semi-annual | Watermaster |
| Conrock Company (also CALMAT) | 08000063 | Semi-annual | Watermaster |
| Los Angeles, County of | 08000070 | Semi-annual | Watermaster |
| California Domestic Water Company | 08000100 | Semi-annual | Watermaster |
| San Gabriel Valley Water Company | 08000112 | Semi-annual | Watermaster |
| San Gabriel Valley Water Company | 71903093 | Semi-annual | Watermaster |

* The well owner was not included in the information supplied by the Watermaster.

## Table 2-6: BPOU-Wide Water Quality Monitoring Program

| Well Name | Recordation Number | Monitoring Frequency | Monitoring Program | Sampling Agency |
|---|---|---|---|---|
| **BPOUSP Extraction Wells** | | | | |
| SA1-1 | NA | Quarterly | IR,FR | BPOUSP |
| SA1-2 | NA | Quarterly | IR,FR | BPOUSP |
| SA1-3 | NA | Quarterly | IR,FR | BPOUSP |
| SA3-1 (2 wells) | NA | Quarterly | IR,FR | BPOUSP |
| SA3-2 (2 wells) | NA | Quarterly | IR,FR | BPOUSP |
| SA3-3 (2 wells) | NA | Quarterly | IR,FR | BPOUSP |
| ***Multiport Monitoring Wells***[a] | | | | |
| EPA MW5-1 (ports 6-13) | NA | Semi-annual[b] | IR | BPOUSP |
| MW5-03 (ports 4-10) | NA | Semi-annual[b] | IR | BPOUSP |
| MW5-05 | NA | Annual[c] | FR | BPOUSP |
| MW5-08 | NA | Annual[c] | FR | BPOUSP |
| MW5-11 | NA | Annual[c] | FR | BPOUSP |
| MW5-13 | NA | Annual[c] | FR | BPOUSP |
| MW5-15 (ports 1-3) | NA | Semi-annual[b] | IR | BPOUSP |
| MW5-17 | NA | Annual[c] | FR | BPOUSP |
| MW5-18 | NA | Annual[c] | FR | BPOUSP |
| MW5-19 (ports 4-5) | NA | Semi-annual[b] | IR | BPOUSP |
| MW5-20 | NA | Annual[c] | FR | BPOUSP |
| MW5-22 (ports 3-4) | NA | Semi-annual[b] | IR | BPOUSP |
| MW5-23 | NA | Annual[c] | FR | BPOUSP |
| MW5-24(Proposed) | NA | Annual[c] | FR | BPOUSP |
| MW5-25(Proposed) | NA | Annual[c] | FR | BPOUSP |
| **Other Monitoring Wells** | | | | |
| AJMW-1 | W11AJMW1 | Annual | FR | BPOUSP |
| AJMW-2 | W11AJMW2 | Annual | FR | BPOUSP |
| AJMW-3 | W11AJMW3 | Annual | FR | BPOUSP |
| ALRC MW-1 | W11AZW01 | Semi-annual | FR | BPOUSP |
| ALRC MW-8 | W11AZW08 | Semi-annual | FR | BPOUSP |
| OSCO MW-2 | W11OSMW2 | Semi-annual | FR | BPOUSP |
| LA County Santa Fe | 8000070 | Annual | FR | Watermaster |
| Baldwin Park Key Well | Z1000006 | Semi-annual[b] | FR | Watermaster |
| **Production Wells - Owner** | | | | |
| Valley County Water District | 01900027 | Annual | IR,FR | Watermaster |
| Valley County Water District | 01900028 | Annual | IR,FR | Watermaster |
| Valley County Water District | 01900032 | Annual | IR,FR | Watermaster |
| Burbank Development Company | 01900093 | Annual | IR,FR | Watermaster |
| United Rock Products Corporation | 01900106 | Annual | IR,FR | Watermaster |
| California American Water Company/Duarte | 01900354 | Annual | IR,FR | Watermaster |
| California American Water Company/Duarte | 01900358 | Annual | IR,FR | Watermaster |
| Valley-View Mutual Water Company | 01900363 | Annual | IR,FR | Watermaster |
| Valley View Mutual Water Company | 01900364 | Annual | IR,FR | Watermaster |
| Glendora, City of | 01900827 | Annual | IR,FR | Watermaster |
| Glendora, City of | 01900829 | Annual | IR,FR | Watermaster |
| Glendora, City of | 01900830 | Annual | IR,FR | Watermaster |

## Table 2-6 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Monitoring Program | Sampling Agency |
|---|---|---|---|---|
| **Production Wells – Owner (continued)** | | | | |
| Covina Irrigating Company | 01900881 | Annual | IR,FR | Watermaster |
| Covina Irrigating Company | 01900882 | Annual | IR,FR | Watermaster |
| Covina Irrigating Company | 01900883 | Annual | IR,FR | Watermaster |
| Covina Irrigating Company | 01900885 | Annual | IR,FR | Watermaster |
| California Domestic Water Company | 01901181 | Annual | IR,FR | Watermaster |
| La Puente Valley County Water District | 01901460 | Annual | IR,FR | Watermaster |
| Livingston-Graham | 01901492 | Annual | IR,FR | Watermaster |
| Livingston-Graham | 01901493 | Annual | IR,FR | Watermaster |
| Suburban Water Systems | 01901598 | Annual | IR,FR | Watermaster |
| Suburban Water Systems | 01901599 | Annual | IR,FR | Watermaster |
| Sterling Mutual Water Company | 01902096 | Annual | IR,FR | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 01902115 | Annual | IR,FR | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 01902116 | Annual | IR,FR | Watermaster |
| Polopolus et. Al. | 01902169 | Annual | IR,FR | Watermaster |
| Owl Rock Products Company | 01902241 | Annual | IR,FR | Watermaster |
| Azusa Agricultural Water Company (Azusa Light and Water) | 01902457 | Annual | IR,FR | Watermaster |
| Azusa Agricultural Water Company (Azusa Light and Water) | 01902458 | Annual | IR,FR | Watermaster |
| United Rock Products Corporation | 01902532 | Annual | IR,FR | Watermaster |
| Azusa, City of (Azusa Light and Water) | 01902533 | Annual | IR,FR | Watermaster |
| Azusa, City of (Azusa Light and Water) | 01902535 | Annual | IR,FR | Watermaster |
| Champion Mutual Water Company | 01902816 | Annual | IR,FR | Watermaster |
| La Puente Valley County Water District | 01902859 | Annual | IR,FR | Watermaster |
| Conrock Company (Calmat Company) | 01902920 | Annual | IR,FR | Watermaster |
| Woodland, Richard | 01902949 | Annual | IR,FR | Watermaster |
| Woodland, Richard | 01902950 | Annual | IR,FR | Watermaster |
| Woodland Farms (6W Farms. Inc.) | 01902951 | Annual | IR,FR | Watermaster |
| Dawes, Mary K. | 01902952 | Annual | IR,FR | Watermaster |
| California Domestic Water Company | 01902967 | Annual | IR,FR | Watermaster |
| Speedway 605 Inc. | 01902968 | Annual | IR,FR | Watermaster |
| Sonoco Products Company | 01902971 | Annual | IR,FR | Watermaster |
| Livingston-Graham | 01903006 | Annual | IR,FR | Watermaster |
| California Domestic Water Company/Duarte | 01903018 | Annual | IR,FR | Watermaster |
| United Rock Products Corporation | 01903062 | Annual | IR,FR | Watermaster |
| Suburban Water Systems | 01903067 | Annual | IR,FR | Watermaster |
| California Domestic Water Company | 01903081 | Annual | IR,FR | Watermaster |
| Conrock Company (Calmat Company) | 01903088 | Annual | IR,FR | Watermaster |
| Owl Rock Products Company | 01903119 | Annual | IR,FR | Watermaster |
| Davidson Optronics Inc. | 08000013 | Annual | IR,FR | Watermaster |
| Miller Brewing Company | 08000034 | Annual | IR,FR | Watermaster |
| Southern California Edison Company | 08000046 | Annual | IR,FR | Watermaster |
| Southern California Edison Company | 08000047 | Annual | IR,FR | Watermaster |
| La Puente Valley County Water District | 08000062 | Annual | IR,FR | Watermaster |
| Conrock Company (Calmat Company) | 08000063 | Annual | IR,FR | Watermaster |
| Los Angeles, City of | 08000070 | Annual | IR,FR | Watermaster |
| Azusa, City of (Azusa Light and Water) | 08000072 | Annual | IR,FR | Watermaster |
| Miller Brewing Company | 08000075 | Annual | IR,FR | Watermaster |

## Table 2-6 (continued)

| Well Name | Recordation Number | Monitoring Frequency | Monitoring Program | Sampling Agency |
|---|---|---|---|---|
| **Production Wells – Owner (continued)** | | | | |
| Miller Brewing Company | 08000076 | Annual | IR,FR | Watermaster |
| Azusa, City of (Azusa Light and Water) | 08000086 | Annual | IR,FR | Watermaster |
| Suburban Water Systems | 08000095 | Annual | IR,FR | Watermaster |
| Industry Waterworks Systems | 08000097 | Annual | IR,FR | Watermaster |
| California Domestic Water Company | 08000100 | Annual | IR,FR | Watermaster |
| Azusa Valley Water Company (Azusa Light and Water) | 08000103 | Annual | IR,FR | Watermaster |
| San Gabriel Valley Water Company | 08000112 | Annual | IR,FR | Watermaster |
| Champion Mutual Water Company | 08000121 | Annual | IR,FR | Watermaster |
| Sterling Mutual Water Company | 08000132 | Annual | IR,FR | Watermaster |
| California American Water Company/Duarte | 08000139 | Annual | IR,FR | Watermaster |
| California American Water Company/Duarte | 08000140 | Annual | IR,FR | Watermaster |
| AZ-Two Inc. (Southdown) | 11900038 | Annual | IR,FR | Watermaster |
| Sonoco Products Company | A1902786 | Annual | IR,FR | Watermaster |
| Valley County Water District | 01902356 | Annual | IR,FR | Watermaster |
| California Domestic Water Company | 01903057 | Annual | IR,FR | Watermaster |
| Woodland Farms (6W Farms, Inc.) | 01903072 | Annual | IR,FR | Watermaster |
| Suburban Water Systems | 08000069 | Annual | IR,FR | Watermaster |
| Industry Waterworks Systems | 08000078 | Annual | IR,FR | Watermaster |
| Industry Waterworks Systems | 08000096 | Annual | IR,FR | Watermaster |
| Industry Waterworks Systems | 08000097 | Annual | IR,FR | Watermaster |

IR Performance Evaluation Monitoring (Interim Remedy)
FR Long-term Remedy Evaluation (Final Remedy)

a. See Table 5-3 for selected multiport depths.
b. Indicates that the semi-annual sampling frequency will be re-evaluated after 3 years of performance monitoring.
c. Indicates the sampling frequency will be quarterly for the first two years of performance monitoring and annually thereafter.

## Table 2-7: Multiport Well Port Sampling Depths
## Semi-Annual Performance Monitoring

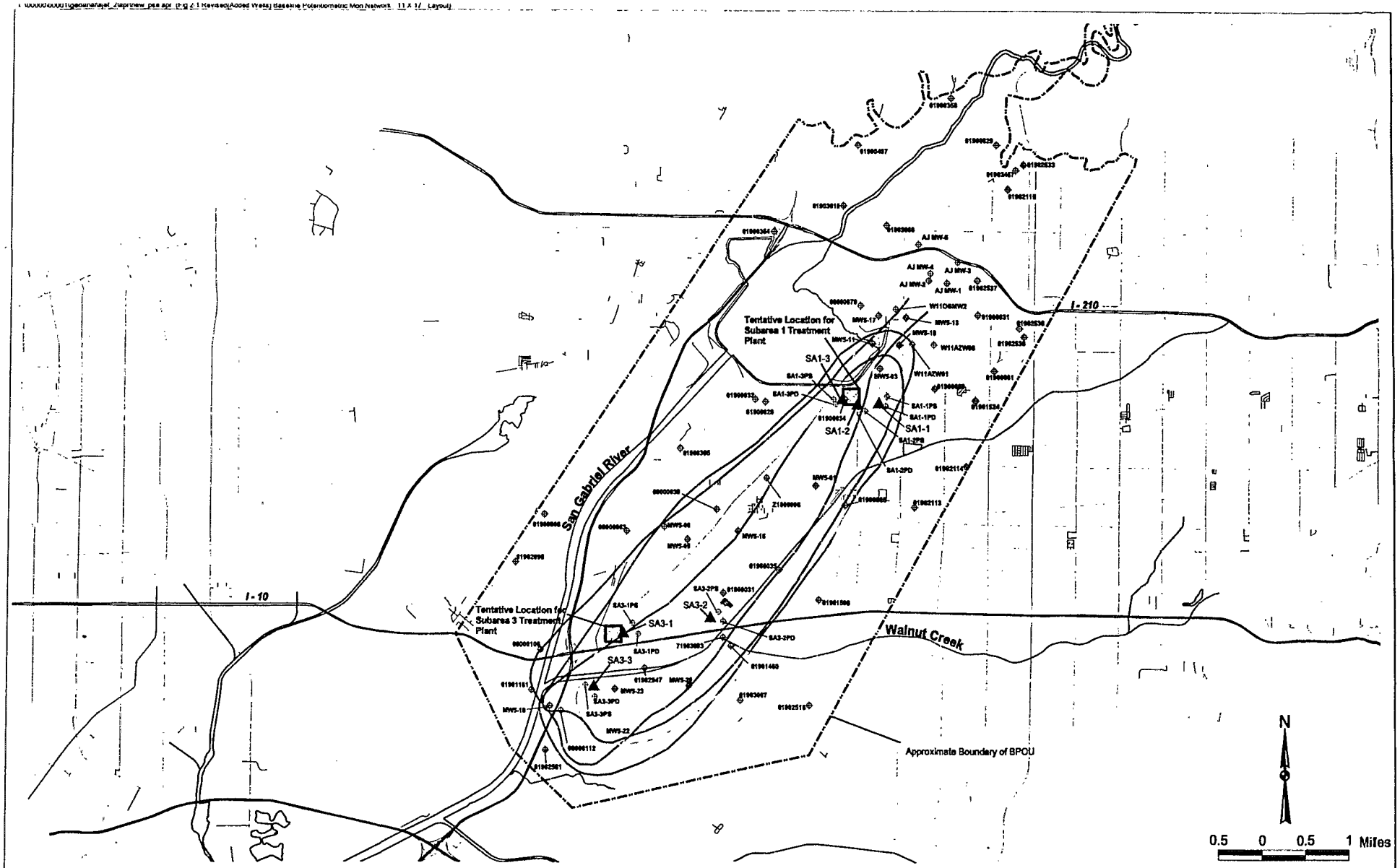
| Well | Zone | Sample Depth (feet bgs) |
|---|---|---|
| EPA MW5-01 | Zone 13 | 216-226 |
| | Zone 12 | 287-297 |
| | Zone 11 | 335-345 |
| | Zone 10 | 430-440 |
| | Zone 9 | 523-533 |
| | Zone 8 | 640-650 |
| | Zone 7 | 765-775 |
| | Zone 6 | 875-885 |
| MW5-03 | Zone 10 | 235-245 |
| | Zone 9 | 300-310 |
| | Zone 8 | 400-410 |
| | Zone 7 | 510-520 |
| | Zone 6 | 590-600 |
| | Zone 5 | 670-680 |
| | Zone 4 | 810-820 |
| MW5-15 | Zone 3 | 235 - 245 |
| | Zone 2 | 450-460 |
| | Zone 1 | 670 - 680 |
| MW5-19 | Zone 5 | 430-440 |
| | Zone 4 | 615-625 |
| MW5-22 | Zone 4 | 600-610 |
| | Zone 3 | 694-704 |

## Table 2-8: Proposed Multiport Monitoring Well Construction Details

| Subarea | Proposed Multiport Well | Sampling Zone | Screened Interval (feet bgs) |
|---|---|---|---|
| 1 | MW5-24 | Zone 7 | 240-250 |
| | | Zone 6 | 390-400 |
| | | Zone 5 | 540-550 |
| | | Zone 4 | 690-700 |
| | | Zone 3 | 840-850 |
| | | Zone 2 | 990-1000 |
| | | Zone 1 | 1140-1150 |
| 1 | MW5-25 | Zone 5 | 240-250 |
| | | Zone 4 | 390-400 |
| | | Zone 3 | 540-550 |
| | | Zone 2 | 690-700 |
| | | Zone 1 | 790-800 |

ft bgs Feet below ground surface

# FIGURES




Plume Outlines - Plume Elevation at -100 feet mean sea level

- TCE 5 ug/L
- Perchlorate 18 ug/L
- NDMA 0.050 ug/L
- Carbon Tetrachloride 0.5 ug/L

Monitoring Wells

- Production Wells
- Multiport Monitoring Wells
- Other Monitoring Wells
- BPOU Piezometer (Proposed)
- ▲ BPOUSP Extraction Wells (Proposed)

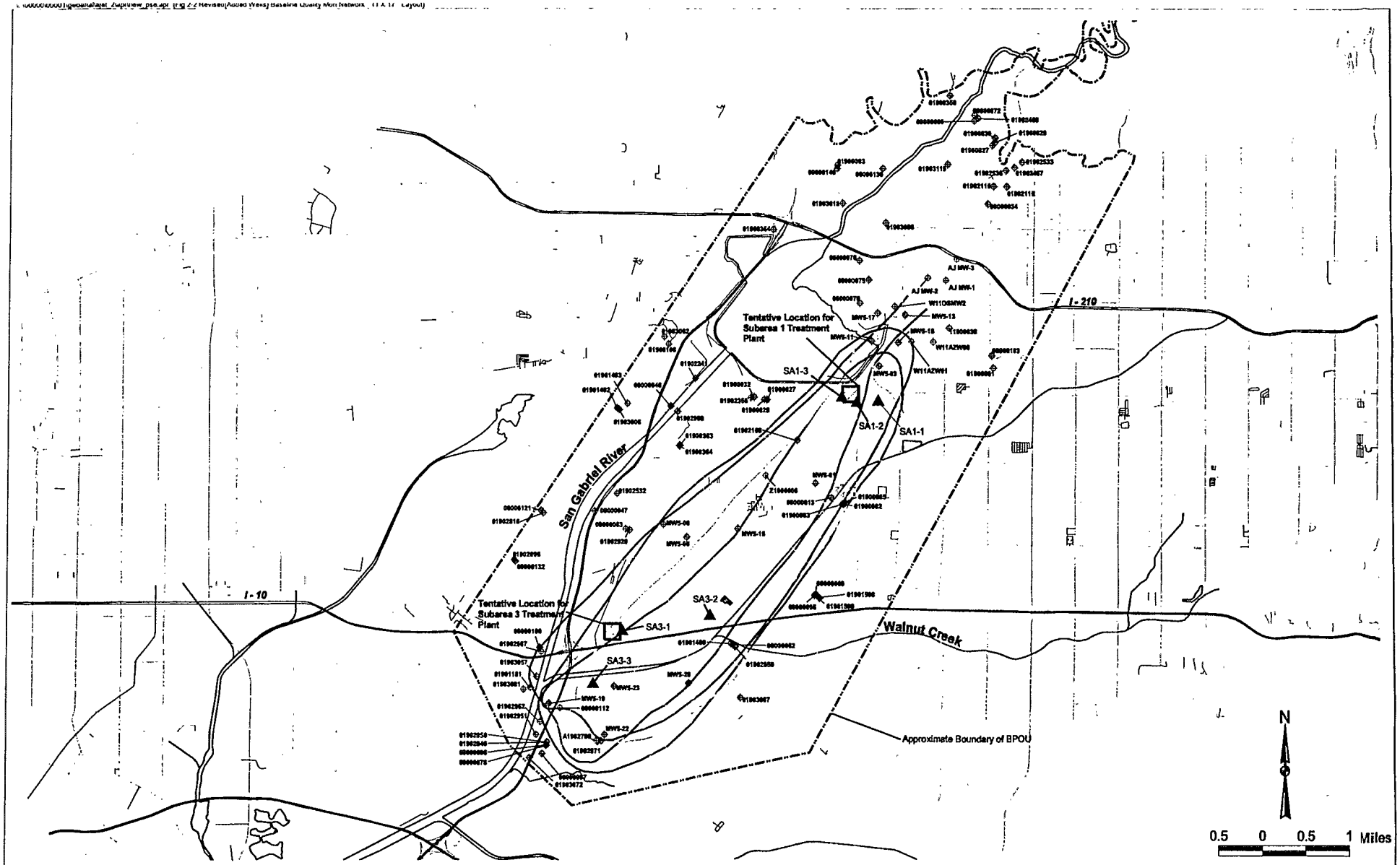
Harding Lawson Associates
Engineering and Environmental Services

**Baseline Potentiometric Monitoring Network Performance Standards Evaluation and Long Term Remedy Evaluation Plan**

Baldwin Park Operable Unit, California

FIGURE **2-1**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717 202 | TLR | 01/00 | 03/00 |




Plume Outlines - Plume Elevation at -100 feet mean sea level

- TCE 5 ug/L
- Perchlorate 18 ug/L
- NDMA 0.050 ug/L
- Carbon Tetrachloride 0.5 ug/L

Monitoring Wells

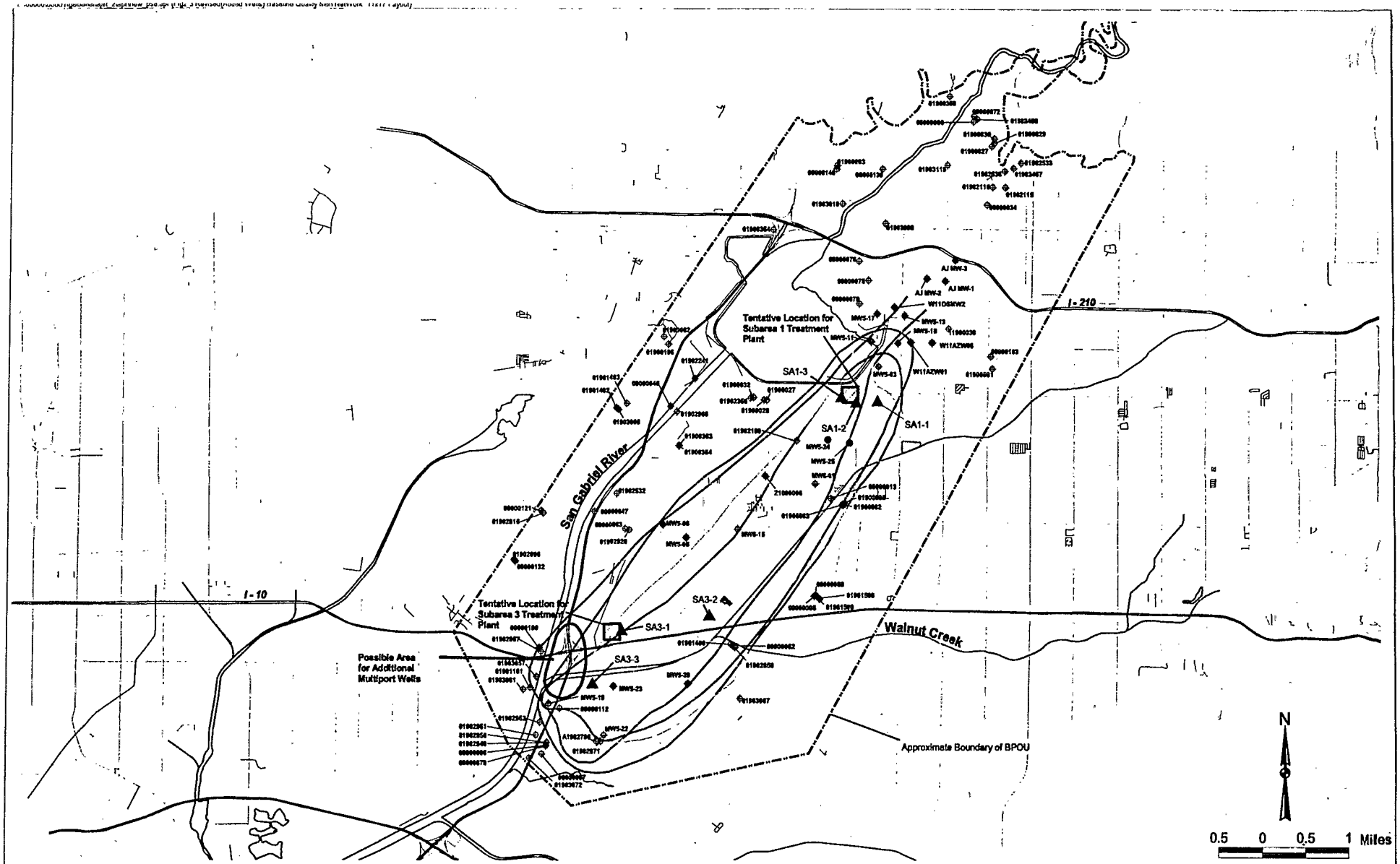
- Production Wells
- Multiport Monitoring Wells
- Other Monitoring Wells
- BPOUSP Extraction Wells (Proposed)

Harding Lawson Associates
Engineering and Environmental Services

**Baseline Water Quality Monitoring Network Performance Standards Evaluation and Long Term Remedy Evaluation Plan**
Baldwin Park Operable Unit, California

FIGURE **2-2**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717 202 | TLR | 01/00 | 03/00 |




Plume Outlines - Plume Elevation at -100 feet mean sea level

- TCE 5 ug/L
- Perchlorate 18 ug/L
- NDMA 0.050 ug/L
- Carbon Tetrachloride 0.5 ug/L

Monitoring Wells

- Production Wells
- Multiport Monitoring Wells
- Other Monitoring Wells
- BPOUSP Extraction Wells (Proposed)
- General Area for Proposed Multiport Monitoring Wells; Wells are also part of the Long-Term Remedy Monitoring Network
- Long-Term Remedy Network Monitoring Locations

Harding Lawson Associates
Engineering and Environmental Services

**BPOU - Wide Water Quality Monitoring Network Performance Standards Evaluation and Long Term Remedy Evaluation Plan**
Baldwin Park Operable Unit, California

FIGURE **2-3**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED DATE |
|---|---|---|---|---|
| DAM | 46717 202 | TLR | 01/00 | 03/00 |