NOTICE OF INTENT TO APPEAR

Southern California Water Company plans to participate in the water right hearing regarding:
(name of party or participant)

Petition to Revise
Declaration of Fully Appropriated Stream Systems
Regarding
the American River, Sacramento County

Scheduled for
May 31, 2002

- ☐ I/we intend to present a policy statement only:
- ☒ I agree to accept electronic service:
- ☒ I/we plan to call the following witnesses to testify at the hearing:

NAME	SUBJECT OF PROPOSED TESTIMONY	ESTIMATED LENGTH OF DIRECT TESTIMONY	EXPERT WITNESS (YES/NO)
SCWC - Jim Carson	History of Groundwater Production by Arden Cordova Water Services (ACWS). Key Issues (1) and (2).	20 minutes	Non-Expert
SCWC - Rob Hanford	Technical Background Regarding Groundwater Production by Arden Cordova Water Services. Key Issues (1) and (2).	20 minutes	Expert
Komex - Stephen Ross - Anthony Brown	Relationship of groundwater to Lower American River, impact of groundwater treatment operations. Key Issues (1) - (4).	20 minutes each	Expert
Stetson Engineers - Stephen Johnson - Jeff Helsley	Groundwater operations; water usage of Lower American River. Key Issues (3) and (4).	20 minutes each	Expert
Kennedy-Jenks - Lynn Takaichi - Morris Taylor	Groundwater operations; water usage of Lower American River. Key Issues (3) and (4).	20 minutes each	Expert

(If more space is required, please add additional pages or use reverse side)

Name, Address, Phone Number and Fax Number of Attorney or Other Representative

Signature: Dated April 9, 2002

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April 29, 2002

To: American River FAS Hearing Participants

Re: Information re Aerojet ARGET and GET E/F Facilities

Attached is a document titled, *GET Effectiveness Evaluation for the American River Study Area*. This report was prepared by Aerojet and was finalized in February of 2000. Of the materials in our possession, this report provides the most complete and detailed description of the Aerojet extraction activities and discharge to Buffalo Creek. It also provides extensive monitoring data regarding these extractions. This information is responsive to the issue of how much new water is being added to Buffalo Creek and the American River pursuant to Aerojet's discharge of groundwater.

An overview map of the extraction and treatment facilities can be found at Figure 2-1 of the report. Since this map is difficult to read as a reproduction, we have prepared a separate color map that represents the same area. This map lacks the detail of the map in the Aerojet report, but it should provide an orientation to the facilities that will assist in your review of the Aerojet report map.

Please note that the color map which we have included identifies not only the facilities which are currently responsible for the discharge of treated water into the American River, but also identifies additional treatment facilities. The additional facilities are identified as the "GET E" and "GET F" facilities. The facilities that are responsible for the current discharge of water into the American River are the ARGET (American River Groundwater Extraction/Treatment) facilities.

In its February 27, 2002 letter to the Board, the RWQCB identified up to 8000 additional gpm that may be available from an expansion of the Aerojet groundwater extraction and treatment operations. The letter states in pertinent part that, "[a] revision to [Aerojet's NPDES] permit is currently in draft form that will allow for an additional 6000 gpm from Aerojet's western GET E/F treatment system to be discharged to Buffalo Creek and/or Lake Natoma. It is anticipated that the permit will be before the Regional Board in April 2002 to be considered for adoption. In the future, it is anticipated that up to 8000 gpm of additional flow will be generated from Aerojet's Western Groundwater Operable Unit Treatment System . . . and discharged directly or indirectly to the American River."

SCWC is attempting to secure additional details concerning this additional discharge and will distribute this information to the parties as soon as we have access to it. However, the location of the GET E/F facilities are shown on the color map included here.

In its Application, SCWC has identified three prospective places for diversion of the new water. SCWC intends to select the most environmentally benign point of diversion after considering the options in environmental review. It may be that the new water will be suitable for appropriation before it ever enters the American River. SCWC has no intention to appropriate more than the specific quantity of groundwater that is added to Buffalo Creek by the above referenced discharges.

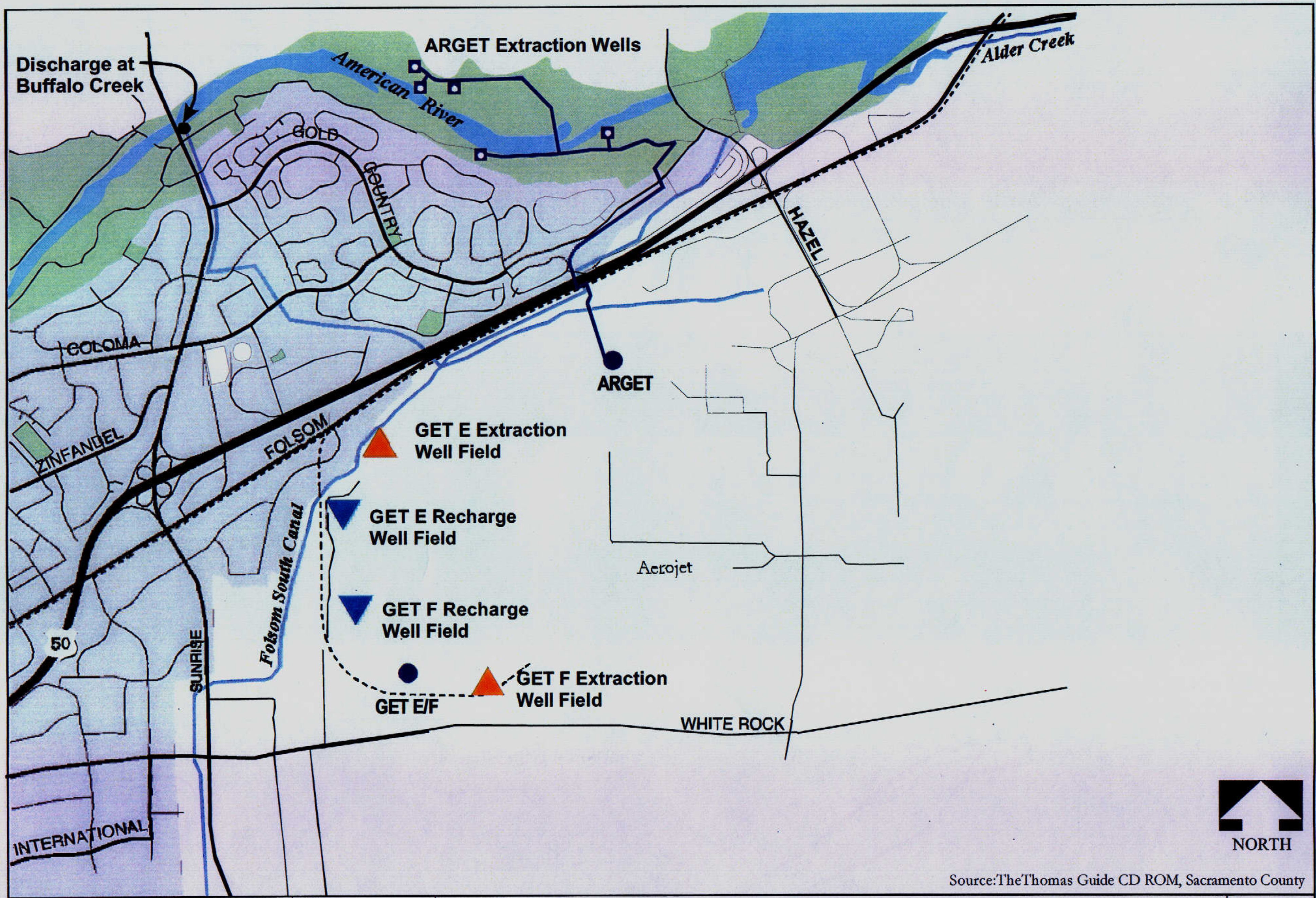
The Aerojet report is labeled with an exhibit number because this is where it falls within SCWC's current collection of exhibits. When our exhibits are distributed in full, we do not intend to serve it on the parties again.

If you have any questions please do not hesitate to contact us.

Sincerely,

Scott S. Slater
Michael T. Fife
For HATCH AND PARENT

MXF:mxf



Source:The Thomas Guide CD ROM, Sacramento County

SOUTHERN CALIFORNIA WATER COMPANY

DATE April 2002		Rancho Cordova System, Region 1, SCWC	EXHIBIT
PROJECT 18878	TITLE	Aerojet Well Fields	4

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Attorneys for Petitioner,
SOUTHERN CALIFORNIA WATER COMPANY

BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In re Petition of Southern California Water)
Company to Revise the Declaration of Fully)
Appropriated Stream Systems Regarding the)
American River, Sacramento County)

SCWC EXHIBIT 18

Aerojet Sacramento Site

GET Effectiveness Evaluation for the American River Study Area

Prepared by:

Gencorp Aerojet
Sacramento, California

February 2000

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1.0 INTRODUCTION

In May 1993, Aerojet revised and submitted an Engineering Evaluation/Cost Analysis (1993 EE/CA) for the American River Study Area (ARSA) which recommended that a groundwater extraction/treatment (GET) facility be located on the north side of the American River to minimize the downgradient migration of chemicals in groundwater. Subsequently, US EPA issued Unilateral Order No. 95-16 (EPA Order) governing the remediation of the plume on both sides of the American River. The EPA Order included a program for completion of the remedial action on the north side of the American River and development of an EE/CA for the plume on the south side of the American River. During design and the associated public comment period, the public expressed substantial concerns regarding the siting of a treatment plant in Sailor Bar Park which resulted in a delay of the project and a reevaluation of the siting of the treatment facilities. The EPA then rescinded the EPA Order and the Central Valley Regional Water Quality Control Board (RWQCB) issued a Cleanup and Abatement Order requesting implementation of an interim action for the ARSA and development of a revised EE/CA which would evaluate extraction of the groundwater and transport back to the Aerojet Sacramento facility for treatment. In September 1996, Aerojet submitted the Final Engineering Evaluation/Cost Analysis (1996 EE/CA) for the ARSA which provided such an evaluation and recommended construction of a groundwater treatment system on the Aerojet site which combines UV/Oxidation and Air Stripping treatment technologies with disposal of the treated groundwater to Buffalo Creek. This report evaluates the performance and effectiveness of the ARSA GET (or ARGET) system for a period of one year from startup in August 1998 through August 1999.

1.1 Site Description

The Aerojet Sacramento facility is located south of US Highway 50 near Rancho Cordova, California approximately 15 miles east of downtown Sacramento (see Figure 1-1). The ARSA, also shown on Figure 1-1, is located north of Highway 50, and west of Hazel Avenue, approximately 0.5 mile north of the Aerojet facility boundary. North of the American River, the ARSA includes Sacramento County's Sailor Bar Park and the surrounding residential properties of Fair Oaks. Most of the investigation north of the river has been conducted within the park area, which encompasses approximately 375 acres. South of the river, the study area includes federal lands of the American River and

Nimbus fish hatcheries, state properties, and various commercial properties and is bounded to the southwest by the community of Gold River.

The ARSA was the site of placer and gold dredging operations in the late 1800's and currently provides recreational opportunities including, but not limited to hiking, horseback riding, fishing, boating and picnicking.

1.2 Site Background

Since the early 1950's, the Aerojet Sacramento facility has been devoted to the development of propulsion systems to support national defense, space exploration and satellite deployment. Industrial activities at the Aerojet site have included solid rocket motor manufacturing and testing, liquid rocket engine manufacturing and testing, and chemical manufacturing. Chemicals used in the manufacturing and production areas on the Aerojet site included chlorinated solvents, propellants, metals, oxidizers, and a variety of chemicals produced in the chemical manufacturing area as described in the Scoping Report (1989).

2.0 ARSA GET FACILITY DESCRIPTION

2.1 System Components

2.1.1 Extraction Wells

Five sets of three extraction wells are located within the ARSA, three north of the river and two south of the river (Figure 2-1). The extraction well sets consist of three wells, each screened in one of the three aquifer units, Aquifer A, Aquifer B and Aquifer C. The aquifer units were screened individually to assure that groundwater would be extracted from each unit at each location and to allow variation of the pumping rates in each unit. One set of wells (4325, 4330 and 4335) is located in the area of highest chemical concentrations, south of the American River on the Nimbus Fish Hatchery property. These wells are intended to expedite removal of chemical mass from the subsurface. The other four sets of extraction wells are located along the downgradient side of the chemical plumes and placed to attempt to maximize the zone of capture created by the groundwater extraction system. The locations of the downgradient extraction wells were somewhat controlled by the geography and land use in the study area. The extraction wells north of the river were all placed on County land within Sailor Bar Park. It was not feasible to locate extraction wells in either residential areas or the heavily wooded ravines north of the river. Average flow rates and total amount of water pumped for each well is summarized in Table 2-1.

2.1.2 Influent Pipelines

The ARSA system utilizes two separate pipelines for collection and conveyance of groundwater from the five sets of extraction wells to the treatment system. One pipeline is dedicated to the conveyance of water produced by the higher concentration wells - 4325, 4330 and 4335 - located on the Nimbus Fish Hatchery property. This pipeline is constructed of 10" x 14" double-walled polyethylene as required by the Agencies to carry the elevated concentration of VOCs present in these wells. Water from the remaining extraction wells contains much lower VOC concentrations and is conveyed using standard single-wall PVC pipe. Various pipe sizes are utilized in this collection system with the largest, a 20" transmission line, beginning at the intersection of the southern end of the river crossing and continuing to the treatment system. Figure 2-1 shows the general alignment of the two collection pipelines as well as the other components of the ARGET system.

2.1.3 River Crossing

Groundwater produced by the extraction well north of the American River crosses under the American River and is then conveyed to Aerojet property located to the south for treatment. The under-river crossing was accomplished with a 2,200-foot horizontal boring. After completion of the boring, a 30" steel casing was pulled into the bore to provide an installation conduit for the pipeline. Within this steel casing, a centralized 18" x 24" double-walled polyethylene pipe was installed.

2.1.4 Treatment Components

Treatment of groundwater produced by the extraction system is accomplished with advanced oxidation and air stripping processes. As shown in Figure 2-2, water produced by higher concentration wells 4325, 4330 and 4335, is conveyed in a separate pipeline and treated first by advanced oxidation. Three 90 kilowatt ultraviolet (UV) reactors skids, installed in parallel, are used to remove the majority of the target compounds present in the water. Hydrogen peroxide is metered into the influent of the UV skids to provide photo-initiated oxidation of target compounds not amenable to direct photolysis. Effluent from the UV system is then combined with the influent line from all other extraction wells in the ARGET system for the removal of the remainder of the target compounds using a single air-stripping tower.

2.1.5 Effluent Disposal

The ARGET treatment system effluent is discharged to the American River by way of Buffalo Creek as shown on Figure 2-1. On 17 April 1998, the California Regional Water Quality Control Board, Central Valley Region adopted waste discharge requirements for this effluent under the National Pollutant Discharge Elimination System (NPDES) and issued permit # CA 0083861.

The ARGET chemical or compound effluent limits specified in the NPDES permit are as follows:

Constituent	Units	Daily Maximum	Monthly Average
Total Copper	µg/l	17	11
Total Lead	µg/l	15	2.5
Total Zinc	µg/l	110	100
Volatile Organics	µg/l	0.5	
Perchlorate	µg/l	18	18
1,4-dioxane	µg/l	15	10

2.2 Evaluation of Treatment Effectiveness

The ARGET system has removed approximately 2,600 pounds of target compounds from the 1,661 million gallons processed by the treatment facility between August 1998 and November 1999. The treatment system has functioned as designed, producing effluent that routinely meets effluent discharge standards with only minor exceptions that are further discussed in Section 2.3.2.

2.2.1 Air Emissions

Estimates of influent groundwater concentrations, UV treatment equipment effluent concentration, and the treatment system flow rate were developed to evaluate air emission rates from the stripping tower as part of the 1996 EE/CA. These estimated emission rates were used to quantify health effects and determine if installation of air emission control equipment was necessary. According to the 1996 EE/CA, total and reactive organic compounds (ROCs) emissions at system start-up were estimated to be 1.9 and 1.7 pounds per day respectively. According to SMAQMD Rule 202, Section 301.1, the application of best available control technology (BACT) was not required since the emissions did not exceed the 10 pounds per day limit for ROCs (SMAQMD, Procedure for Permit Processing). In addition, an assessment was completed to determine if the emission rate would result in a cancer risk value in excess of the 0.1×10^{-6} deminimus level since the off-gas from the air stripper also contained compounds regulated as toxic organics. This assessment concluded that the deminimus level was not exceeded and the application of toxic best available control technology (T-BACT) would not be required. The 1996 EE/CA also concluded that if groundwater chemical concentrations increase where the cancer risk deminimus value or limit for ROCs might be exceeded, the treatment system would be modified, including installation of additional UV/Oxidation equipment, to maintain ROC emissions levels and risk values below the regulatory limits. The 1996 EE/CA presented estimated worst-case influent groundwater concentrations that could be encountered in the future. These estimates result in total and ROCs emission rates of 15.2 and 14.3 pound per day respectively, and a residential 70-year maximum exposed individual (MEI) cancer risk value of 0.30 x 10^{-6} without the installation of air emission control equipment.

Table 2-2 compares the air emission rates estimated in the 1996 EE/CA to the calculated average air emission rates from operation of ARGET between 8/26/98 and 10/10/99. The actual emission rate of ROCs was 0.33 lb/day, well below the SMAQMD daily limit. Air emission rates presented in the 1996 EE/CA were calculated at an estimated treatment system flow rate of 3,445 gpm, whereas actual air emission rates presented in Table 2-2 are calculated using the actual ARGET treatment system average flow rate of 2,740 gpm.

2.2.2 Effluent Chemicals and Concentrations

Review of water quality results obtained from the effluent of the ARGET system from system start up through November 1999, generally shows routine compliance with the waste discharge requirements established under the current NPDES permit (CA 0083861). Except for a single TCE value of 1.7 µg/l that occurred on 8 July 1998, the system has complied with the discharge permit for VOCs. In addition, several occurrences of a tentatively identified compound, possibly PCE, were identified in analytical results obtained using Method 8270. These results did not agree with the analytical results obtained on the same date using the more sensitive Method 601. Also, 17 unknown compounds were reported during the period 18 August 1998 through 10 November 1999 in analytical results provided by Method 8270 analysis.

Perchlorate was not evaluated as part of the 1996 EE/CA, but subsequent events resulted in establishment of an effluent discharge standard of 18 µg/l. Perchlorate is currently detected in the influent pipeline associated with the Fish Hatchery Wells (4325, 4330, and 4335) at a concentration of approximately 21 µg/l. Perchlorate in not currently detected in the influent pipeline associated with the remaining wells. When the two influent pipelines are combined the resultant average perchlorate concentration measured in the treatment system effluent is approximately 6 µg/l.

3.0 SUBSURFACE CONDITIONS

3.1 Geology

Figure 3-1 shows the monitor, extraction, recharge and water supply wells from which data were collected for the evaluation of subsurface conditions for this project. Evaluation of lithologic and geophysical logs shows that the sediments consist of Tertiary- and Quaternary-age alluvial deposits from previous courses of the American River. Historic gold-dredging operations have disturbed the shallow sediments in the area.

Lithologic and geophysical logs of monitor, extraction, recharge and public water supply wells were used to construct six hydrogeologic cross-sections through the area (Figures 3-2 through 3-7). Finer-grained materials (silts, clays, siltstones, and claystones) were grouped together as aquitards while the coarser-grained materials (sands, gravels, and sandstones) were grouped together as aquifers. The interpretation of the continuity of lenses and layers shown on the cross-sections is based on geophysical logs, lithologic descriptions, and the response of water levels to pumping. In general, lateral variations in stratigraphy are greater in the north-south direction than in the east-west direction. This configuration is consistent with the depositional patterns expected from the ancestral American River, which flowed westward.

In previous ARSA reports, the hydrostratigraphy has been divided into four main aquifer units, labeled the Upper, Middle, Lower and Deeper Aquifers. To adapt the aquifer labeling for other related projects including on-site studies and the Western Operable Unit Feasibility Study, these aquifers are relabeled herein as Aquifer A, Aquifer B, Aquifer C and Aquifer D, respectively.

Aquifer pumping tests were performed on the 15 extraction wells installed in the ARSA in 1993 through 1995. The purpose of these tests was to determine the approximate quantity of water each well would produce under full-scale operating conditions and to evaluate the hydrologic characteristics of the aquifers being pumped. The results of these tests were presented in the 1996 EE/CA. Table 3-1 presents a summary of the aquifer testing and analyses including test dates, duration, pumping rates, drawdown, distance to pumping wells, transmissivity and storage coefficient as originally published in the 1996 EE/CA.

Aquifers A, B and C contain the majority of the chemical mass in the study area addressed by this report. Below Aquifer C is a relatively continuous aquitard as well as additional water-bearing units, identified as a group as Aquifer D. Aquifers A through C tend to be thicker in the eastern portion of the study area near the fish hatcheries and become thinner to the west. Conversely, Aquifer D becomes thicker and more prevalent than aquitard materials to the west, while aquitard materials are more prevalent at depth in the eastern portion of the study area.

Aquifer A

Aquifer A consists of higher permeability sands and gravels with lenses of interbedded sediments of lower permeability and extends to a depth of approximately 25 to 100 feet below ground surface. Groundwater in Aquifer A exists under both unconfined and semi-confined conditions as determined by local stratigraphy. The average transmissivity for Aquifer A calculated from the ARSA aquifer tests is 70,000 feet squared per day (ft^2/d) and the average storage coefficient is $4.8x10^{-3}$.

Aquifer B

Aquifer B is separated from Aquifer A by a relatively continuous aquitard ranging from approximately 10 to 55 feet in thickness. In general, Aquifer B consists of sands, gravels, and silty sands ranging in thickness between 10 and 70 feet. In the central and western portions of the study area Aquifer B is bifurcated into two water bearing units as shown on cross-sections B-B' and E-E' on Figures 3-3 and 3-6, respectively. The average transmissivity for Aquifer B calculated from the ARSA aquifer tests is 42,500 ft^2/d and the average storage coefficient is $1.3x10^{-3}$.

Aquifer C

Aquifer C is separated from the Aquifer B by an aquitard ranging in thickness from approximately 15 to 50 feet. In general, Aquifer C consists of sands, gravels, and silty sands ranging in thickness between 15 and 55 feet. The average transmissivity for Aquifer C calculated from the ARSA aquifer tests is 11,500 ft^2/d and the average storage coefficient is $9.6x10^{-3}$.

Aquifer D

For this study, the water-bearing zones below Aquifer C are grouped together as Aquifer D; therefore the thickness of this unit is not well defined. Aquifer D is separated from Aquifer C by a relatively continuous aquitard ranging in thickness from approximately 15 to 100 feet. Aquifer D contains more finer-grained sands and silts than overlying aquifers. This is reflected in the somewhat lower average transmissivity for Aquifer D of 3,200 ft^2/d, calculated from the ARSA aquifer tests. The average storage coefficient is $8.4x10^{-4}$.

3.2 Groundwater Flow

3.2.1 Water Level Changes

As described in section 2.1.1 above, the 15 ARGET extraction wells consist of five wells each screened in Aquifer A, Aquifer B and Aquifer C. The average total pumping rate from these wells is approximately 2,750 gpm: approximately 1,100 gpm from the Aquifer A wells, 1,300 gpm from the Aquifer B wells and 350 gpm from the Aquifer C wells (see Table 2-1).

Water levels have declined throughout the ARSA since commencement of pumping in August of 1998. Table 3-2 presents a summary of the water level changes in monitor wells from April 1998 through October of 1999. The water level declines range from 1.6 to 26.5 feet, with an average decline of 8.3 feet in Aquifer A, 9.0 feet in Aquifer B and 12.0 feet in Aquifer C. Despite the fact that there are no extraction wells screened in Aquifer D, pumping from the overlying aquifers has also apparently caused water levels to decline an average of 12.0 feet in this unit.

Figure 3-8 is a hydrograph of wells 30100 and 30101-30103 located approximately 130 feet northwest and just downgradient of extraction wells 4325, 4330 and 4335 on the south side of the river. These wells replaced monitor well 1357-1360 which was lost due to riverbank erosion in 1997. Water levels in these wells have declined 8.8 to 25.5 feet since the start of pumping. The largest decline was noted in Well 30102 completed in Aquifer C.

Figure 3-9 is a hydrograph of well 1395-1399 located approximately 160 feet west and downgradient of extraction wells 4300, 4301 and 4302 on the north side of the river. Water levels in these wells have declined 12.3 to 20.7 feet since the start of pumping. The largest decline was noted in well 1395 completed in Aquifer A. Water levels in these wells are now at their all-time lowest point for data collected since 1991.

Figure 3-10 is a hydrograph of well 1538-1540 located approximately 590 feet northwest and downgradient of extraction wells 4300, 4301 and 4302. Well 1538 completed in Aquifer A went dry after pumping commenced. Water levels in wells 1539 and 1540 have declined 16.1 and 15.0 feet, respectively since the start of pumping. Water levels in these wells are now at their all-time lowest point for data collected since 1993.

Figure 3-11 is a hydrograph of well 1525-1527 located approximately 475 feet west and downgradient of extraction wells 4355, 4360 and 4365. Water levels in these wells have declined 11.6 to 17.0 feet since the start of pumping. Water levels in these wells are now at their all-time lowest point for data collected since 1992.

Figure 3-12 is a hydrograph of well 1585-1587 located approximately 1,175 feet northwest and downgradient of extraction wells 4340, 4345 and 4350. Water levels in these wells have declined 11.8 to 12.1 feet since the start of pumping. Water levels in these wells are now at their all-time lowest point for data collected since 1995.

Figure 3-13 is a hydrograph of wells 1519-1521 and 1522-1524 located approximately 1,100 feet southeast and upgradient of extraction wells 4300, 4301 and 4302. Water levels in these wells have declined 9.7 to 18.9 feet since the start of pumping. The largest decline was noted in well 1521 completed in Aquifer D. Water levels in these wells are now at their all-time lowest point for data collected since 1992.

Figure 3-14 is a hydrograph of wells 1571-1573 and 1574 located approximately 965 feet northwest and downgradient of extraction wells 4370, 4375 and 4380. Water levels in these wells have declined 6.2 to 8.2 feet since the start of pumping. The largest decline was noted in well 1573 completed in Aquifer C. Water levels in these wells are now at their all-time lowest point for data collected since 1994.

Hydrographs for the remaining monitor wells are presented in Appendix A.

3.2.2 Groundwater Gradients

Figures 3-15 through 3-18 present groundwater elevation contour maps of each aquifer based upon data collected during plant-wide soundings conducted in April 1998, October 1998, April 1999 and October 1999. These four dates represent non-pumping conditions prior to startup of the ARGET, two months of pumping, eight months of pumping and 14 months of pumping, respectively. Water levels taken from extraction wells during pumping were adjusted upward to compensate for assumed well losses which would otherwise exaggerate their effect on the contoured surfaces. Table 3-3 presents the measured and corrected water levels and the estimated well efficiencies used to calculate the corrections. The estimated well efficiencies were based on performance during aquifer tests and water levels in nearby monitor wells.

Aquifer A

The April 1998 potentiometric surface map for Aquifer A on Figure 3-15 indicates that, under non-pumping conditions, groundwater flows generally to the west-northwest. The gradient ranges from approximately 0.015 feet per foot (79 feet per mile) in the eastern portion of the study area to approximately 0.004 to 0.006 feet per foot (20 to 33 feet per mile) in the central and western portion of the study area. The average non-pumping gradient across the study area is approximately 0.006 feet per foot (31 feet per mile). The remaining three contour maps on Figure 3-15 show the effect of pumping of the ARSA extraction wells on the potentiometric surface.

Although the unconfined to semi-confined nature of Aquifer A suggests that some hydraulic connection exists between the American River and Aquifer A, the presence of chemicals in Aquifer A on the north side of the river and the configuration of the potentiometric surface of Aquifer A indicate that the river is not a significant barrier to chemical migration or groundwater flow.

Aquifer B

Groundwater in Aquifer B exists under confined to semi-confined conditions. The April 1998 potentiometric surface map for Aquifer B on Figure 3-16 indicates that, under non-pumping conditions, groundwater flows generally to the west-northwest under a gradient of approximately 0.008 feet per foot (40 feet per mile) in the eastern portion of the study area and gradient of approximately 0.005 feet per foot (26 feet per mile) in the western portion of the study area. The average gradient across the study area is approximately 0.006 feet per foot (31 feet per mile). The remaining three contour maps on Figure 3-16 show the effects of pumping of the ARSA extraction wells on the potentiometric surface.

Aquifer C

Groundwater in Aquifer C exists under confined to semi-confined conditions. The April 1998 potentiometric surface map for Aquifer C on Figure 3-17 indicates that, under non-pumping conditions, groundwater flows generally to the west-northwest under a gradient of approximately 0.01 feet per foot (51 feet per mile) in the eastern portion of the study area and under a gradient of approximately 0.006 feet per foot (31 feet per mile) in the western portion of the study area. In the central portion of the study area, there is an area with a relatively flat gradient, 0.002 feet per foot (9 feet per mile). The average gradient across the study area is approximately 0.005 feet per foot (28 feet per mile). The remaining three contour maps on Figure 3-17 show the effect of pumping of the ARSA extraction wells on the potentiometric surface.

Aquifer D

Groundwater in Aquifer D exists under confined to semi-confined conditions. The April 1998 potentiometric surface map for Aquifer D on Figure 3-18 indicates that, under non-pumping conditions, groundwater flows generally to the west under a gradient of approximately 0.008 feet per foot (43 feet per mile) in the eastern portion of the study area, approximately 0.002 feet per foot (11 feet per mile) in the central portion of the study area and 0.009 feet per foot (47 feet per mile) in the western portion of the study area. The average gradient across the study area is approximately 0.006 feet per foot (34 feet per mile). The remaining three contour maps on Figure 3-18 show the effect of pumping of the ARSA extraction wells on the potentiometric surface. Pumping of the overlying aquifers does not significantly alter the general configuration of the potentiometric surface of Aquifer D.

3.2.3 Capture Zones

Figures 3-19 through 3-21 present estimated capture zones for Aquifers A, B and C, respectively. The capture zones are based on potentiometric surface maps for the

October 1999 water level data. The Surfer vector map function was used to create working maps of groundwater flow vectors. From these maps, the capture zones were estimated. In areas where data is sparse and the contours are somewhat suspect, the capture zones were adjusted to more realistically depict their effect on the groundwater flow system.

3.2.4 Vertical Gradients

Figures 3-22 through 3-27 present contour maps of the vertical gradients between Aquifers A and B, Aquifers B and C, and Aquifers C and D. For each pair of aquifers there is one map for data collected prior to pumping in April 1998 and one map for data collected after eight months of pumping in April 1999. Shaded areas indicate areas of upward gradients. April 1998 was the last full round of water level measurements prior to startup of the ARGET system. April 1999 was chosen for comparison so that seasonal variability in water levels would not be introduced in the evaluation.

The vertical gradients were calculated by selecting locations where monitor wells exist in adjacent aquifers. The water level difference between the adjacent wells divided by the vertical distance between the middle of the well screens resulted in the calculated vertical gradient. Positive values indicate downward gradients and negative values indicate upward gradients. Table 3-4 presents the data used to calculate these values. Values close to zero indicate little or no potential for vertical groundwater movement.

The vertical gradients between Aquifers A and B range from –0.021 to 0.184 with an average value of 0.012 under non-pumping conditions. Under pumping conditions the values range from –0.021 to 0.288 with an average of 0.024, indicating that pumping increases the downward vertical gradient between Aquifers A and B.

The vertical gradients between Aquifers B and C range from –0.040 to 0.235 with an average value of 0.035 under non-pumping conditions. Under pumping conditions the values range from –0.168 to 0.375 with an average of 0.042, indicating that pumping increases the downward vertical gradient between Aquifers B and C. It is also evident that the downward vertical gradient between Aquifers B and C is greater than between Aquifers A and B.

The vertical gradients between Aquifers C and D range from –0.095 to 0.175 with an average value of 0.020 under non-pumping conditions. Under pumping conditions the values range from –0.254 to 0.175 with an average of 0.009, indicating that pumping decreases the downward (or increases the upward) vertical gradient between Aquifers C and D. It is also evident that under pumping conditions the downward vertical gradient between Aquifers C and D is considerably less than between Aquifers A and B or between Aquifers B and C.

3.3 Distribution of Chemicals in Groundwater

Chemicals, primarily volatile organic compounds (VOCs), have been identified in groundwater within the ARSA at depths of approximately 50 to 250 feet below ground surface. Results for samples collected between January 1990 and April 1993 were presented in Appendix D of the 1993 EE/CA. Results for samples collected between January 1993 and January 1996 were presented in Appendix D of the 1996 EE/CA. Results of samples collected between January 1996 and September 1999 have been presented in quarterly monitoring reports and monthly database submittals to the regulatory agencies.

The five most common VOCs found in the groundwater at highest-concentrations in the ARSA are as follows; trichloroethylene (TCE), Freon-113, cis- and/or trans-1,2-dichloroethylene (1,2-DCE), 1,1-dichloroethylene (1,1-DCE), and perchloroethylene (PCE). The graph presented in Figure 3-28 shows the composition and trend of these five compounds since March 1991 for well 1405 which is located in the more highly concentrated portion of the plume on the south side of the American River. Because TCE is the most prevalent chemical and its distribution encompasses that of the other chemicals, TCE has been chosen as the indicator to define the maximum extent of VOCs in the groundwater.

In addition to VOCs, perchlorate and 1,4-dioxane have also been identified in the groundwater in the ARSA. These two chemicals have been identified primarily in wells located in the vicinity of the fish hatcheries, south of the American River. The distribution of perchlorate and 1,4-dioxane are encompassed within the TCE plume. In 1998 31 monitor wells were also sampled and analyzed for n-nitrosodimethylamine (NDMA). None of the samples were found to contain NDMA above the laboratory detection limits of 0.02 and 0.0075 μg/l. The laboratory detection limit was being lowered during this time, which is why some of the results are at 0.02 µg/l and some are at 0.0075 µg/l. Table 3-5 presents the analytical results for the five main VOCs, perchlorate, 1,4-dioxane, and NDMA for samples collected from January 1998 through September 1999.

The chemical distribution maps discussed below are based upon data collected from monitor, extraction and water supply wells during the summer quarter 1998, the last complete round of sampling prior to startup of the ARGET system, and the summer quarter 1999, representing 10 to 12 months of pumping of the ARGET system. The summer quarterly sampling events include all the ARSA monitor wells, while the other three quarterly sampling events include only a select group of wells. Distribution maps for TCE are presented here, while maps for the other four VOCs, perchlorate and 1,4-dioxane are presented in Appendix B.

The highest TCE concentrations in each aquifer are located in a relatively small area in the central part of the study area under the western portion of the fish hatchery property south of the American River. The highest concentrations and widest distribution of chemicals are within Aquifer B.

Aquifer A

Figures 3-29 and 3-30 present the distribution of TCE in Aquifer A for summer 1998 and summer 1999, respectively. The overall extent of TCE in Aquifer A has remained about the same, although the highest concentrations have decreased significantly. The 1,000-µg/l contour is no longer present. TCE concentrations in wells 1162 and 1361 along the southern border of the plume have increased somewhat from 67 and 57 µg/l to 140 and 62 µg/l, respectively. The estimated capture zone for Aquifer A created by pumping is also shown of Figure 3-30. The Aquifer A capture zone encompasses the majority of the Aquifer A TCE plume. A relatively small area of the plume (<100 µg/l) falls outside the capture zone in the southern portion of the map. Both the TCE distribution and capture zone are not well defined in this area due to a limited number of monitor wells. This is the Gold River residential area where previous attempts to install monitor wells were unsuccessful and placing additional monitor wells is problematic.

Aquifer B

Figures 3-31 and 3-32 present the distribution of TCE in Aquifer B for summer 1998 and summer 1999, respectively. The overall extent of TCE in Aquifer B has remained approximately the same, although the highest concentrations have decreased significantly. The 1,000-μg/l contour has significantly decreased in size. TCE concentrations along the southern border of the plume have decreased slightly, while the TCE concentration in well 1509 in the northern portion of the plume has increased from 47 to 150 μg/l. The estimated capture zone created by pumping is also shown on Figure 3-32. The Aquifer B capture zone encompasses the majority of the Aquifer B TCE plume. Two relatively small areas of the plume (<100 μg/l) fall outside the capture zone the northeastern portion and in the southern portion of the map. Both the TCE distribution and capture zone are not well defined in these areas due to a limited number of monitor wells. These are both residential areas where placing additional monitor wells is problematic. In addition, the terrain is quite steep in the northeastern area, limiting access for wells

Aquifer C

Figures 3-33 and 3-34 present the distribution of TCE in Aquifer C for summer 1998 and summer 1999, respectively. The overall extent of TCE in Aquifer C has remained about the same, although the highest concentrations have decreased significantly. The 1,000-μg/l contour is now much smaller. TCE concentrations along the southern border of the plume have decreased somewhat. TCE concentration in well 1540 located north of extraction well 4302 has decreased from 140 to 45 μg/l. The estimated capture zone created by pumping is also shown of Figure 3-34. The Aquifer C capture zone encompasses almost the entire Aquifer C TCE plume. A relatively small area of the plume (< 50 μg/l) falls outside the capture zone in the southern portion of the map. Both the TCE distribution and capture zone are not well defined in this area due to a limited number of monitor wells. This is the Gold River residential area where placing additional monitor wells is problematic.

Aquifer D

Figures 3-35 and 3-36 present the distribution of TCE in Aquifer D for summer 1998 and summer 1999, respectively. The overall extent and the highest concentrations of TCE in

Aquifer D have remained about the same over the one year period of ARGET operation. As shown on the Figures 3-35 and 3-36, one monitor well, 1480, has shown an increase of TCE from 230 µg/l to 330 µg/l, while all other wells have similar or lower concentrations during this period. There are no extraction wells screened in Aquifer D. Some hydraulic capture of TCE in this aquifer is likely occurring by leakage from Aquifer D into Aquifer C where the vertical gradient between the two aquifers is upward from D to C (Figure 3-27).

3.4 Chemical Concentration Trends

The general decrease in VOC concentrations indicates that the ARGET system is proving to be very effective at removing chemical mass. Approximately 2,600 pounds of VOCs were removed during the first 15 months of operation. To assess the ARGET's effectiveness at minimizing downgradient migration of chemicals, graphs showing the trend of VOC concentrations in wells located near the perimeter of the plume and/or downgradient of extraction wells were prepared. VOC trend graphs for selected wells are shown here, while VOC trend graphs for the remaining wells are presented in Appendix C.

Figure 3-37 is a graph of VOC concentration trends for wells 1531-1533 located in the northern portion of the VOC plume and within the estimated capture zone of the ARGET system. Wells 1531 and 1532, completed in Aquifers A and B, respectively, had been showing an increasing trend of relatively low TCE concentrations since 1994. Since startup of the ARGET, TCE concentrations in these wells have shown a decreasing trend. Well 1533, completed in Aquifer C, shows no evidence of VOCs prior to or since startup of the ARGET.

Figure 3-38 is a graph of VOC concentration trends for wells 1538-1540 located just north and downgradient of extraction wells 4300, 4301 and 4302 and within the estimated capture zone of the ARGET system. Well 1538, completed in Aquifer A, had been showing an increasing trend of relatively low TCE concentrations since 1995. Since startup of the ARGET, well 1538 has been dry so no additional samples have been collected. Well 1539, completed in Aquifer B, had a general decreasing trend of TCE, 1,2-DCE and PCE since 1996. After startup of the ARGET, there was an increase in the first sample collected from this well followed by a decreasing trend in subsequent samples. Well 1540, completed in Aquifer C, had an increasing trend in TCE, 1,2-DCE and PCE since 1995. After startup of the ARGET, there was an increase in the first sample collected from this well followed by a decreasing trend in subsequent samples.

Figure 3-39 is a graph of VOC concentration trends for wells 1525-1527 located northwest and downgradient of extraction wells 4355, 4360 and 4365 and within the estimated capture zone of the ARGET system. Well 1525, completed in Aquifer A, and well 1526, completed in both Aquifers B and C, continue to show no evidence of VOCs. Well 1527, completed in Aquifer D, had a general increasing trend of relatively low TCE concentrations since 1996. After startup of the ARGET, the TCE concentration has appeared to stabilize at approximately 5 to 10 µg/l.

Figure 3-40 is a graph of VOC concentration trends for wells 1585-1587 located west of extraction wells 4355, 4360 and 4365 and beyond the estimated capture zone of the ARGET system. Well 1585, completed in Aquifer A, shows no evidence of VOCs prior to or since startup of the ARGET. Well 1586, completed in Aquifer B, had a decreasing trend of relatively low TCE concentrations since 1995. After startup of the ARGET, the TCE concentration increased somewhat followed by a decreasing trend for subsequent samples. Well 1587, completed in Aquifer C, had a slightly increasing trend in relatively low VOC concentrations since 1995. After startup of the ARGET, samples have shown a slight decreasing trend in VOC concentrations.

Figure 3-41 is a graph of VOC concentration trends for wells 1509-1511 located within the VOC plume, upgradient of extraction wells 4300, 4301, and 4302 and within the ARGET capture zone. Well 1509, completed in Aquifer B, had in increasing trend in TCE and 1,2-DCE prior to startup of the ARGET. Since startup of the ARGET system, TCE, 1,2-DCE and PCE have shown increasing concentrations. This may be a result of the higher concentration portion of the plume approaching this well. The well is located well within the capture zone of the ARGET system. Well 1510, completed in Aquifer C, had a decreasing trend of relatively low TCE concentrations since 1996. After startup of the ARGET, TCE concentrations increased somewhat, followed by a decreasing trend for subsequent samples. TCE concentrations for well 1510 remain below 2 µg/l. Well 1511, completed in Aquifer D, shows no evidence of VOCs in the four years prior to or since startup of the ARGET.

Figure 3-42 is a graph of VOC concentration trends for wells 1480, 1489 and 1524, all completed in Aquifer D. These wells all exhibited an increasing trend in VOC concentrations since 1992/1993. After startup of the ARGET, VOCs in well 1480 increased significantly then decreased somewhat. VOCs in well 1489 have increased somewhat since startup of the ARGET. The VOC concentrations in well 1524 have stayed relatively consistent since 1996.

Figure 3-43 is a graph of VOC concentration trends for wells 1394, 1402 and 1471, all completed in Aquifer D. These wells have exhibited somewhat irregular trends in VOC concentrations since 1992. After startup of the ARGET, VOC concentrations in all three wells have decreased.

4.0 Conclusions and Recommendations

4.1 Conclusions

- The ARGET treatment system is very effective at removing VOCs from groundwater (Table 2-2). Approximately 2,600 pounds of VOCs were removed from approximately 1.7 billion gallons of water during the first 15 months of operation of the system.

- Analysis of chemical distribution maps and capture zones for Aquifers A, B and C indicate that the ARGET system is effectively capturing the vast majority of the VOC plume and reducing the mass of VOCs in the groundwater. The plume appears to be within the capture zones except for small areas of relatively low concentrations, which are either in residential neighborhoods or steep terrain. The installation of additional wells is problematic in these areas.

- Analyses of chemical trend graphs indicate that the ARGET system is effectively controlling the downgradient migration of chemicals in groundwater in Aquifers A, B and C.

- Analysis of chemical distribution and VOC trends for Aquifer D since ARGET began operation indicates that VOCs in this aquifer are, except for monitor well 1480, relatively stable or declining. The cause of the increase at well 1480 is not clear, however significant downward movement of VOCs from Aquifer C is unlikely at this location based on the near neutral head gradient between Aquifers C and D at this location.

4.2 Recommendations

- Aerojet recommends collecting an additional four quarters of monitoring data to further evaluate the distribution and concentration trends of VOCs in Aquifer D. This data will be collected during the four quarters of calendar year 2000. The Aquifer D plume appears to be moving relatively slowly and is well defined horizontally by a series of clean monitor wells. These wells will provide for early warning of changes in the leading edge of the plume and thus protect downgradient resources. To better define concentration trends, five Aquifer D monitor wells will be changed from annual sampling to quarterly sampling, including wells 1373, 1471, 1483, 1508 and 1524 (Figure 3-36). Other proposed changes to the monitoring program are to reduce sampling frequency of Aquifer D monitor wells 1409, 1589 and 1590 (Figure 3-36) from quarterly sampling to annual sampling. These wells are located approximately 3,500 feet downgradient (northwest) of the leading edge of the Aquifer D plume and show a relatively consistent history of non-detects or very low VOC concentrations. Note that two shallower Aquifer D wells (wells 1408 and 1588) will continue to be sampled quarterly at these two locations.

- A letter report addressing Aquifer D will be submitted March 1, 2001 which will present an evaluation of the quarterly monitoring and provide appropriate recommendations for either further field work or the preparation of a Remedial Action Plan Workplan or other remedial action selection documentation in accordance with CERCLA and the NCP. A revised schedule for the ARSA program is presented in Table 4-1.

5.0 References

Gencorp Aerojet, Engineering Evaluation and Cost Analysis for the American River Study Area, Aerojet Sacramento Site, May 1993

Gencorp Aerojet, Final Revised Engineering Evaluation and Cost Analysis for the American River Study Area, Aerojet Sacramento Site, September 1996

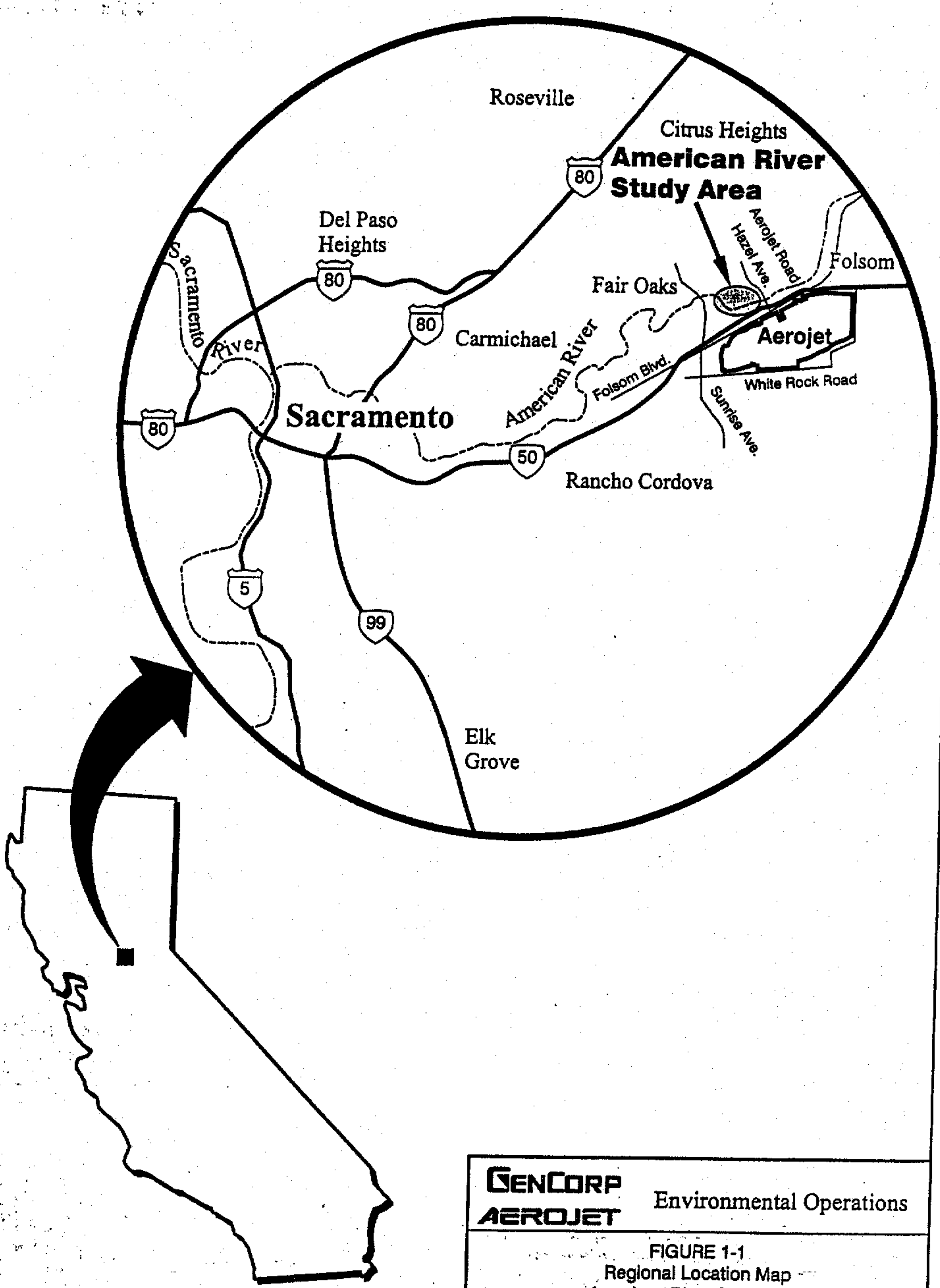
Gencorp Aerojet, Scoping Report, December 1989

Table 3-1
Summary of Aquifer Test Results

Pumped Well (Aquifer)	Test Date (Duration)	Q (gpm)	Obs. Wells for Analysis	Obs. Well Aquifer	r (feet)	s (feet)	T (gpd/ft)	T (ft^2/day)	S	L (feet)	Type Curve (r/B)
4300	11/8-12/93	388.8	1395 D	A	158	2.70	81,050	10,835	98.0E-6	394	0.4
(Aquifer A)	(96 hrs.)		1395 R	A	158	--	154,440	20,646	89.7E-6	789	0.2
4301	11/15-19/93	218.3	1396 D	B	178	3.30	26,190	3,501	128.6E-6	592	0.3
(Aquifer B)	(96 hrs.)		1396 R	B	178	--	24,440	3,267	122.8E-6	592	0.3
			1539 D	C	593	0.71	88,740	11,863	269.9E-6	742	0.8
			1539 R	C	593	--	62,820	8,398	246.2E-6	593	1.0
4302	11/1-5/93	35.0	1397 D	C	139	6.70	697	93	193.6E-6	174	0.8
(Aquifer C)	(96 hrs.)		1397 R	C	139	--	621	83	180.7E-6	154	0.9
			1540 D	C	581	0.58	4,103	548	312.3E-6	387	1.5
			1540 R	C	581	--	4,103	548	248.1E-6	387	1.5
4302	11/22-24/93	35.3	1397 D	C	139	6.90	789	105	199.8E-6	199	0.7
(Aquifer C)	(48 hrs.)		1397 R	C	139	--	598	80	174.0E-6	154	0.9
			1533 D	C	1,343	0.39	9,054	1,210	380.8E-6	1,492	0.9
			1533 R	C	1,343	--	10,890	1,456	295.6E-6	1,343	1.0
			1540 D	C	581	0 64	4,334	579	287.3E-6	387	1.5
			1540 R	C	581	--	3,522	471	268.1E-6	387	1.5
4325	8/29/95	424.8	1357D	A	409	1.80	80,770	10,797	196.4E-6	1,364	0.3
(Aquifer A)	(8 hrs.)		1357R	A	409	--	80,770	10,797	196.4E-6	1,364	0.3
			1358D	B	409	1.86	73,660	9,847	210.5E-6	1,364	0.3
			1358R	B	409	—	75,350	10,073	192.0E-6	1,364	0.3
			1370D	A	879	0.77	82,650	11,049	165.8E-6	1,255	0.7
			1370R	A	879	--	82,650	11,049	1.7E-3	1,255	0.7
			1371D	B	879	0.77	53,370	7,135	144.4E-6	879	1.0
			1371R	B	879	--	61,270	8,191	154.7E-6	976	0.9
			1388D	B	1,003	0.23	627,000	83,818	652.0E-6	3,344	0.3
			1388R	B	1,003	—	641,600	85,769	900.5E-6	3,343	0.3
			1404D	B	774	0.35	414,200	55,371	544.8E-6	2,581	0.3
			1404R	B	774	—	464,800	62,135	615.7E-6	2,581	0.3
			1469D	A	834	0.10	475,600	63,578	3.9E-3	927	0.9
			1469R	A	834	—	395,600	52,884	3.4E-3	927	0.9
			1478D	A	994	0.17	498,000	66,573	1.9E-3	1,987	0.5
			1478R	A	994	—	404,800	54,114	2.0E-3	1,987	0.5
4330	8/24/95	452.7	1357D	A	389	2.40	58,190	7,779	163.7E-6	1,298	0.3
(Aquifer B)	(8 hrs.)		1357R	A	389	--	60,940	8,146	159.9E-6	1,298	0.3
			1358D	B	389	2.71	53,070	7,094	127.0E-6	1,298	0.3
			1358R	B	389	—	65,300	8,729	118.6E-6	1,947	0.2
			1370D	A	891	0.81	55,580	7,430	167.7E-6	891	1.0
			1370R	A	891	--	54,310	7,260	156.5E-6	891	1.0
			1371D	B	891	0.81	55,580	7,430	163.9E-6	891	1.0
			1371R	B	891	—	63,810	8,530	160.2E-6	990	0.9
			1379D	C	804	0.17	638,100	85,302	12.7E-3	N/A	Theis
			1379R	C	804	--	988,300	132,117	4.0E-3	4,019	0.2
			1388D	B	996	0.25	484,000	64,701	600.7E-6	2,489	0.4
			1388R	B	996	--	495,300	66,212	705.7E-6	1,991	0.5
			1404D	B	780	0.41	367,200	49,088	576.2E-6	2,600	0.3
			1404R	B	780	--	358,800	47,965	576.2E-6	1,950	0.4
			1469D	A	848	0.13	421,000	56,360	2.9E-3	942	0.9
			1469R	A	848	—	412,000	55,076	2.7E-3	942	0.9
			1478D	A	978	0.22	312,500	41,775	1.8E-3	1,396	0.7
			1478R	A	978	--	393,400	52,590	2.4E-3	1,629	0.6
			1479D	C	978	2.25	9,013	1,205	1.0E-3	N/A	Theis
			1479R	C	978	—	86,080	11,507	925.0E-6	N/A	Theis
			1480D	D	978	2.08	8,412	1,125	2.0E-3	1,955	0.5
			1480R	D	978	—	80,330	10,739	987.4E-6	N/A	Theis
4335	8/22/95	238.3	1359D	C	374	8.10	9,687	1,295	177.0E-6	1,246	0.3
(Aquifer C)	(8 hrs.)		1359R	C	374	--	11,650	1,557	177.0E-6	3,738	0.1
			1372D	C	912	3.28	12,770	1,707	97.0E-6	1,519	0.6
			1372R	C	912	--	20,240	2,706	122.0E-6	N/A	Theis
			1389D	C	975	1.04	49,680	6,641	387.5E-6	2,437	0.4
			1389R	C	975	--	48,550	6,490	405.8E-6	1,949	0.5
			1479D	C	986	2.90	10,380	1,388	88.7E-6	1,233	0.8
			1479R	C	986	--	16,830	2,250	117.0E-6	9,862	0.1
			1480D	D	986	2.99	9,687	1,295	92.9E-6	1,233	0.8
			1480R	D	986	--	14,330	1,916	125.3E-6	4,931	0.2
4340	3/7/95	25.3	1564D	A	186	0.65	43,870	5,865	893.6E-6	1,864	0.1
(Aquifer A)	(8 hrs.)		1564R	A	186	--	60,560	8,096	935.7E-6	1,864	0.1
4345	12/12/94	387.9	1396D	B	1,020	0.24	424,400	56,734	389.8E-6	2,039	0.5
(Aquifer B)	(8 hrs.)		1396R	B	1,020	--	280,400	37,484	458.0E-6	1,133	0.9
			1397D	C	1,020	0.23	337,100	45,064	3.0E-3	1,699	0.6
			1397R	C	1,020	--	454,800	60,798	3.2E-3	1,699	0.6
			1525D	A	748	0.29	672,700	89,927	2.0E-3	1,869	0.4
			1525R	A	748	--	754,700	100,889	3.1E-3	3,738	0.2
			1526D	B	748	0.33	546,800	73,097	978.2E-6	2,492	0.3
			1526R	B	748	—	405,300	54,181	1.5E-3	1,869	0.4
			1564D	A	288	1.18	116,900	15,627	60.1E-3	96	0.3
			1564R	A	288	--	189,600	25,346	42.6E-3	288	0.1
			1565D	B	288	9.80	6,135	820	1.1E-3	41	0.7
			1565R	B	288	--	6,135	820	1.5E-3	41	0.7
			1566D	C	288	5.37	8,275	1,106	5.7E-3	32	0.9
			1566R	C	288	--	8,087	1,081	7.2E-3	32	0.9
4350	12/19/94	61.5	1565D	B	179	0.45	21,770	2,910	565.0E-6	256	0.7
(Aquifer C)	(8 hrs.)		1565R	B	179	—	3,614	483	565.1E-6	90	2.0
			1566D	C	179	1.00	8,090	1,081	252.4E-6	224	0.8
			1566R	C	179	--	3,221	431	332.7E-6	119	1.5
4355	11/23/94	387.7	1395D	A	640	0.17	2,126,000	284,205	609.4E-6	12,800	0.05
(Aquifer A)	(8 hrs.)		1395R	A	640	--	2,331,000	311,609	1.1E-3	12,800	0.05
			1396D	B	640	0.18	866,100	115,781	1.6E-3	6,401	0.1
			1396R	B	640	--	487,000	65,102	2.2E-3	914	0.7
			1397D	C	640	0.16	119,600	15,988	7.3E-3	427	1.5
			1525D	A	487	0.17	627,400	83,871	3.3E-3	1,219	0.4
			1525R	A	487	—	971,800	129,911	6.2E-3	1,625	0.3
			1526D	B	487	0.19	227,800	30,452	3.1E-3	542	0.9
			1526R	B	487	--	286,800	38,340	2.5E-3	542	0.9
			1564D	A	573	0.14	510,000	68,177	8.2E-3	955	0.6
			1565D	B	573	0.23	928,000	124,056	2.1E-3	N/A	Theis
			1565R	B	573	—	1,252,000	167,368	2.8E-3	N/A	Theis
4360	12/1/94	434.2	1395D	A	662	0.20	1,435,000	191,832	1.0E-3	13,250	0.05
(Aquifer B)	(8 hrs.)		1395R	A	662	—	2,122,000	283,670	1.4E-3	13,250	0.05
			1396D	B	662	0.37	464,300	62,068	430.9E-6	3,312	0.2
			1396R	B	662	—	249,300	33,327	483.5E-6	946	0.7
			1397D	C	662	0.30	38,620	5,163	2.1E-3	331	2.0
			1397R	C	662	--	80,680	10,785	3.5E-3	442	1.5
			1525D	A	460	0.40	433,300	57,924	2.6E-3	2,298	0.2
			1525R	A	460	—	788,400	105,394	1.6E-3	4,595	0.1
			1526D	B	460	0.51	377,400	50,451	916.3E-6	2,298	0.2
			1526R	B	460	—	612,000	81,813	679.3E-6	7,658	0.06
			1565D	B	579	0.33	368,800	49,301	2.8E-3	1,448	0.4
			1565R	B	579	--	453,700	60,651	4.0E-3	1,448	0.4
4365	12/7/94	568.0	1397D	C	680	0.10	11,570	1,547	628.2E-6	340	2.0
(Lower)	(8 hrs.)		1397R	C	680	--	11,310	1,512	673.2E-6	340	2.0
			1566D	C	587	0.12	115,700	15,467	925.6E-6	1,173	0.5
			1566R	C	587	--	136,000	18,181	331.3E-3	1,173	0.5
4370	8/4/95	391.8	1488D	B	648	0.16	391,000	52,269	9.3E-3	926	0.7
(Aquifer A)	(8 hrs.)										
4375	8/2/95	210.9	1488D	B	657	0.16	191,900	25,653	3.3E-3	938	0.7
(Aquifer B)	(8 hrs.)		1488R	B	657	—	179,100	23,942	2.6E-3	821	0.8
			1572D	B	952	0.13	96,190	12,859	1.3E-3	635	1.5
			1572R	B	952	--	149,000	19,918	924.7E-6	952	1.0
			1573D	C	952	0.17	36,570	4,889	903.6E-6	476	2.0
			1573R	C	952	—	34,930	4,669	883.1E-6	476	2.0
4380	8/8/95	98.9	1489D	D	628	1.23	13,620	1,821	773.8E-6	1,569	0.4
(Aquifer C)	(8 hrs.)		1489R	D	628	--	15,290	2,044	1.1E-3	1,569	0.4
			1573D	C	1,006	0.13	16,760	2,240	1.3E-3	903	2.0
			1573R	C	1,006	--	12,420	1,660	1.2E-3	402	2.5

Notes: D = drawdown analysis
R = recovery analysis
r = distance from pumped well
s = maximum drawdown measured during test

b = aquifer thickness
T = aquifer transmissivity
S = aquifer storage coefficient
L = Leakage Factor [r/(r/B)]



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Environmental Operations

FIGURE 1-1
Regional Location Map
American River Study Area

2/8/2000 ah SR10109211

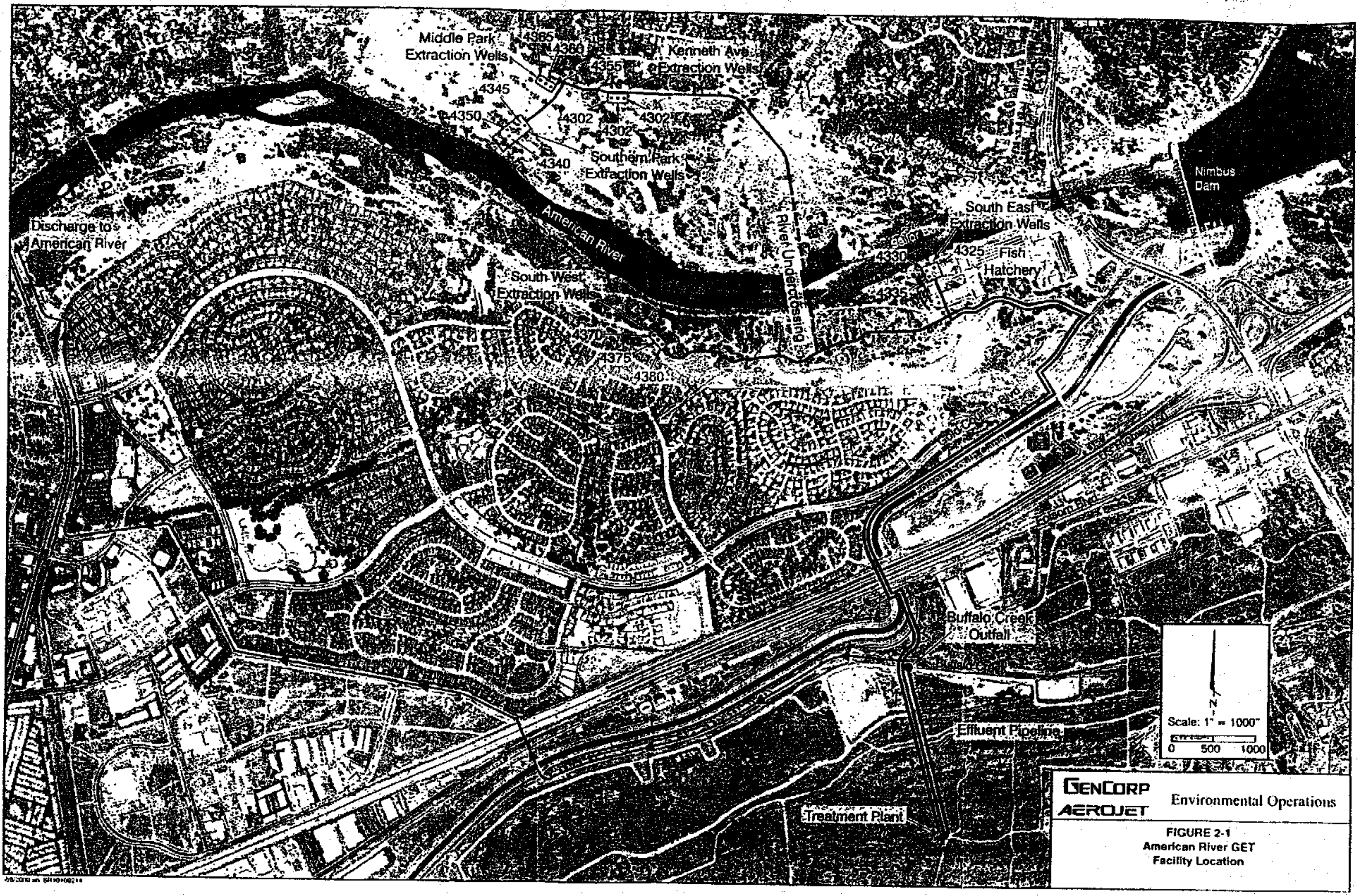

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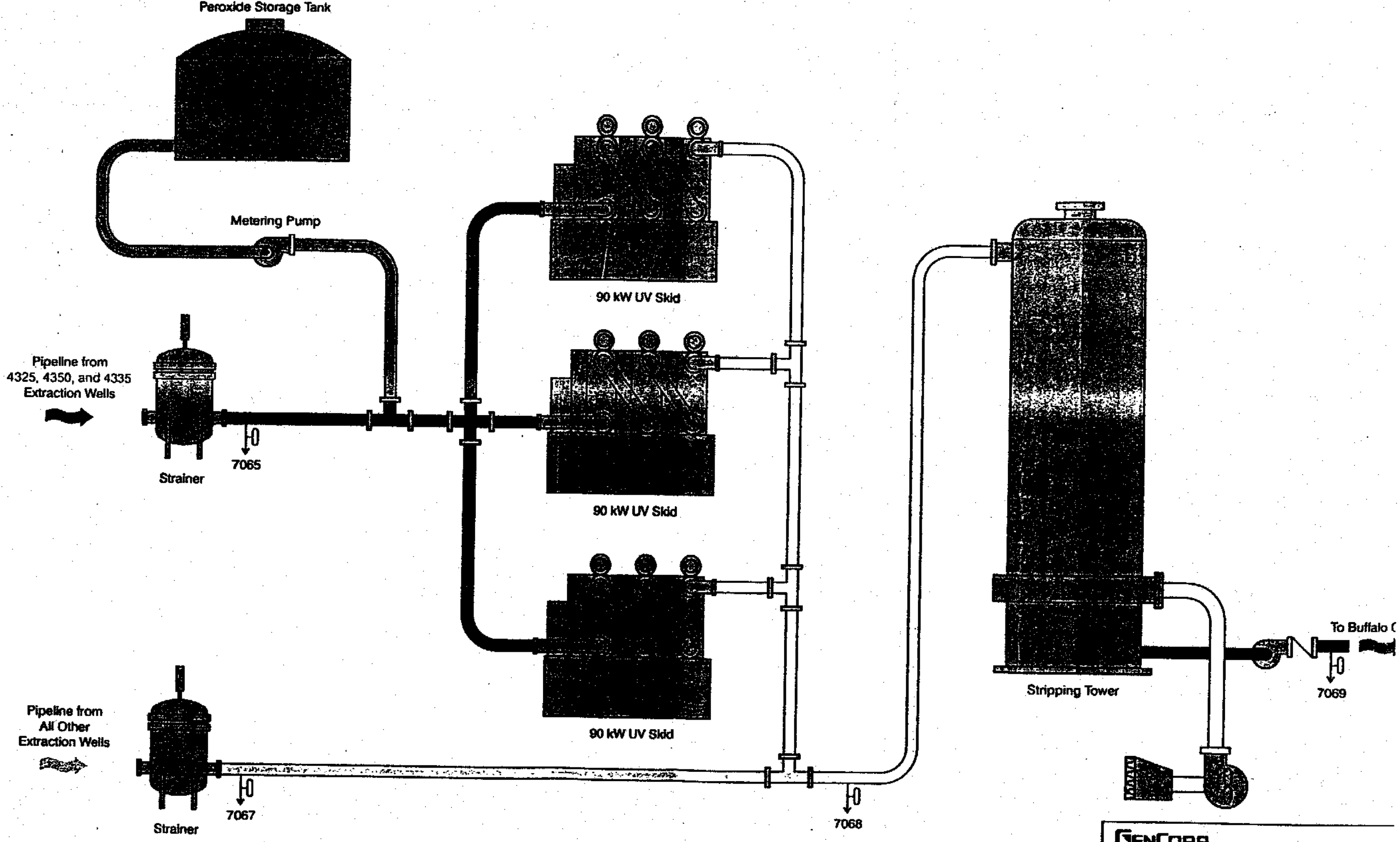
FIGURE 2-1
American River GET
Facility Location



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Environmental Operati

FIGURE 2-2
American River GET
Treatment System Components

14/2000 an SR10108215

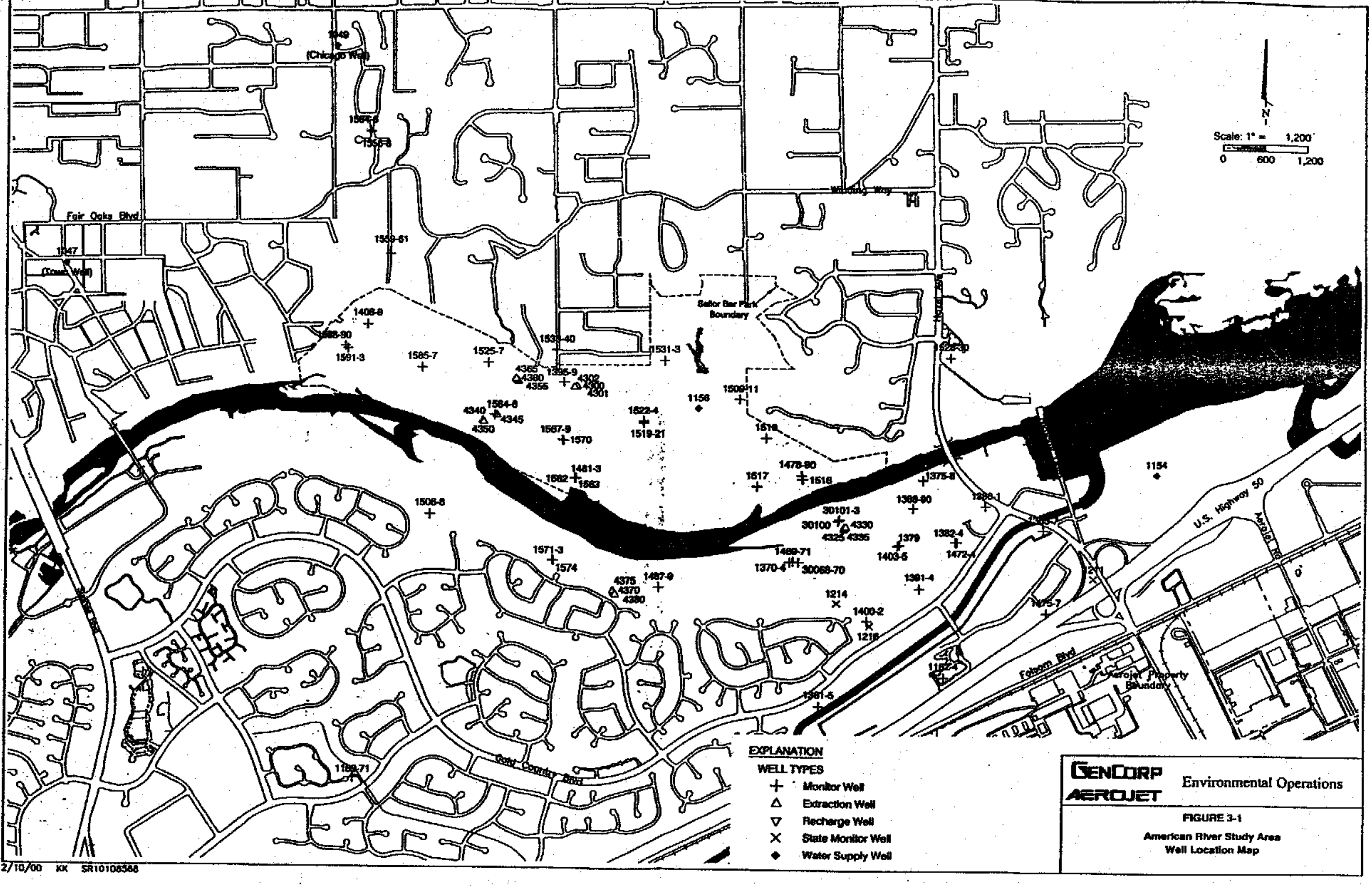

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FIGURE 3-1
American River Study Area
Well Location Map

2/10/00 KK SR10108568

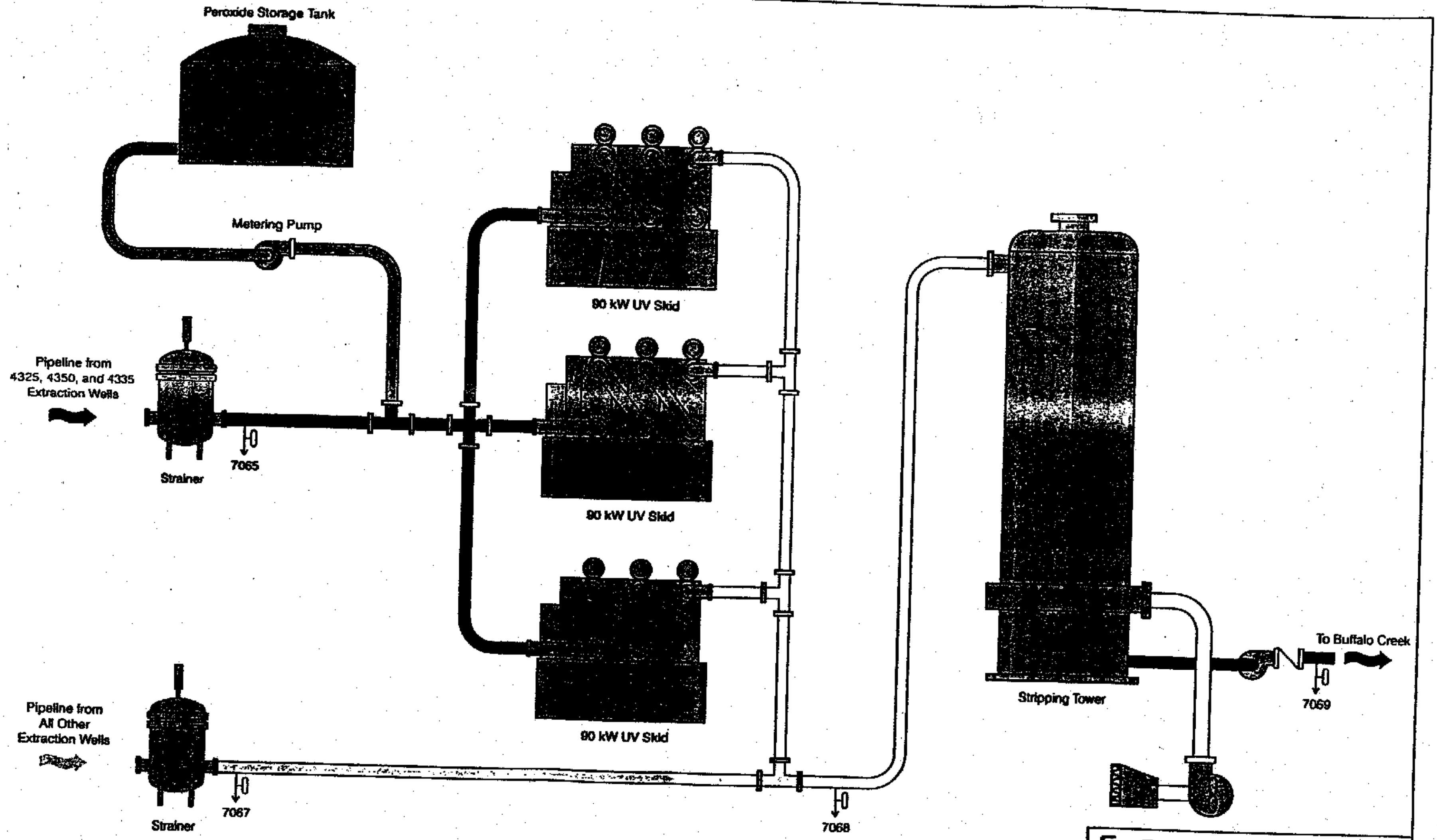

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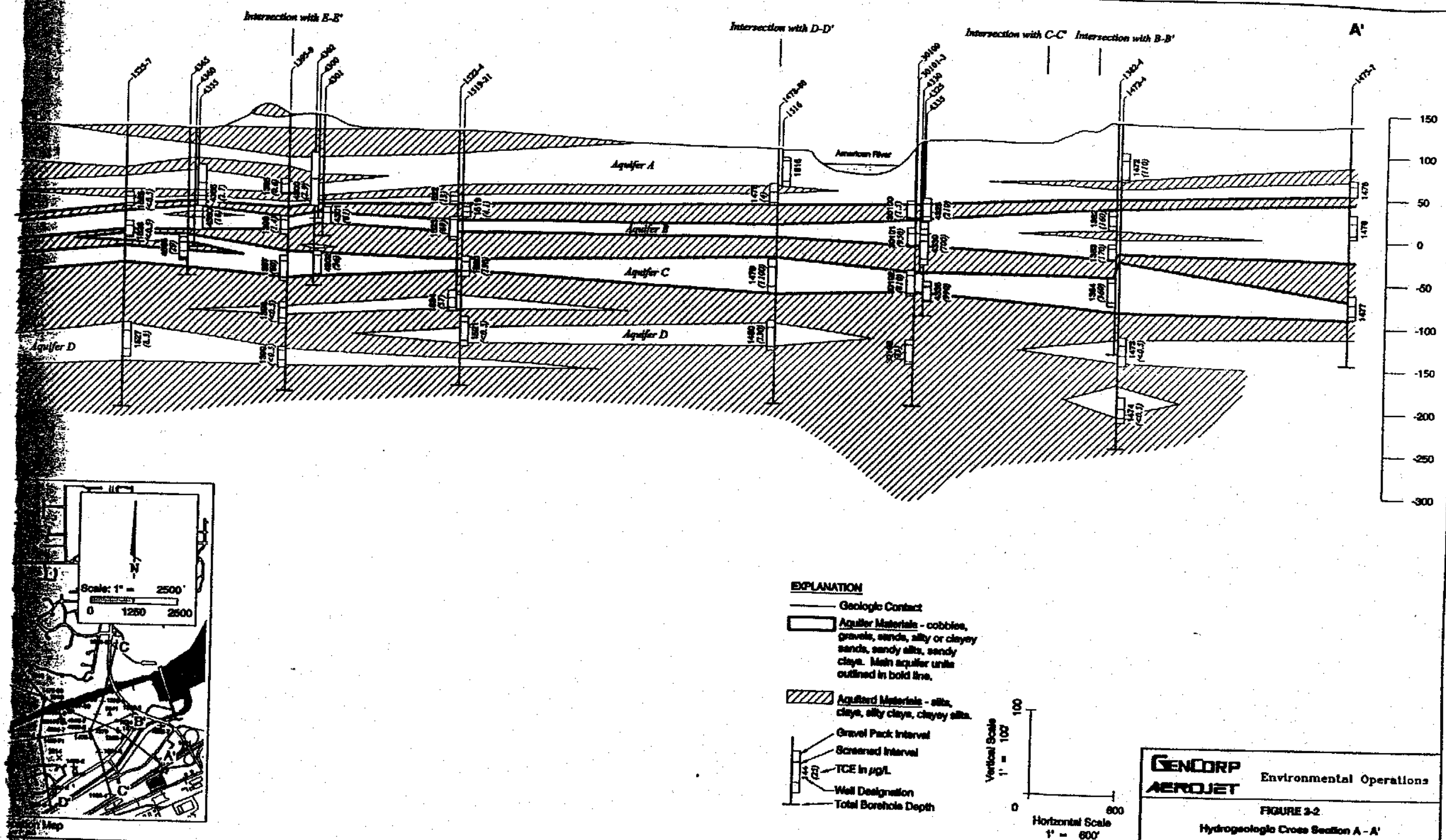
FIGURE 2-2
American River GET
Treatment System Components

3/14/2000 sn SR10100215



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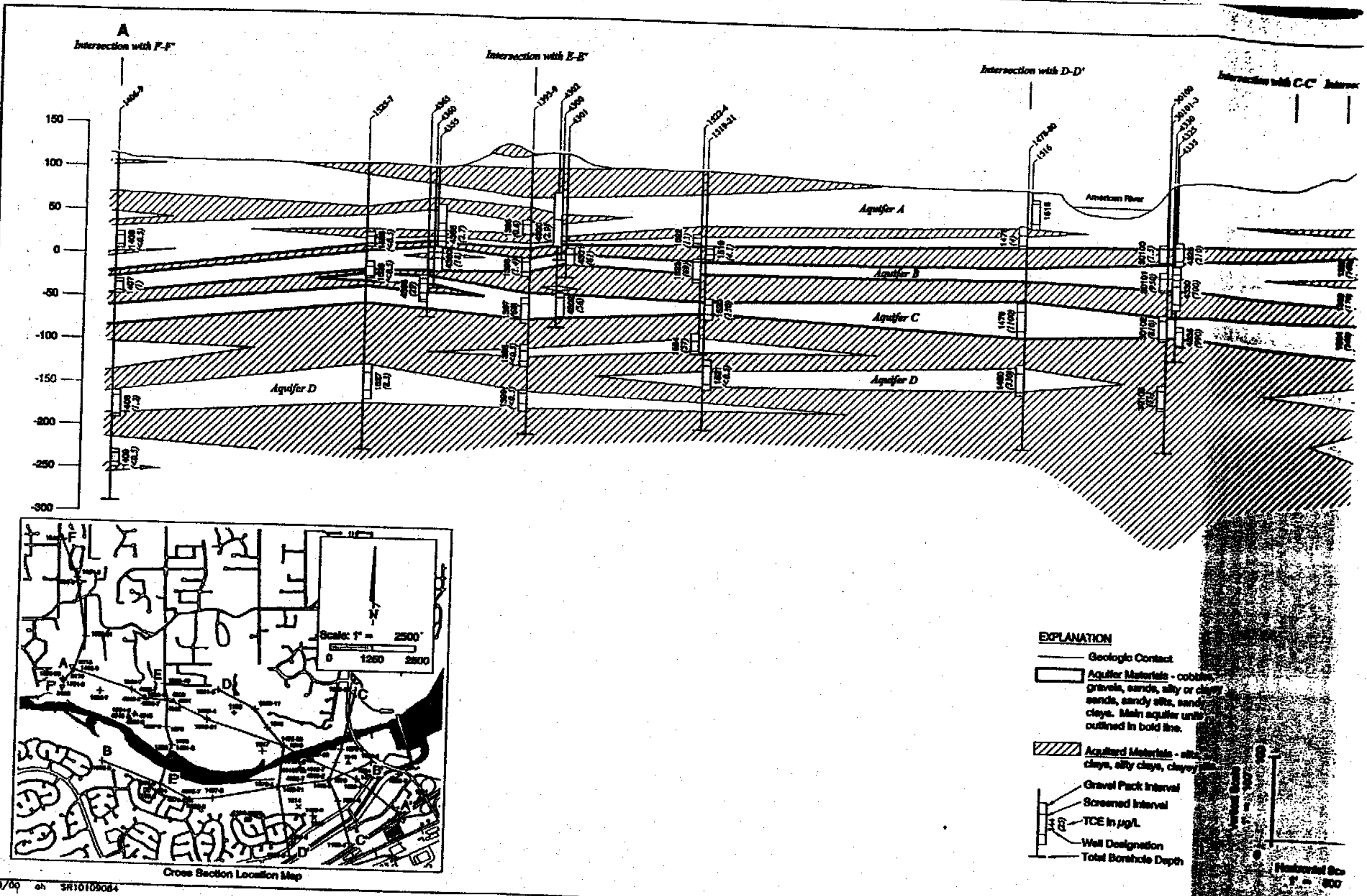
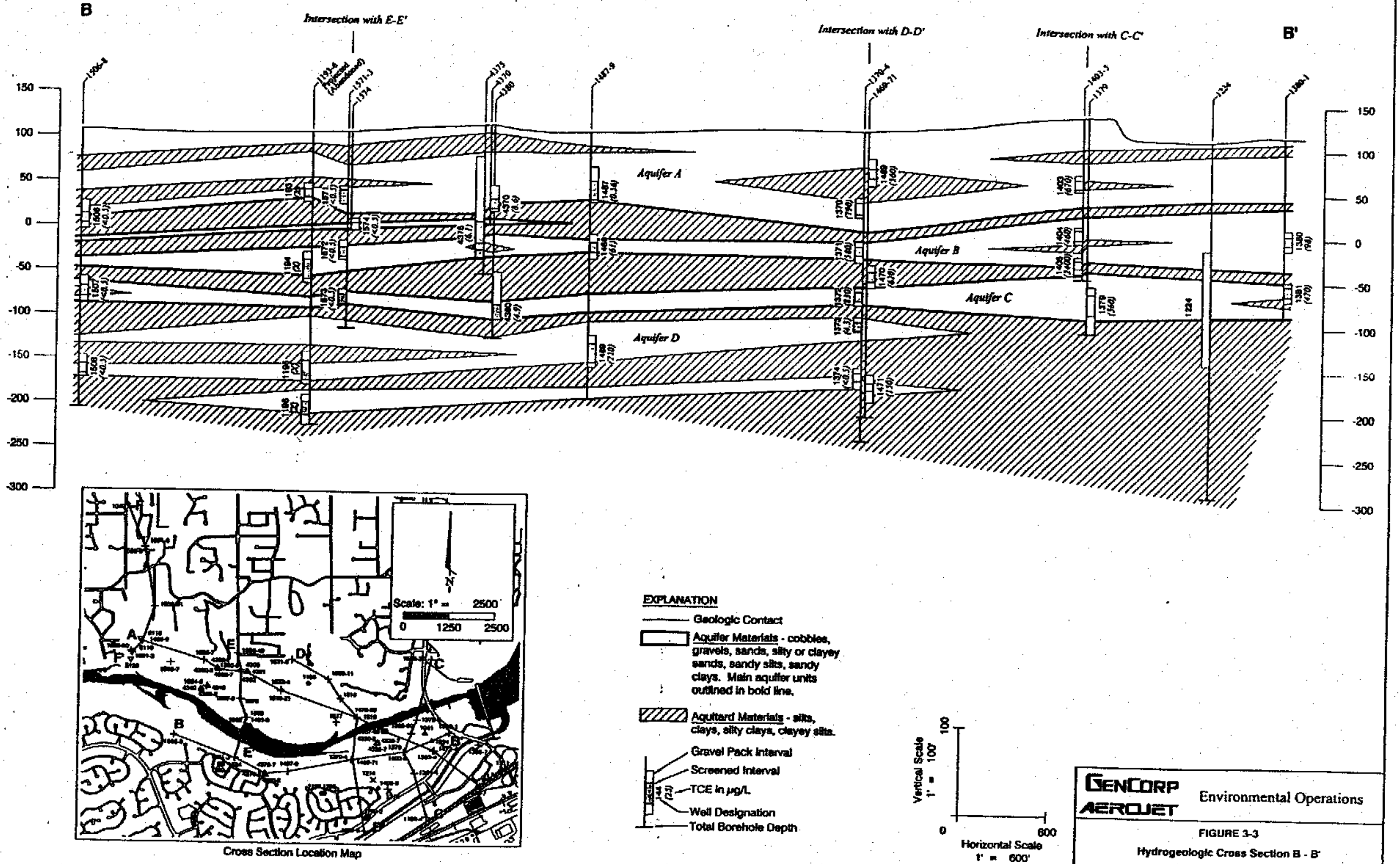
Environmental Operations

FIGURE 3-2

Hydrogeologic Cross Section A - A'


A
Intersection with F-F'
Intersection with E-E'
Intersection with D-D'
Intersection with C-C'
150
100
50
0
-50
-100
-150
-200
-250
-300
1404-9
1525-7
1395-9
1522-4
1518-21
1478-80
1516
30100
30101-3
American River
Aquifer A
Aquifer B
Aquifer C
Aquifer D
Scale: 1" = 2500'
0
1250
2500
N
Cross Section Location Map
EXPLANATION
Geologic Contact
Aquifer Materials - cobbles, gravels, sands, silty or clayey sands, sandy silts, sandy clays. Main aquifer units outlined in bold line.
Aquitard Materials - silts, clays, silty clays, clayey silts
Gravel Pack Interval
Screened Interval
TCE in µg/L
Well Designation
Total Borehole Depth
Horizontal Sc
1" = 800



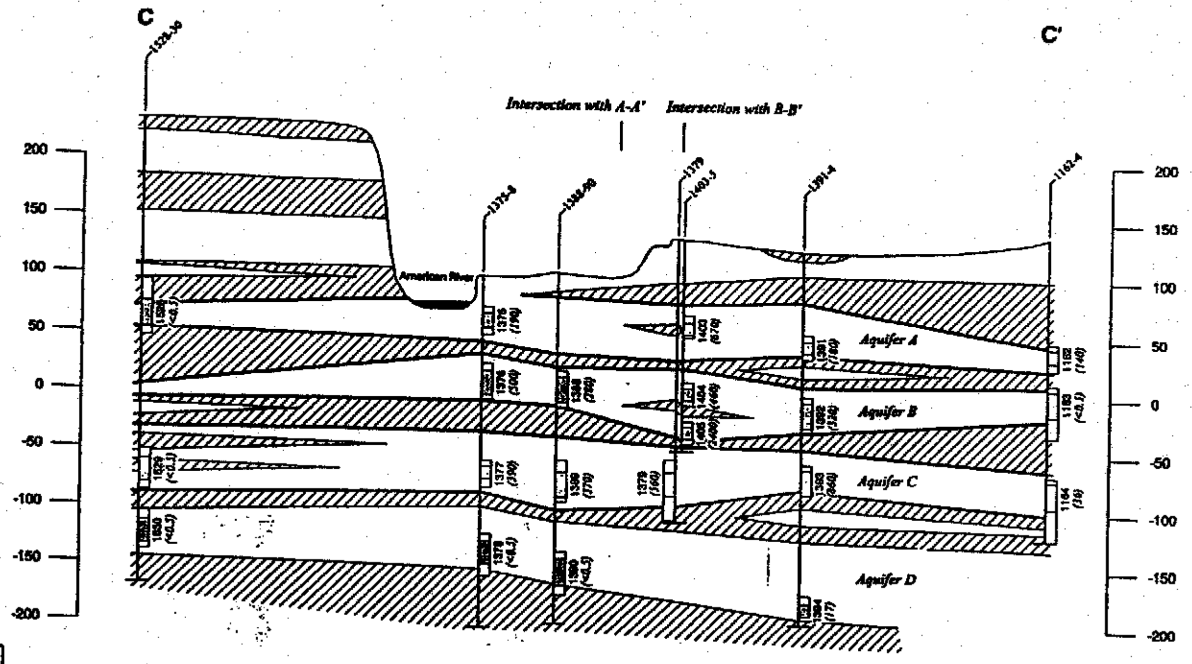
Cross Section Location Map

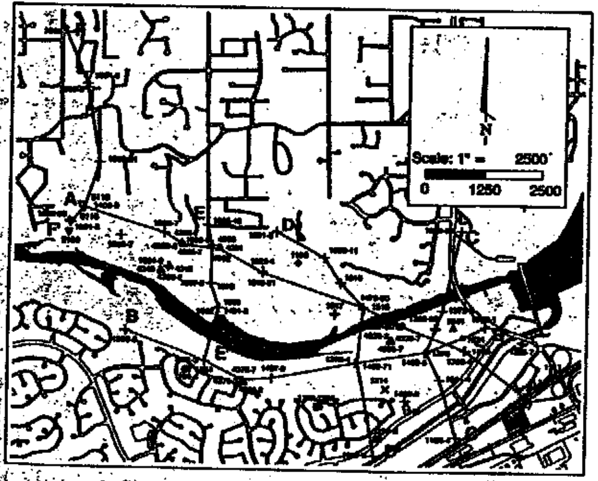
GENCORP AEROJET Environmental Operations

FIGURE 3-3

Hydrogeologic Cross Section B - B'

2/10/00 gh SR10109088





EXPLANATION

— Geologic Contact

▭ Aquifer Materials - cobbles, gravels, sands, silty or clayey sands, sandy silts, sandy clays. Main aquifer units outlined in bold line.

▨ Aquitard Materials - silts, clays, silty clays, clayey silts.

Gravel Pack Interval
Screened Interval
144 (12) TCE in µg/L
Well Designation
Total Borehole Depth

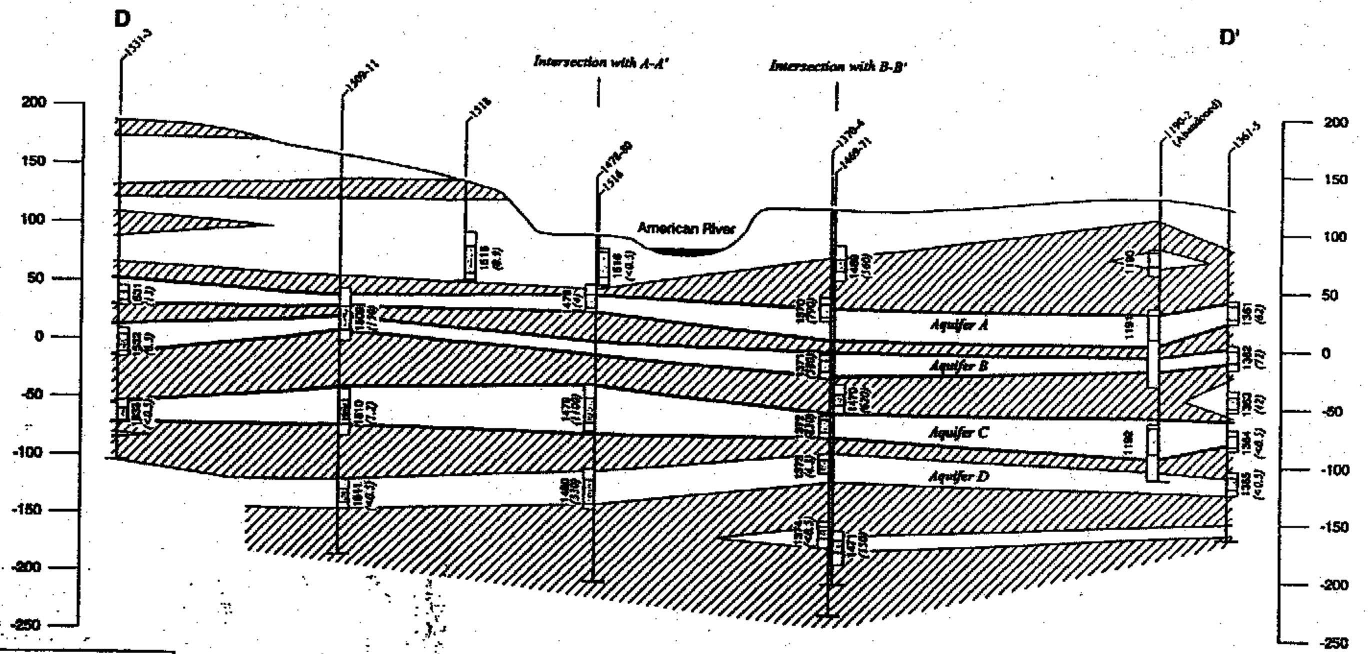
Vertical Scale
1' = 100'
0 100

Horizontal Scale
1' = 600'
0 600

GENCORP AEROJET Environmental Operations

FIGURE 3-4

Hydrogeologic Cross Section C - C'



EXPLANATION

—— Geologic Contact

▭ Aquifer Materials - cobbles, gravels, sands, silty or clayey sands, sandy silts, sandy clays. Main aquifer units outlined in bold line.

▨ Aquitard Materials - silts, clays, silty clays, clayey silts.

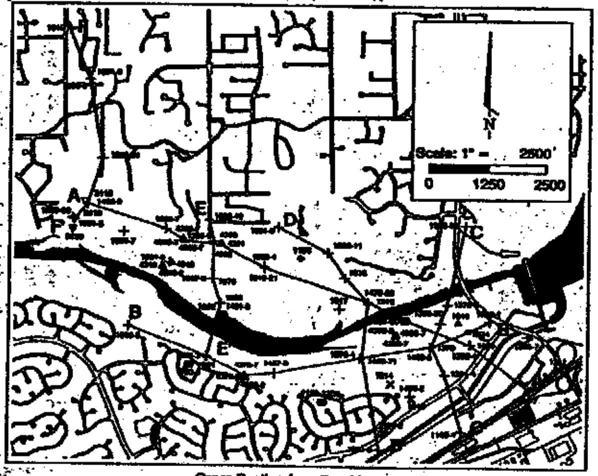
- Gravel Pack Interval
- Screened Interval
- 144 (21) —TCE in μg/L
- Well Designation
- Total Borehole Depth

Vertical Scale
1" = 100'

100

0 600

Horizontal Scale
1" = 600'



Cross Section Location Map

2/20/00 ch SR10109092

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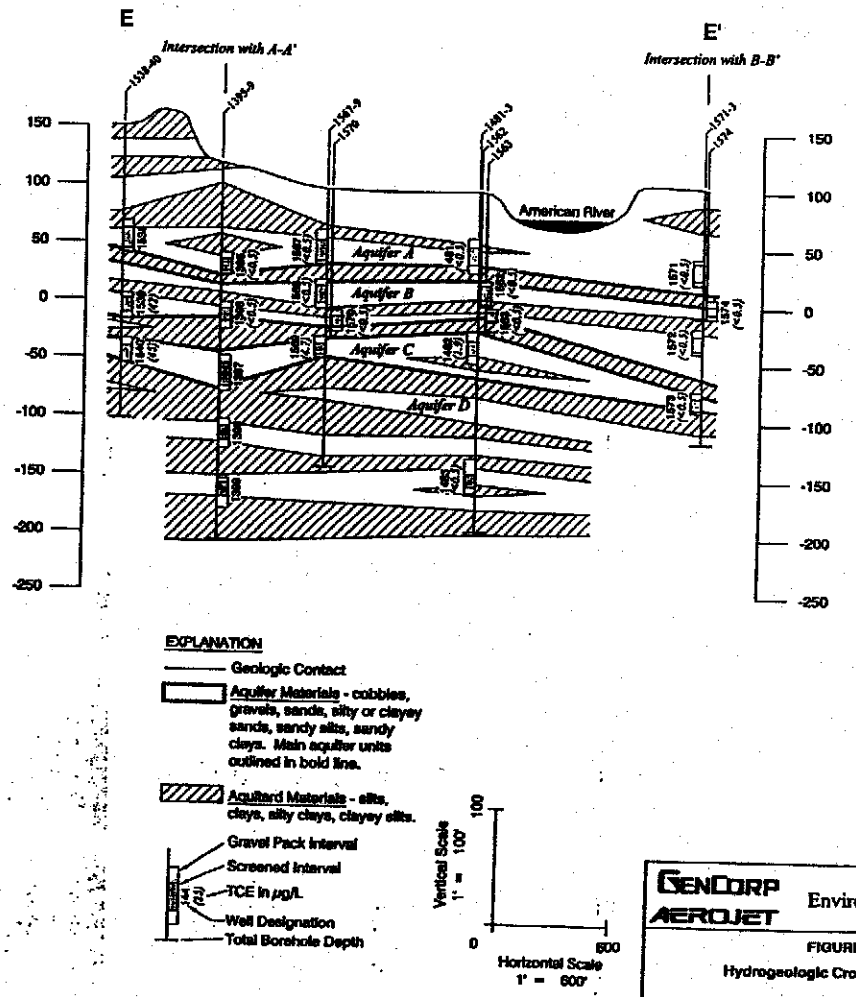
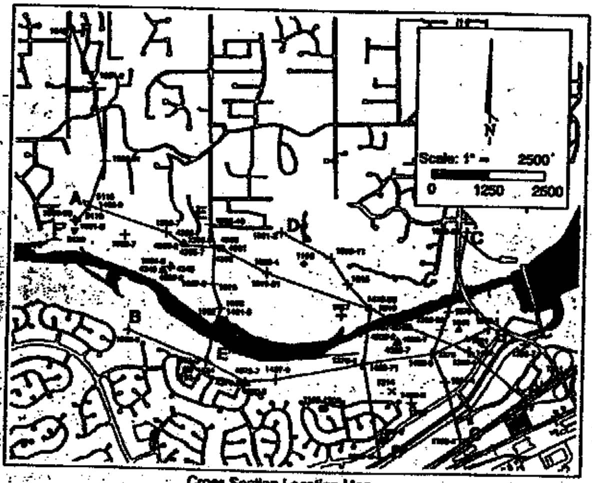
Environmental Operations

FIGURE 3-5

Hydrolgeologic Cross Section D - D'





Cross Section Location Map

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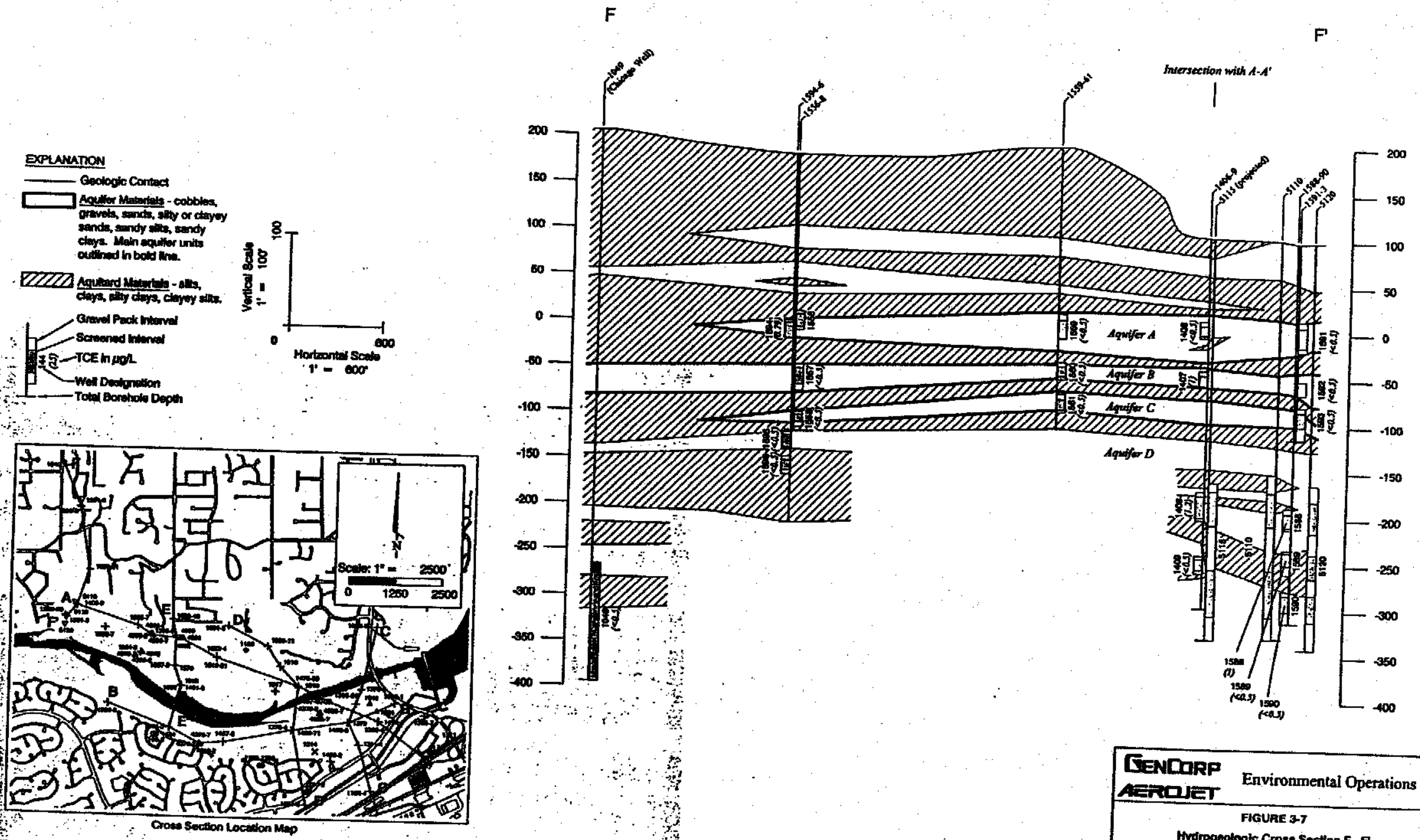
Environmental Operations

FIGURE 3-6

Hydrogeologic Cross Section E - E'

2/10/00 ah SR10109093



Cross Section Location Map

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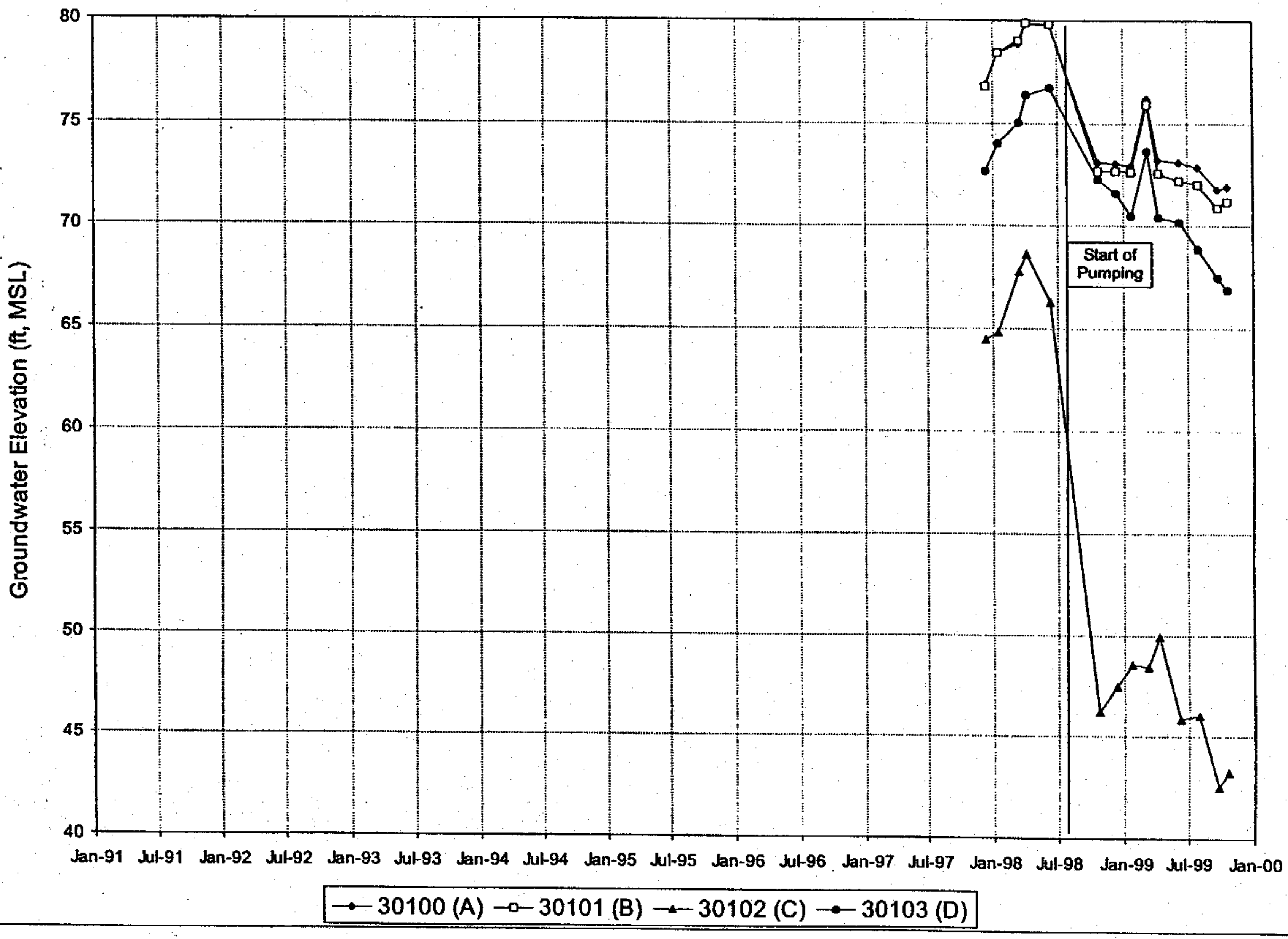
FIGURE 3-7

Hydrogeologic Cross Section F - F'

Figure 3-8
Hydrograph Wells 30100, 30101-03



SR10109322

02/09/2000

Figure 3-9
Hydrograph Wells 1395-99

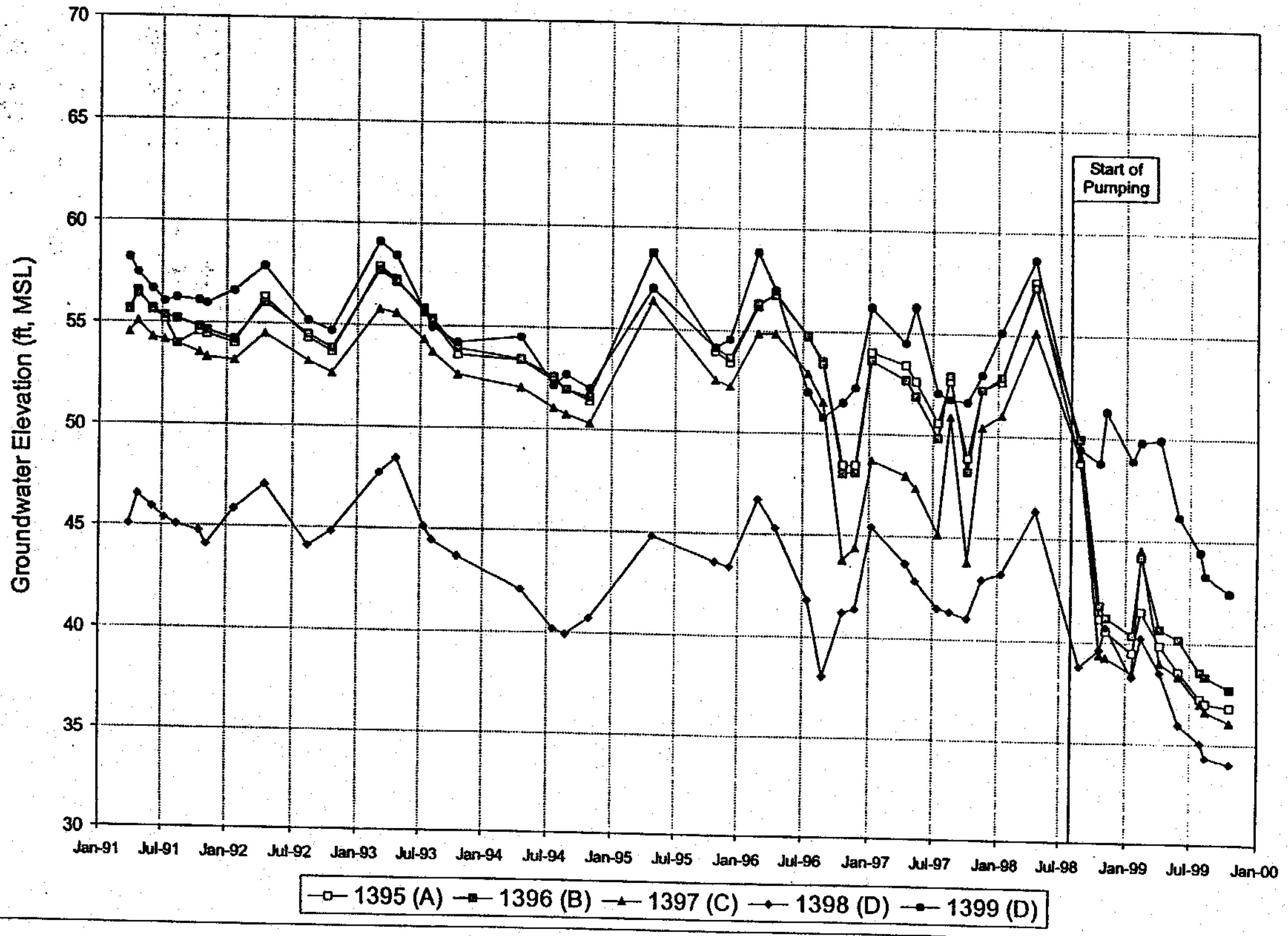


Figure 3-10
Hydrograph Wells 1538-40

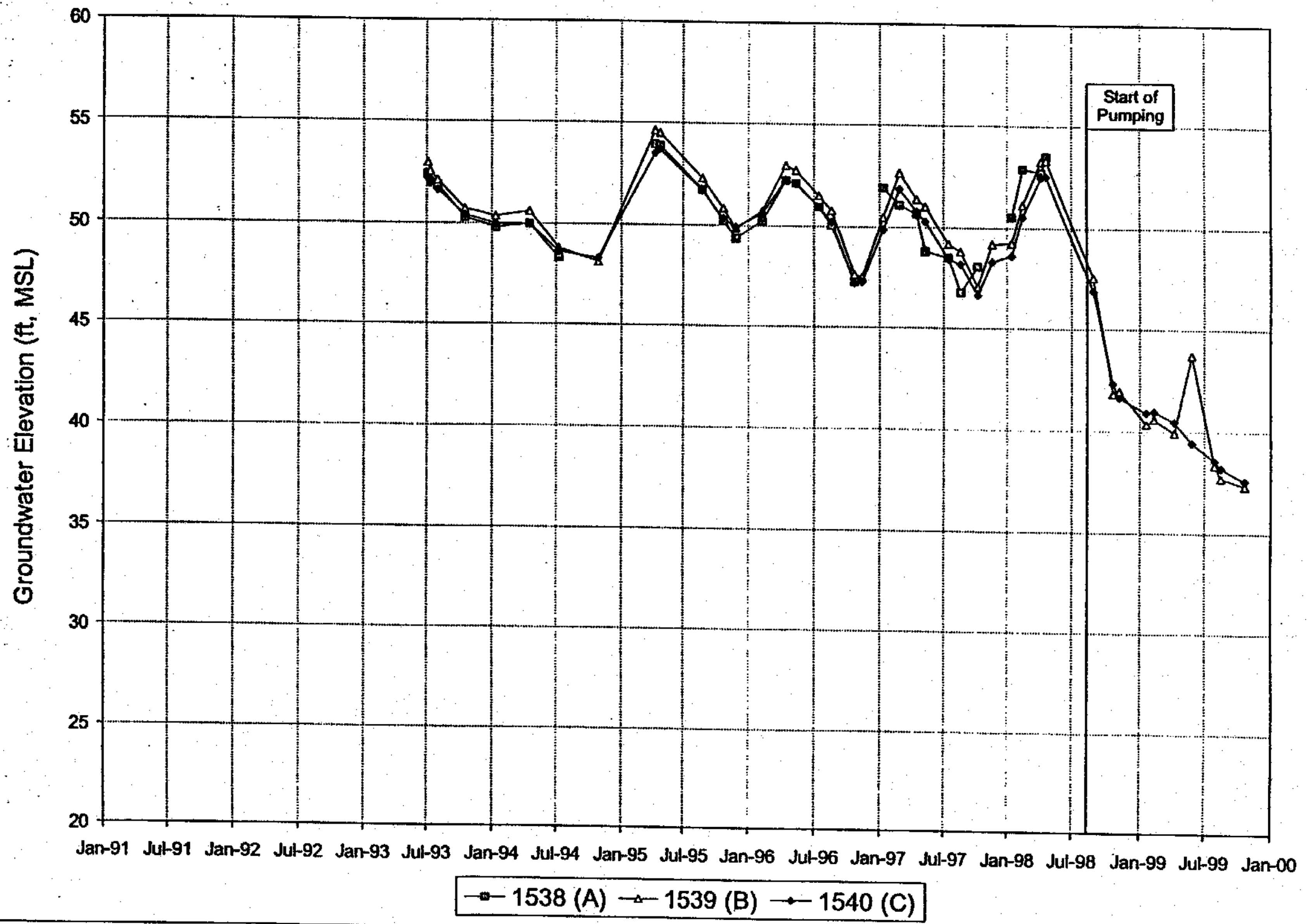


Figure 3-11
Hydrograph Wells 1525-27

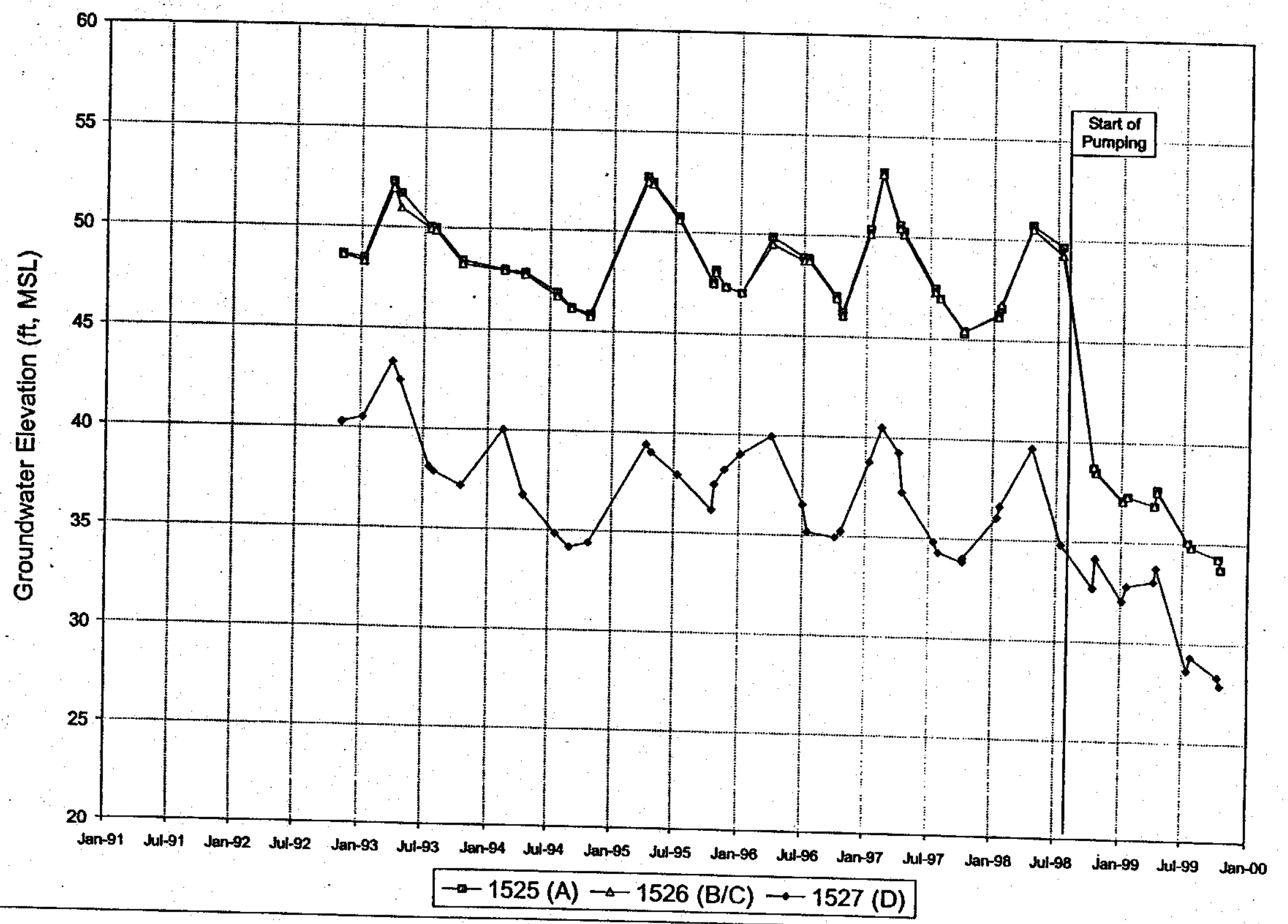
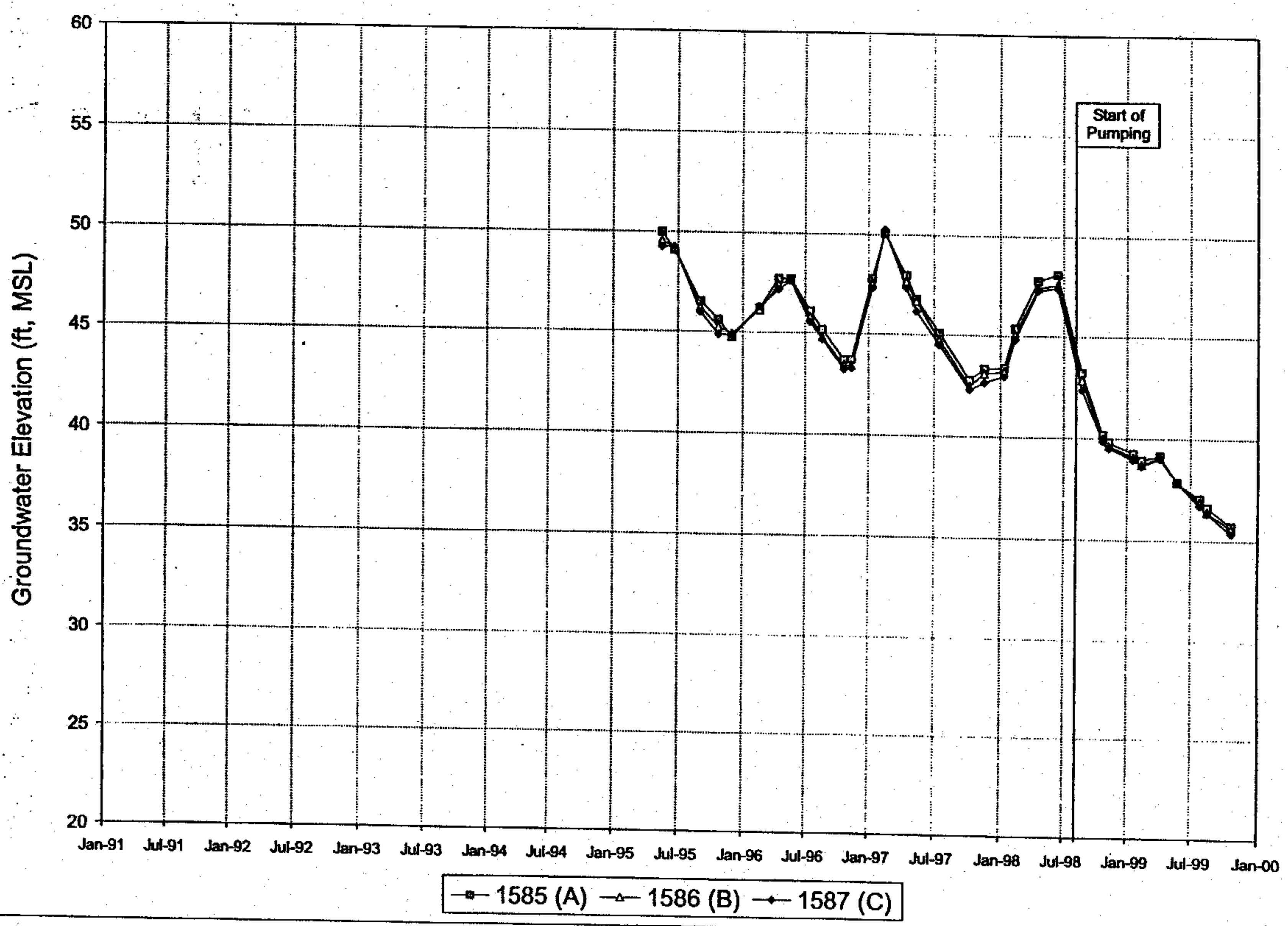


Figure 3-12
Hydrograph Wells 1585-87



02/09/2000

Figure 3-13
Hydrograph Wells 1519-21, 1522-24

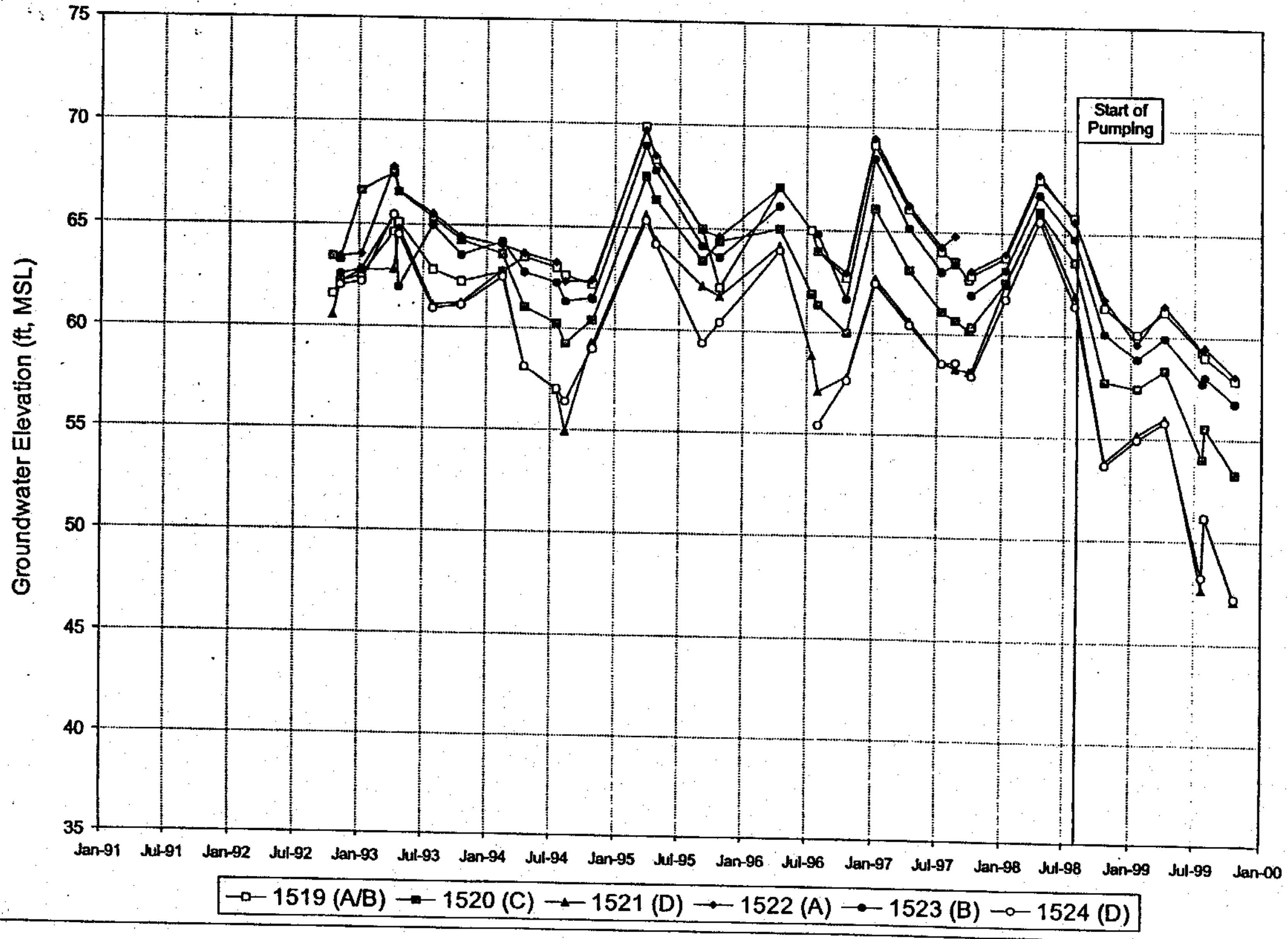
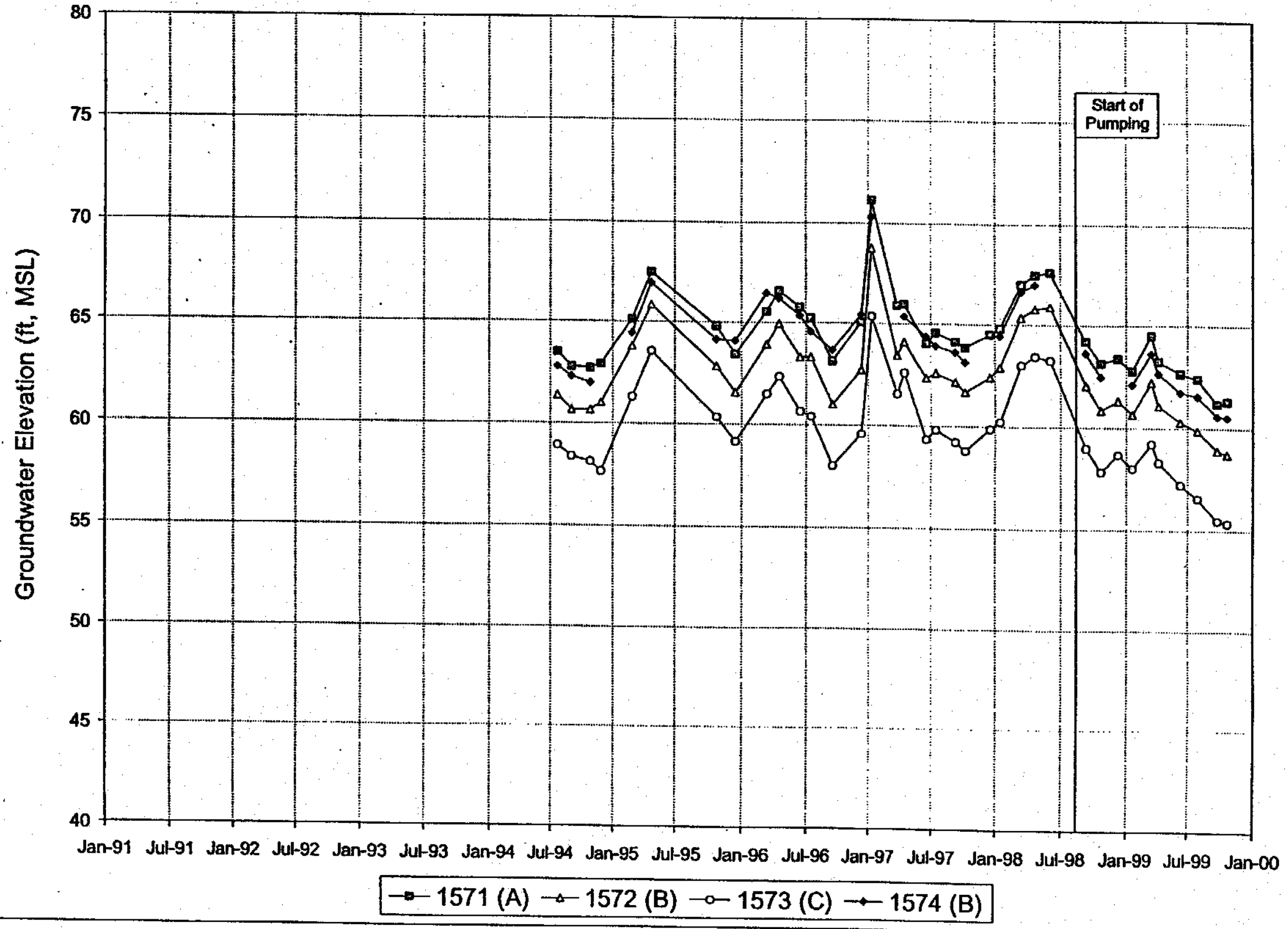


Figure 3-14
Hydrograph Wells 1571-73, 1574



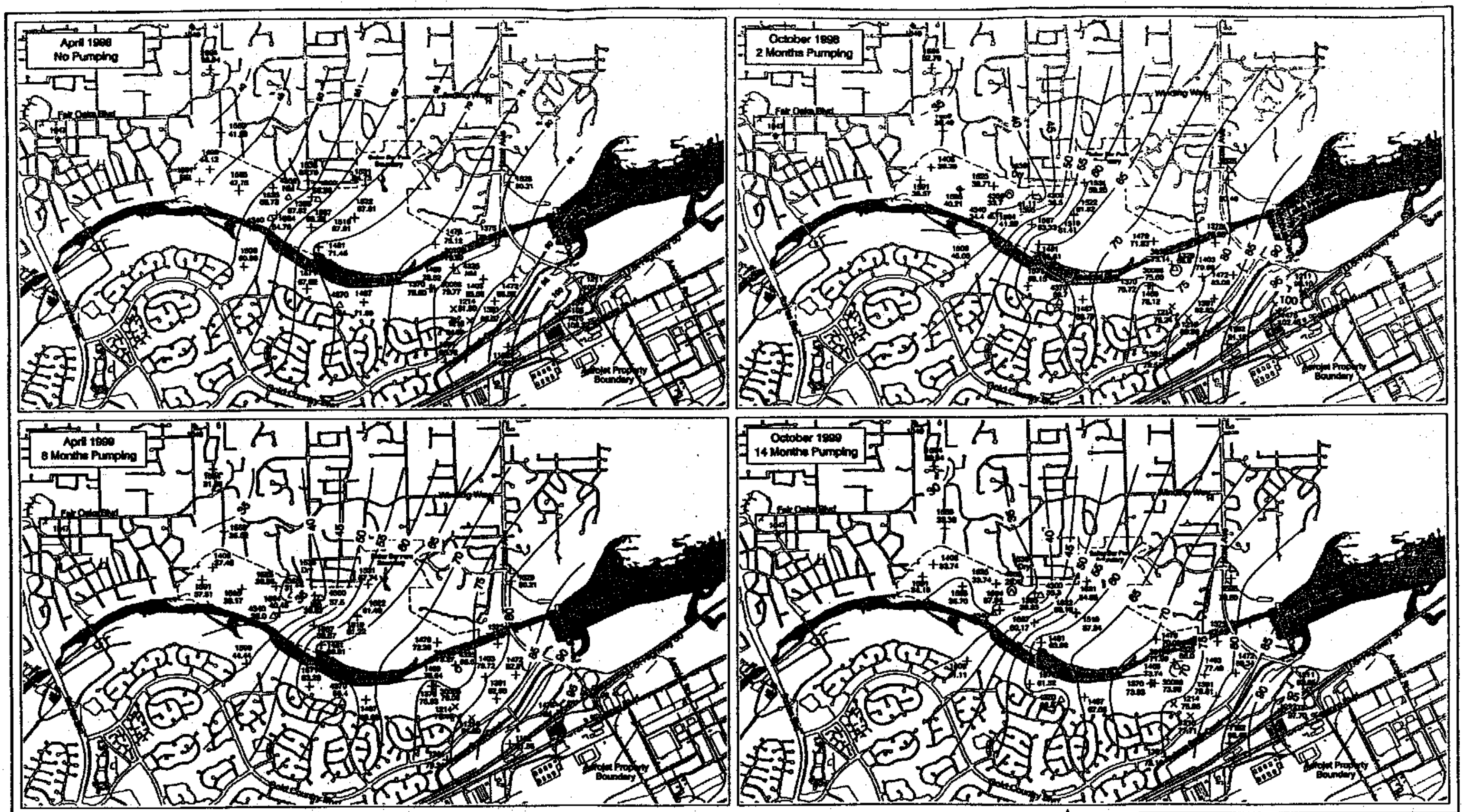


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FIGURE 3-15

American River Study Area
Potentiometric Surface Map, Aquifer A
4/98 Through 10/99

2/8/2000 eh SR10109103

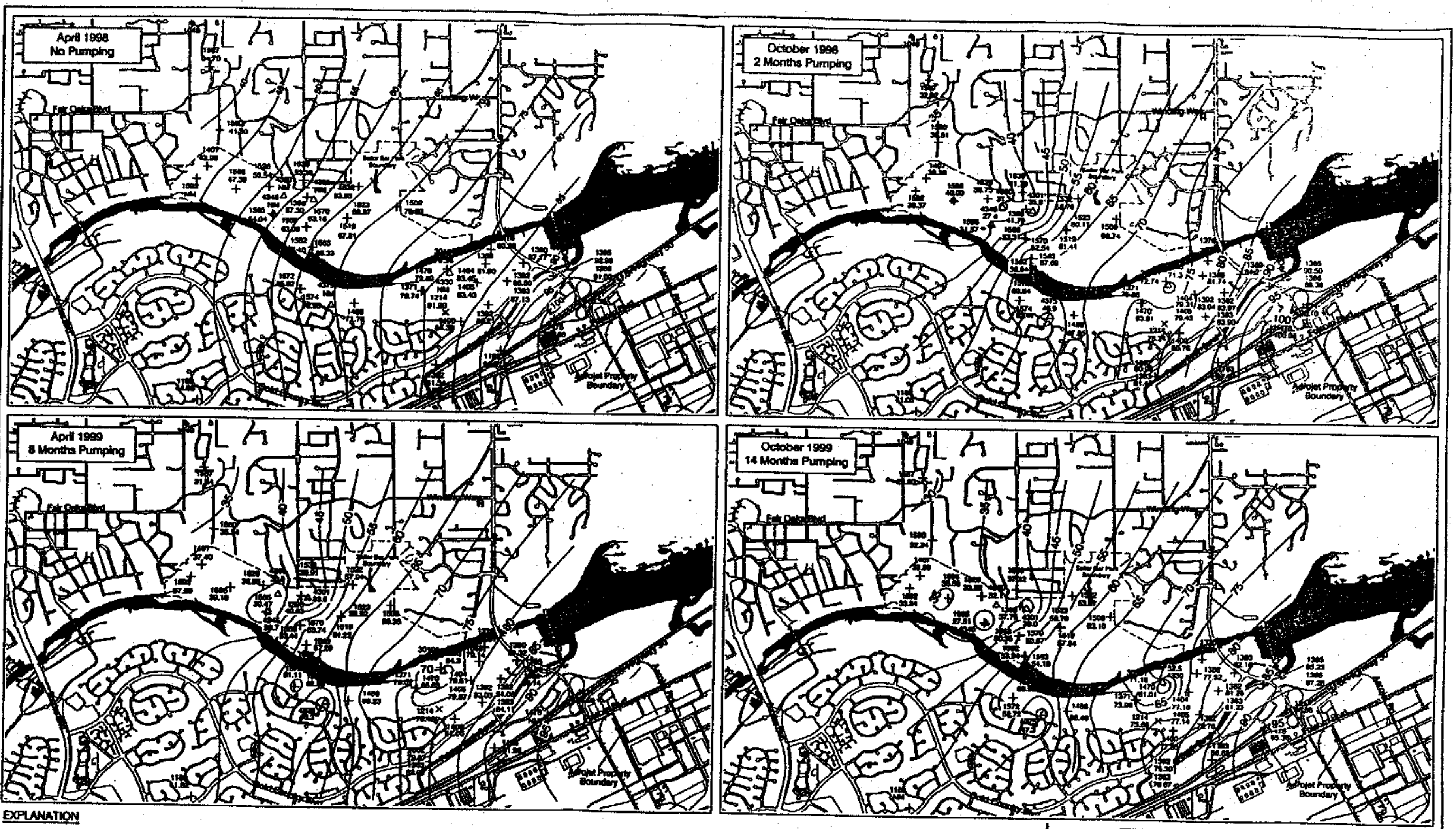

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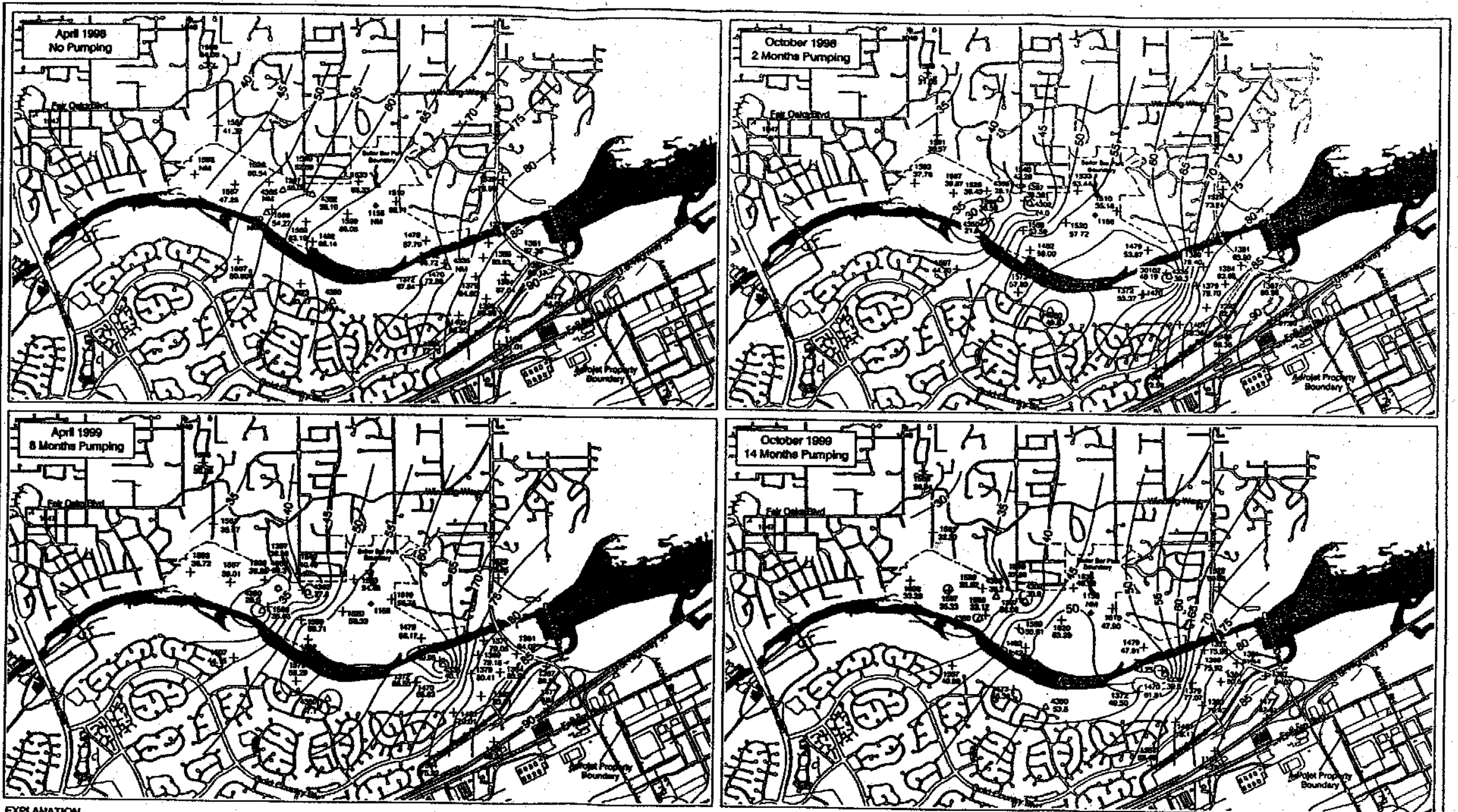
FIGURE 3-16

American River Study Area
Potentiometric Surface Map, Aquifer B
4/98 Through 10/99

2/10/2000 oh SR10109102



EXPLANATION

KEY TO WELL SYMBOLS

1234 — Well Identification (Multiple Numbers Indicate Multiple Completions)

90.25 — Groundwater Elevation in feet MSL

Well Type and Location

WELL TYPES

+	Monitor Well
△	Extraction Well
▽	Recharge Well
X	State-owned Monitor Well
◆	Water Supply Well

—50— Groundwater Elevation Contour (ft, MSL)

N

Scale: 1" = 2500'

0 1250 2500

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FIGURE 3-17

American River Study Area
Potentiometric Surface Map, Aquifer C
4/98 Through 10/99

2/10/00 ah SR10109104

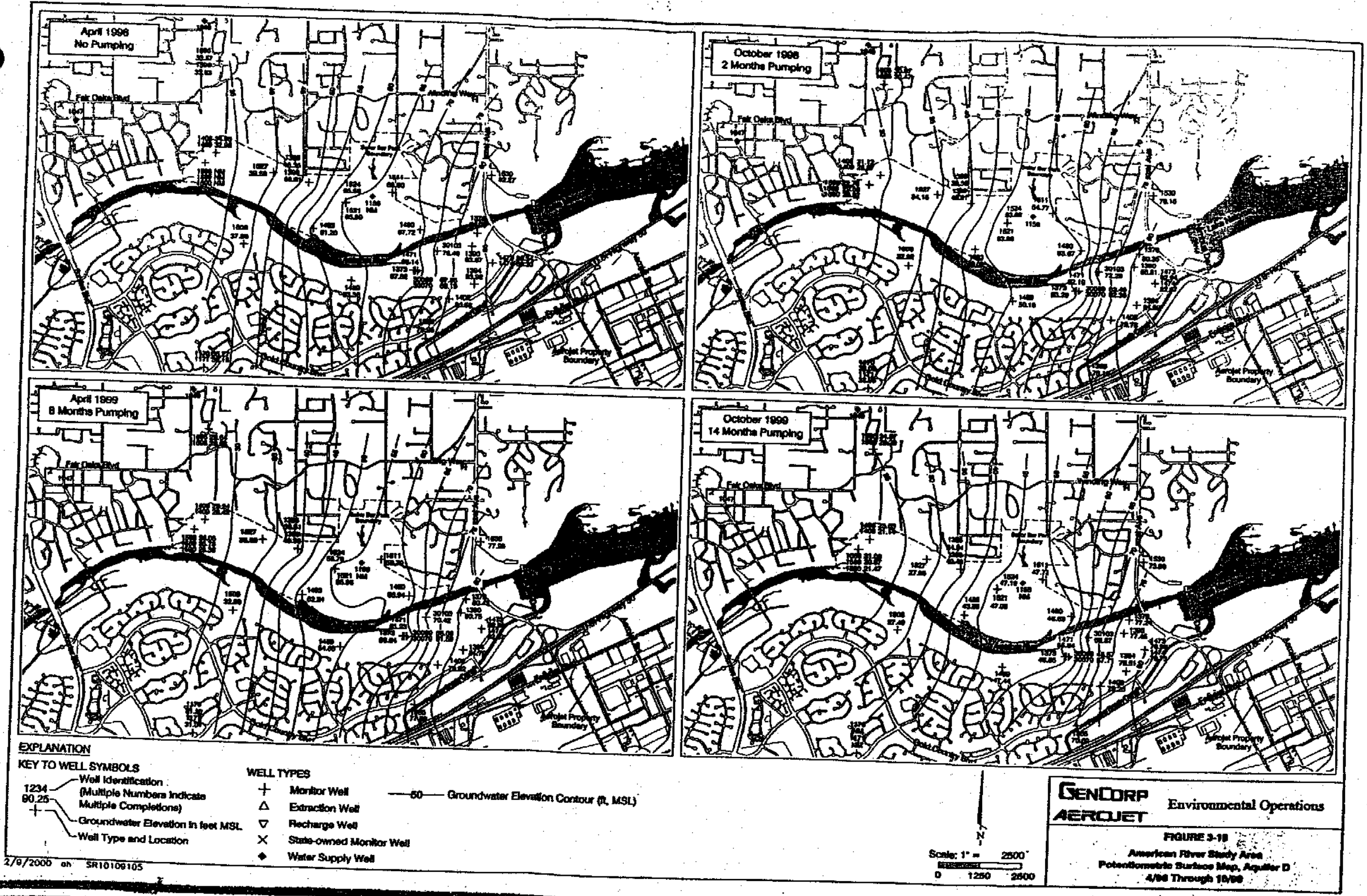

FIGURE 3-19

American River Study Area
Potentiometric Surface Map, Aquifer D
4/98 Through 10/99

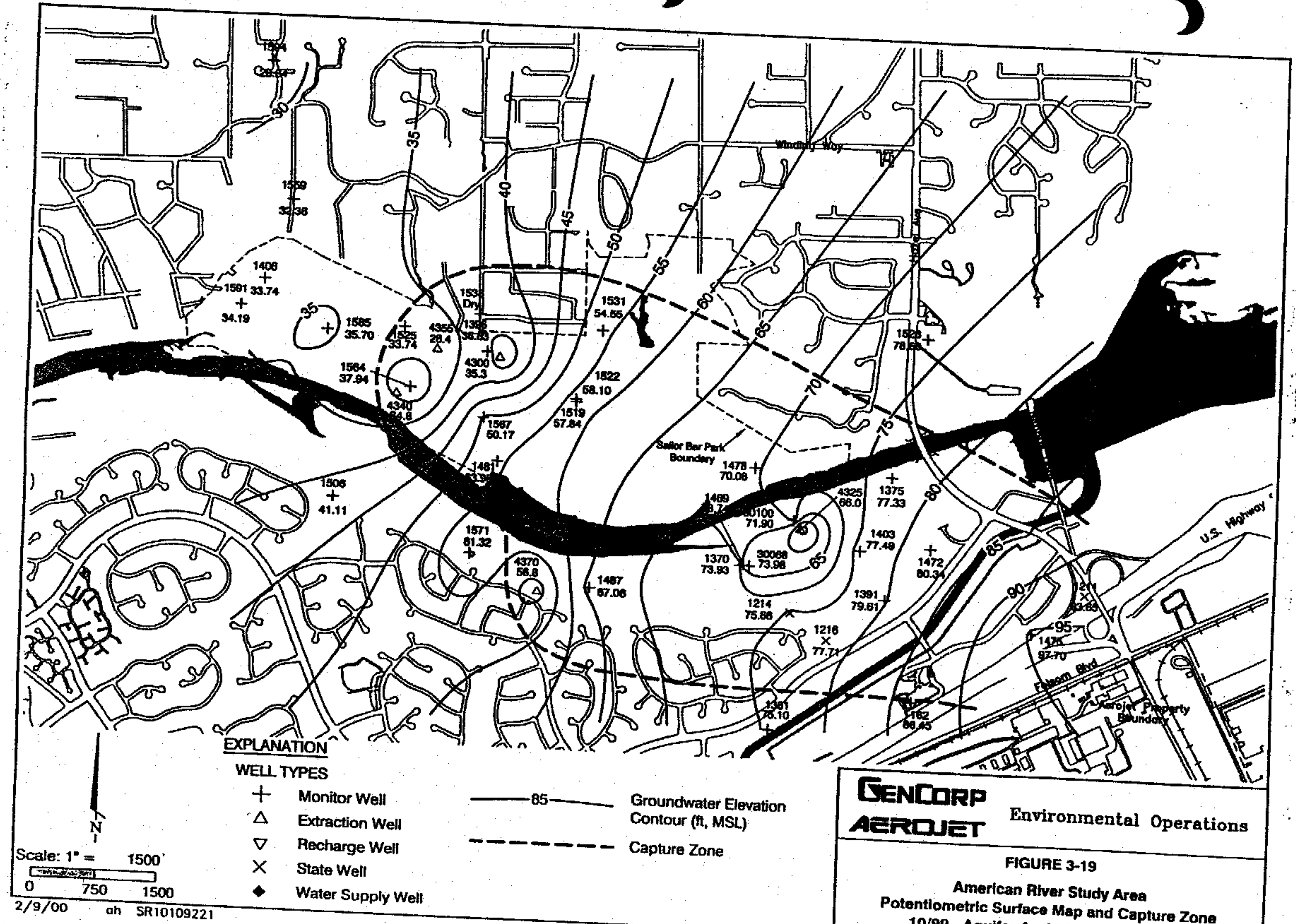

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FIGURE 3-19

American River Study Area
Potentiometric Surface Map and Capture Zone
10/99 - Aquifer A - 14 Months Pumping

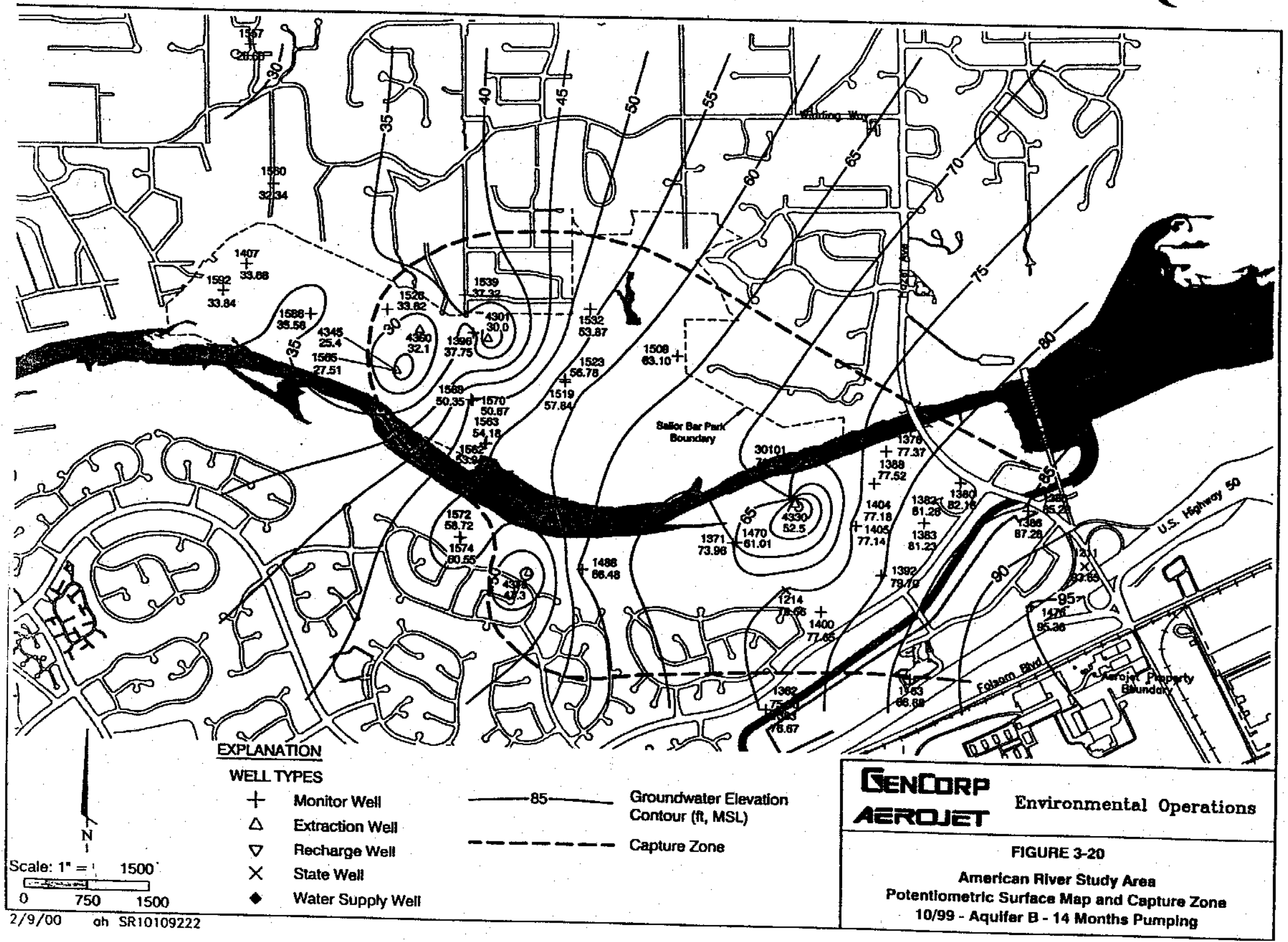

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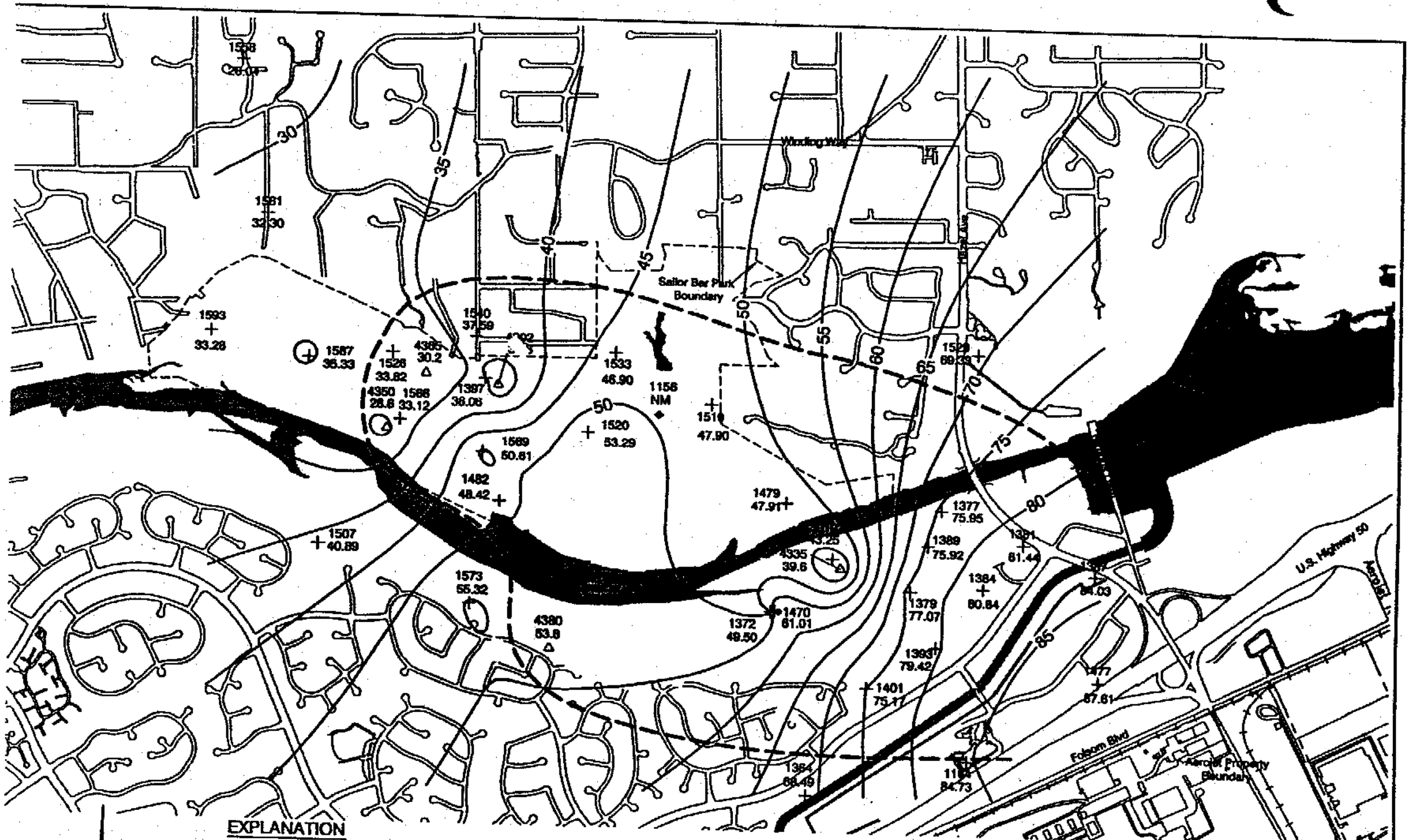
FIGURE 3-20

American River Study Area
Potentiometric Surface Map and Capture Zone
10/99 - Aquifer B - 14 Months Pumping



EXPLANATION

WELL TYPES

- \+ Monitor Well
- △ Extraction Well
- ▽ Recharge Well
- × State Well
- ◆ Water Supply Well

——85—— Groundwater Elevation Contour (ft, MSL)

— — — — Capture Zone

N

Scale: 1" = 1500'

0 750 1500

2/9/00 oh SR10109223

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FIGURE 3-21

American River Study Area
Potentiometric Surface Map and Capture Zone - 10/99
Aquifer C - 14 Months Pumping

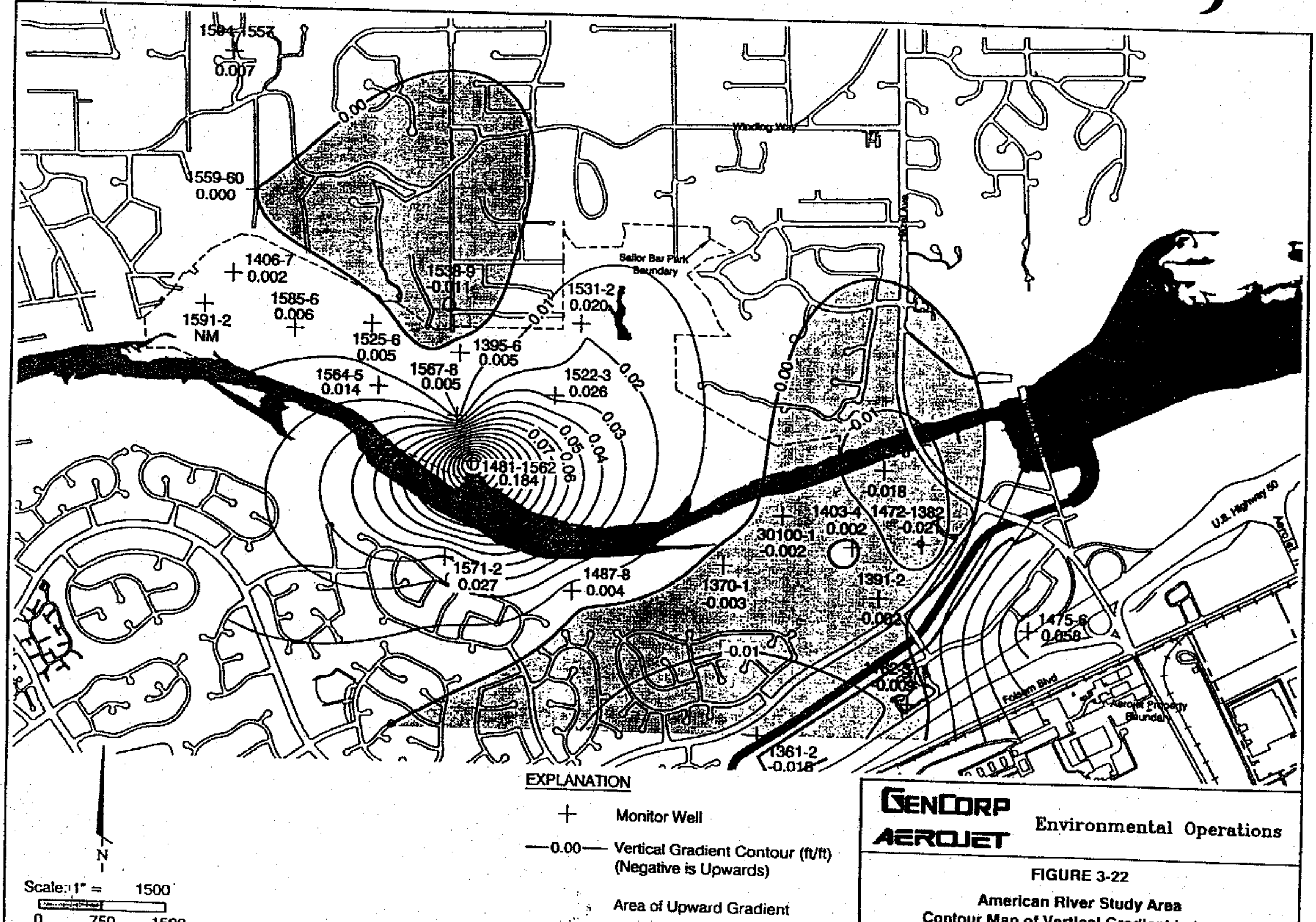

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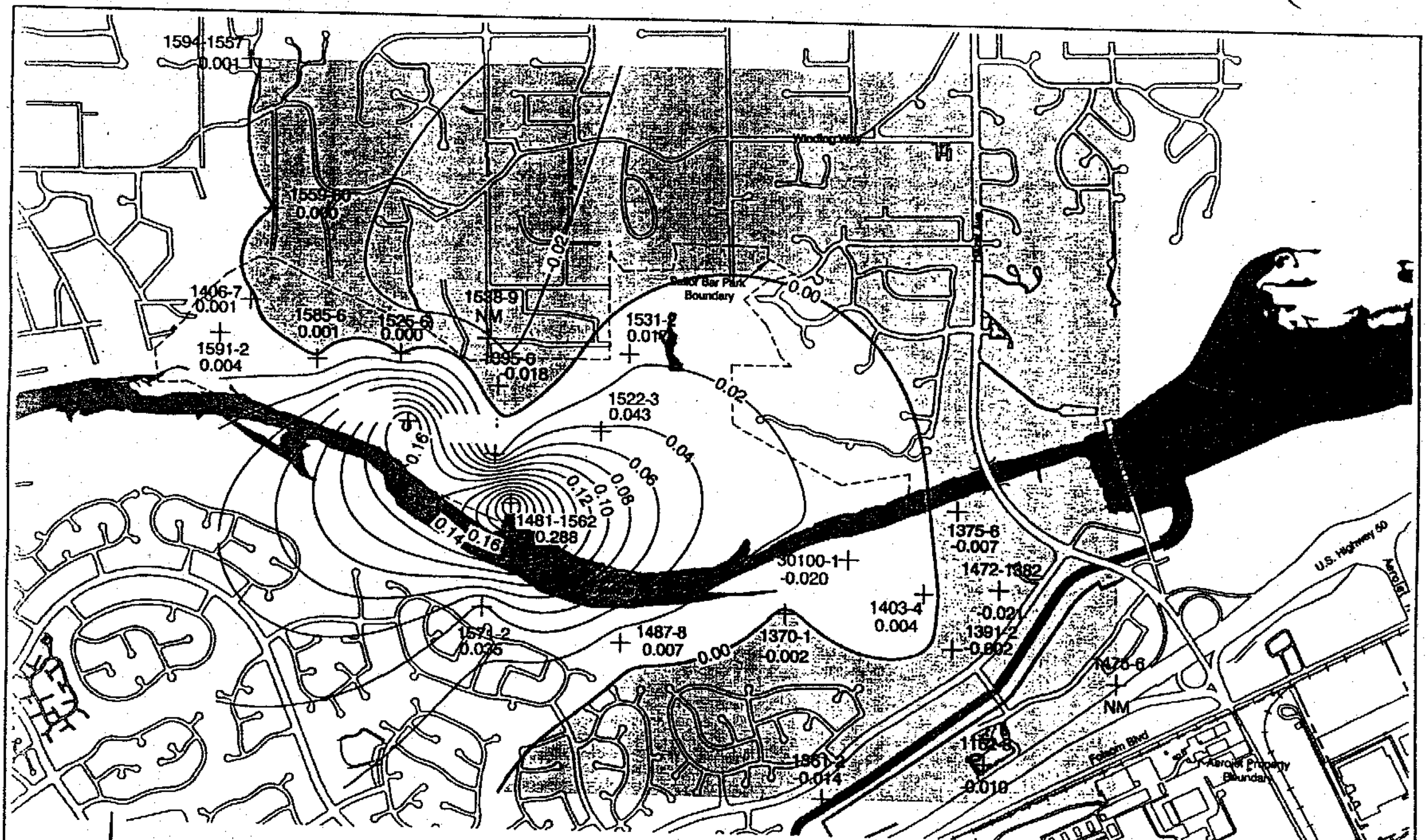
FIGURE 3-22

American River Study Area
Contour Map of Vertical Gradient between
Aquifers A and B, April 1998

2/9/00 ah SR10109253



EXPLANATION

+ Monitor Well

—0.00— Vertical Gradient Contour (ft/ft) (Negative is Upwards)

▨ Area of Upward Gradient

2/9/00 ah SR10109254

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FIGURE 3-23

American River Study Area Contour Map of Vertical Gradient between Aquifers A and B, April 1999

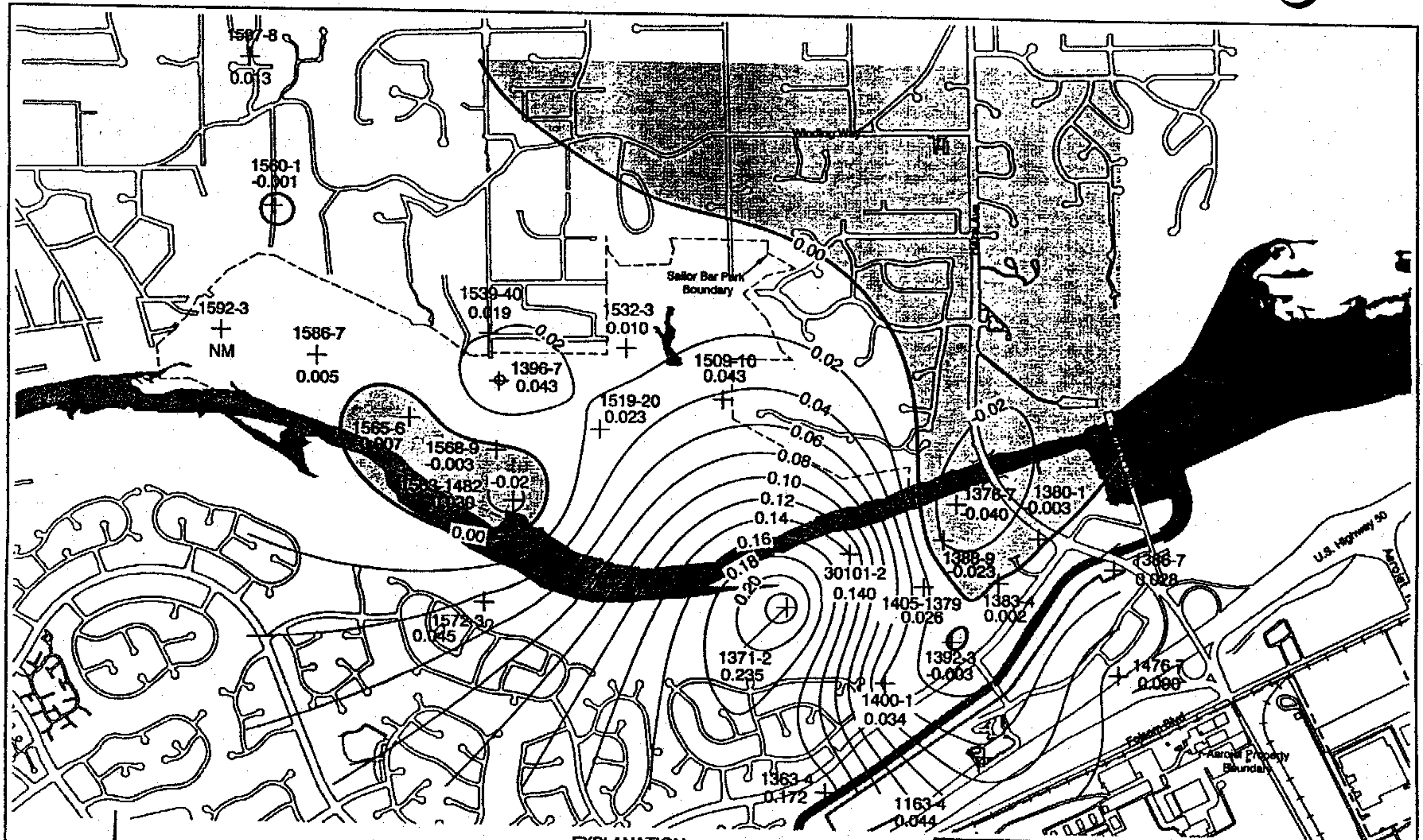

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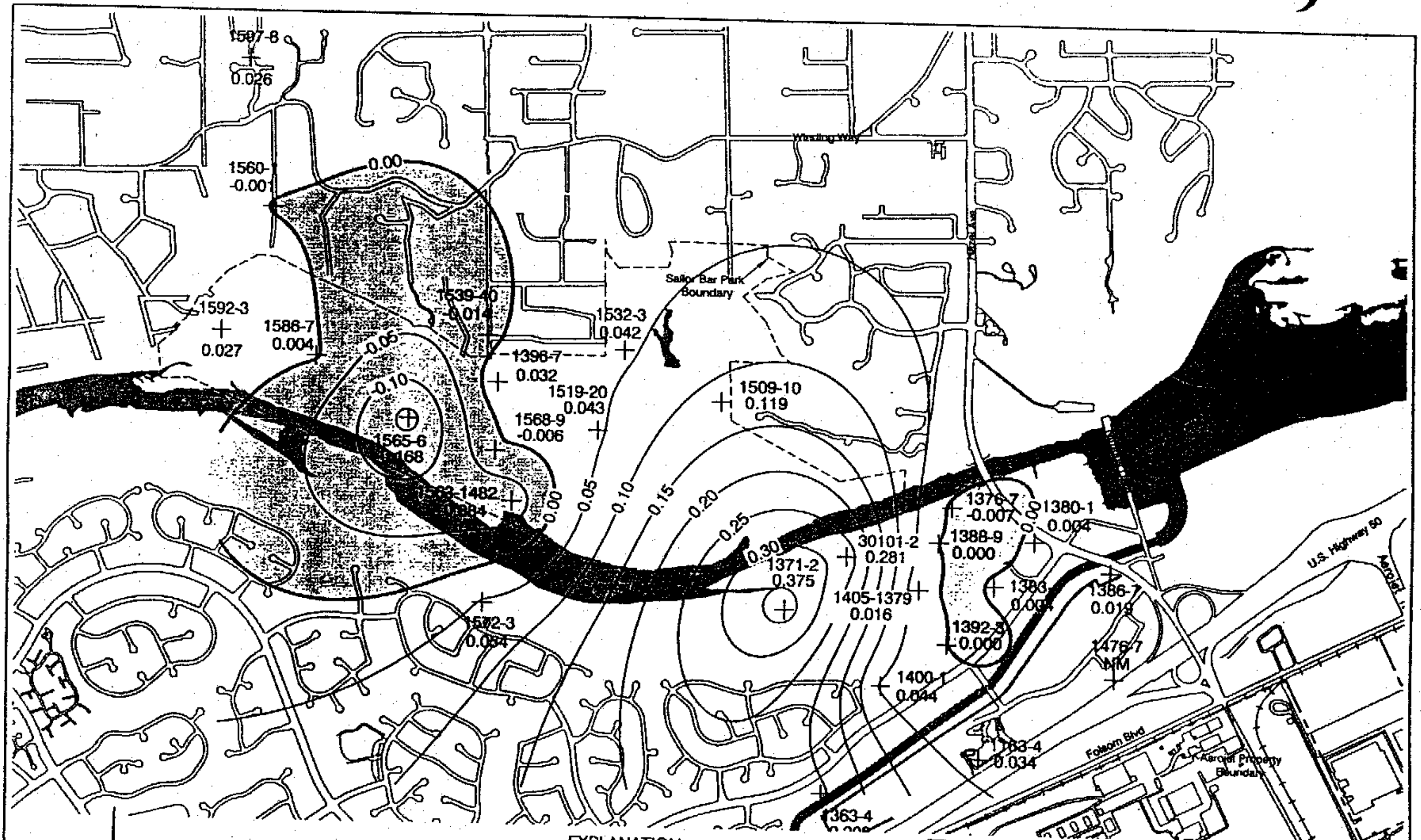
FIGURE 3-24

American River Study Area
Contour Map of Vertical Gradient between
Aquifers B and C, April 1998



EXPLANATION

+ Monitor Well

—0.00— Vertical Gradient Contour (ft/ft) (Negative is Upwards)

▨ Area of Upward Gradient

N

Scale: 1" = 1500'

0 750 1500

2/9/00 ah SR10109256

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FIGURE 3-25

American River Study Area
Contour Map of Vertical Gradient between
Aquifers B and C, April 1999

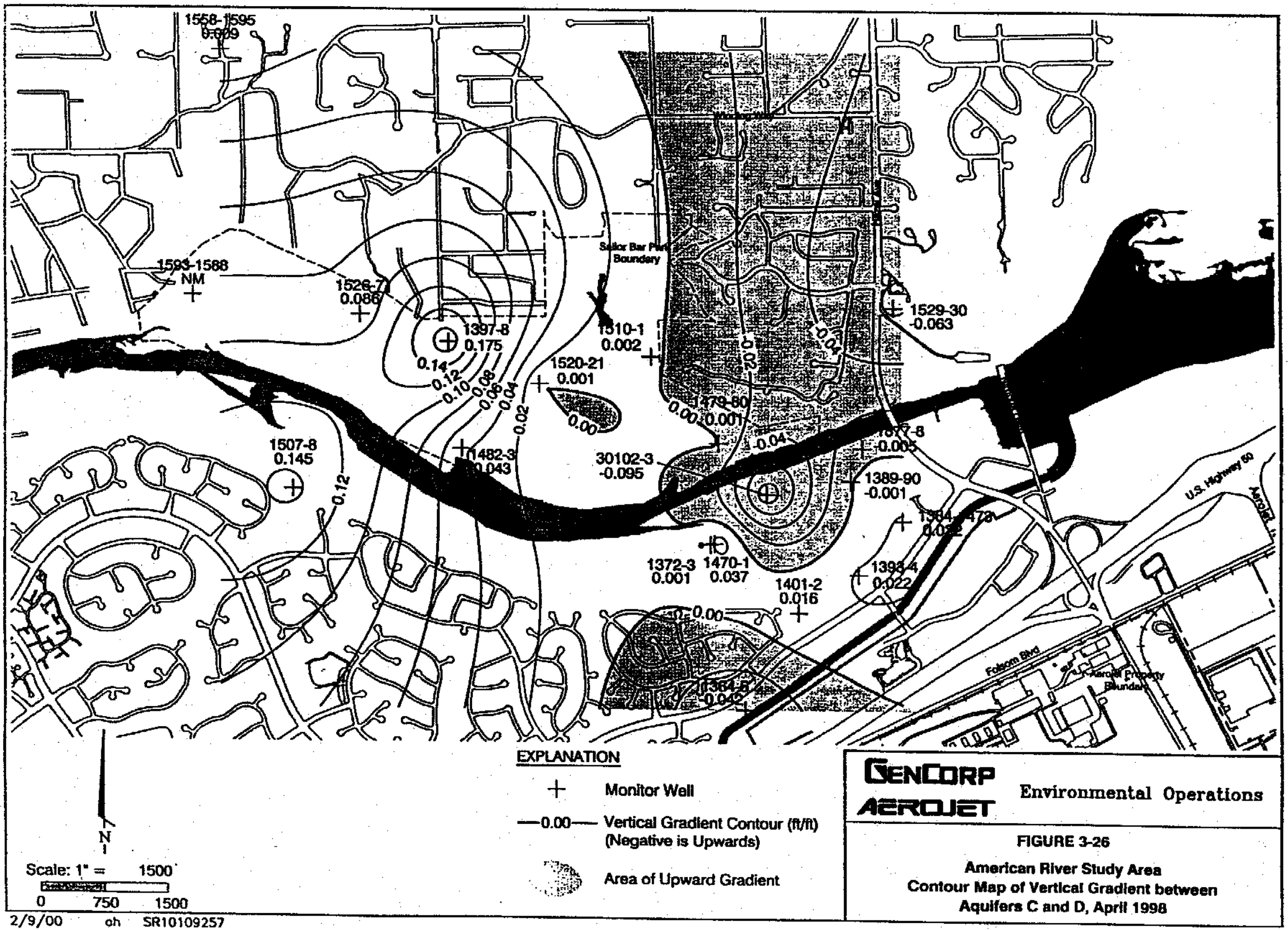

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FIGURE 3-26

American River Study Area
Contour Map of Vertical Gradient between
Aquifers C and D, April 1998

2/9/00 oh SR10109257

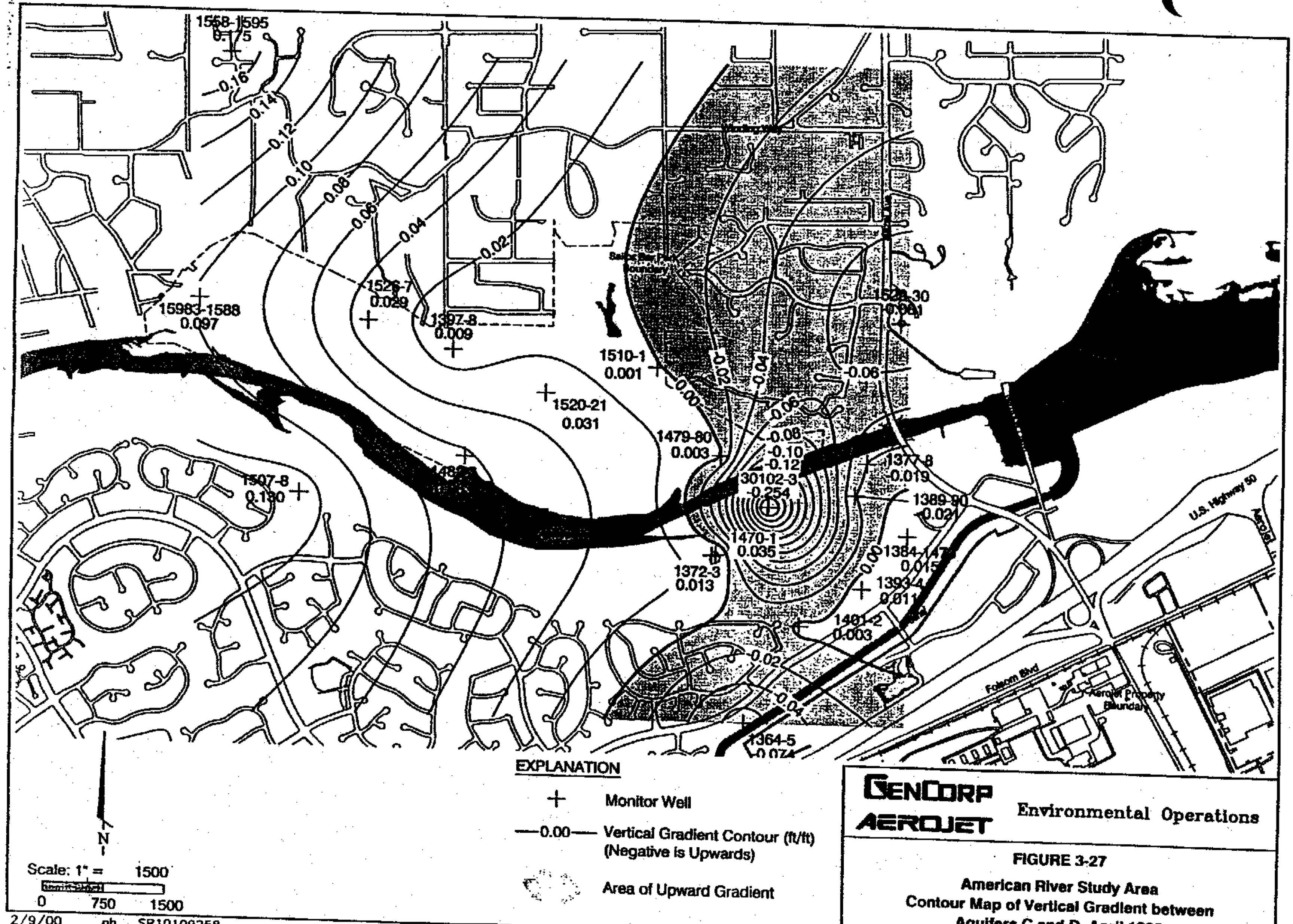

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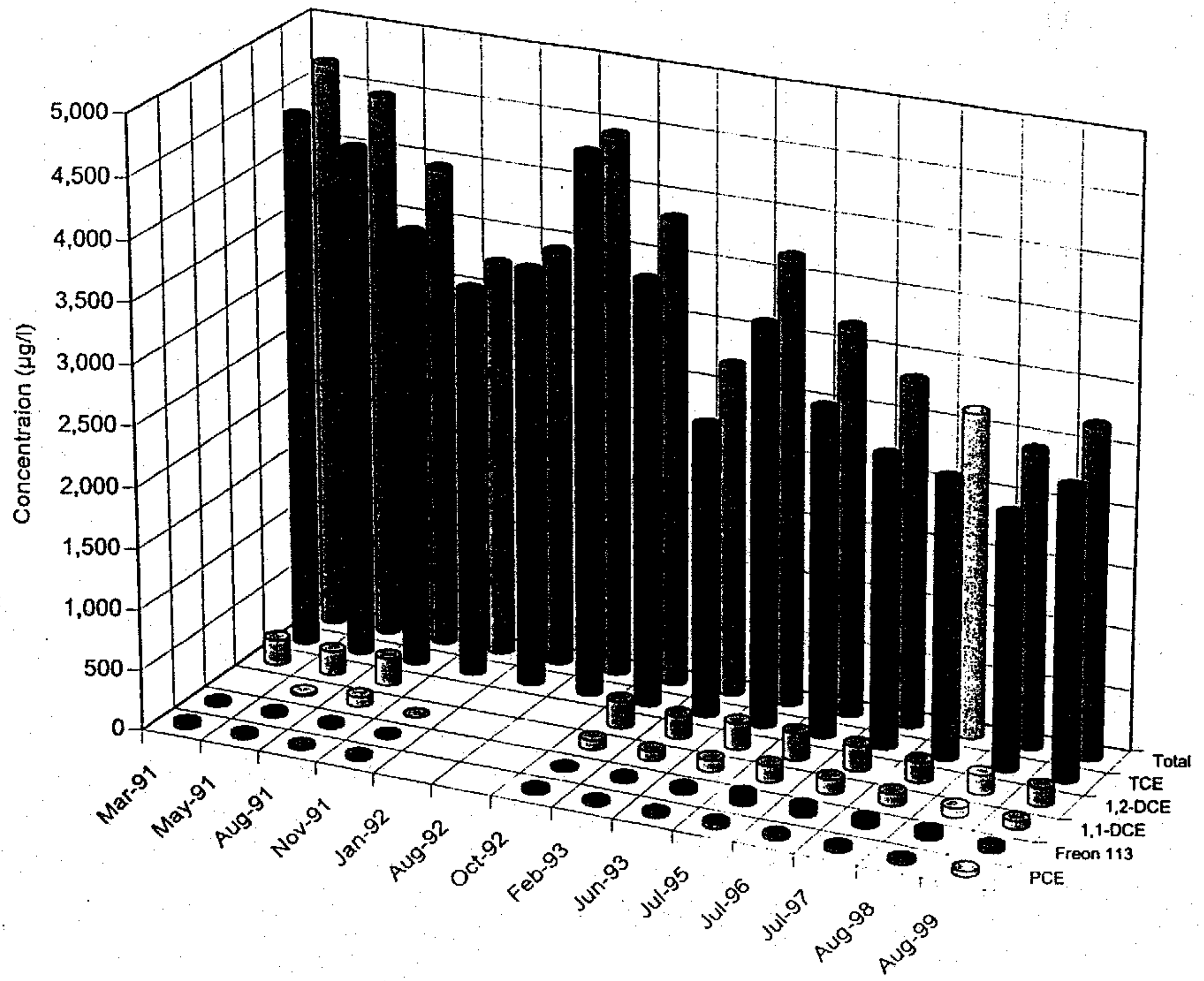
FIGURE 3-27

American River Study Area
Contour Map of Vertical Gradient between
Aquifers C and D, April 1999

Figure 3-28

Well 1405 - VOC Trend in Groundwater (µg/l)



2/10/2000

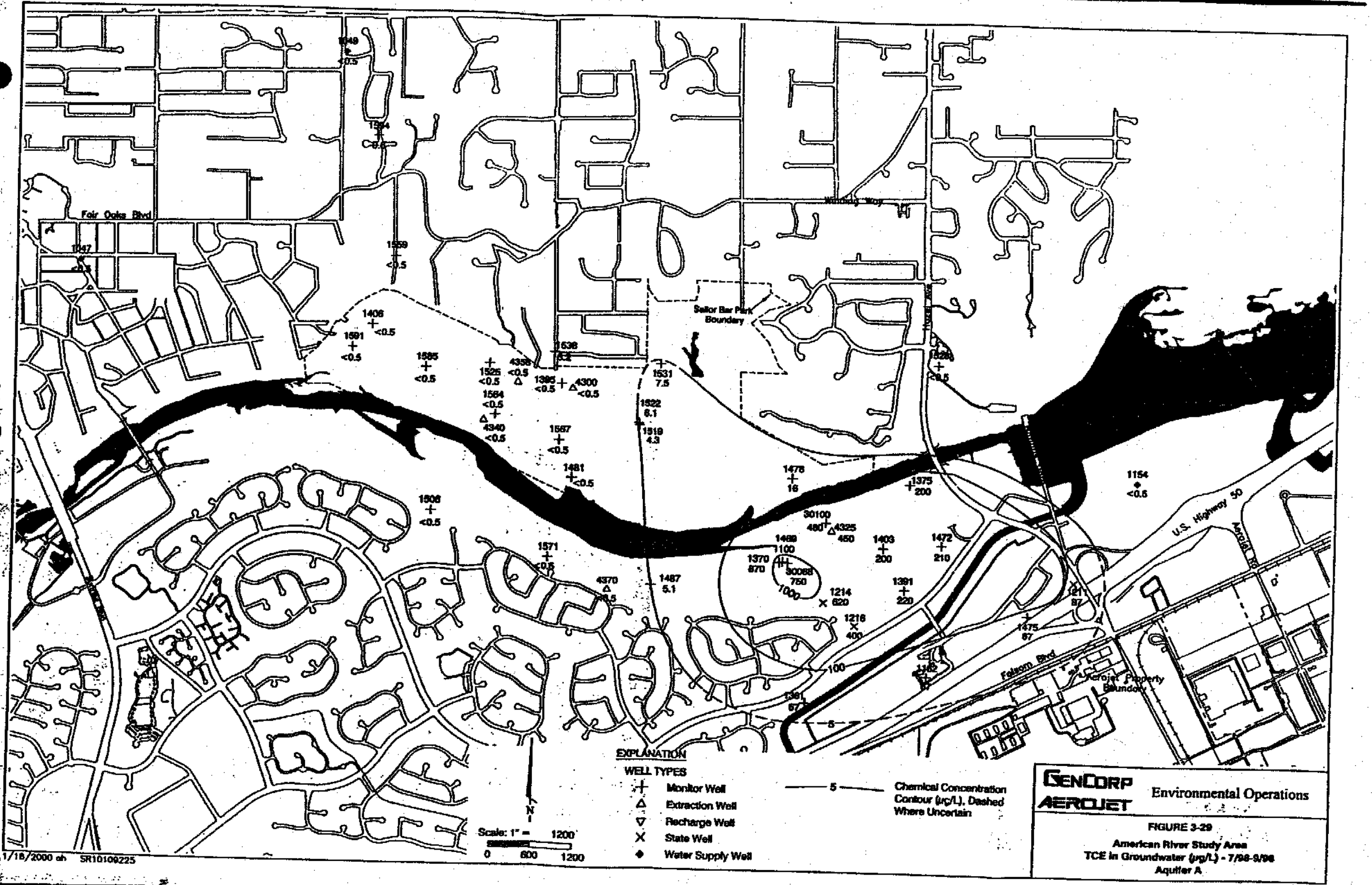


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FIGURE 3-29

American River Study Area
TCE in Groundwater (µg/L) - 7/98-9/98
Aquifer A

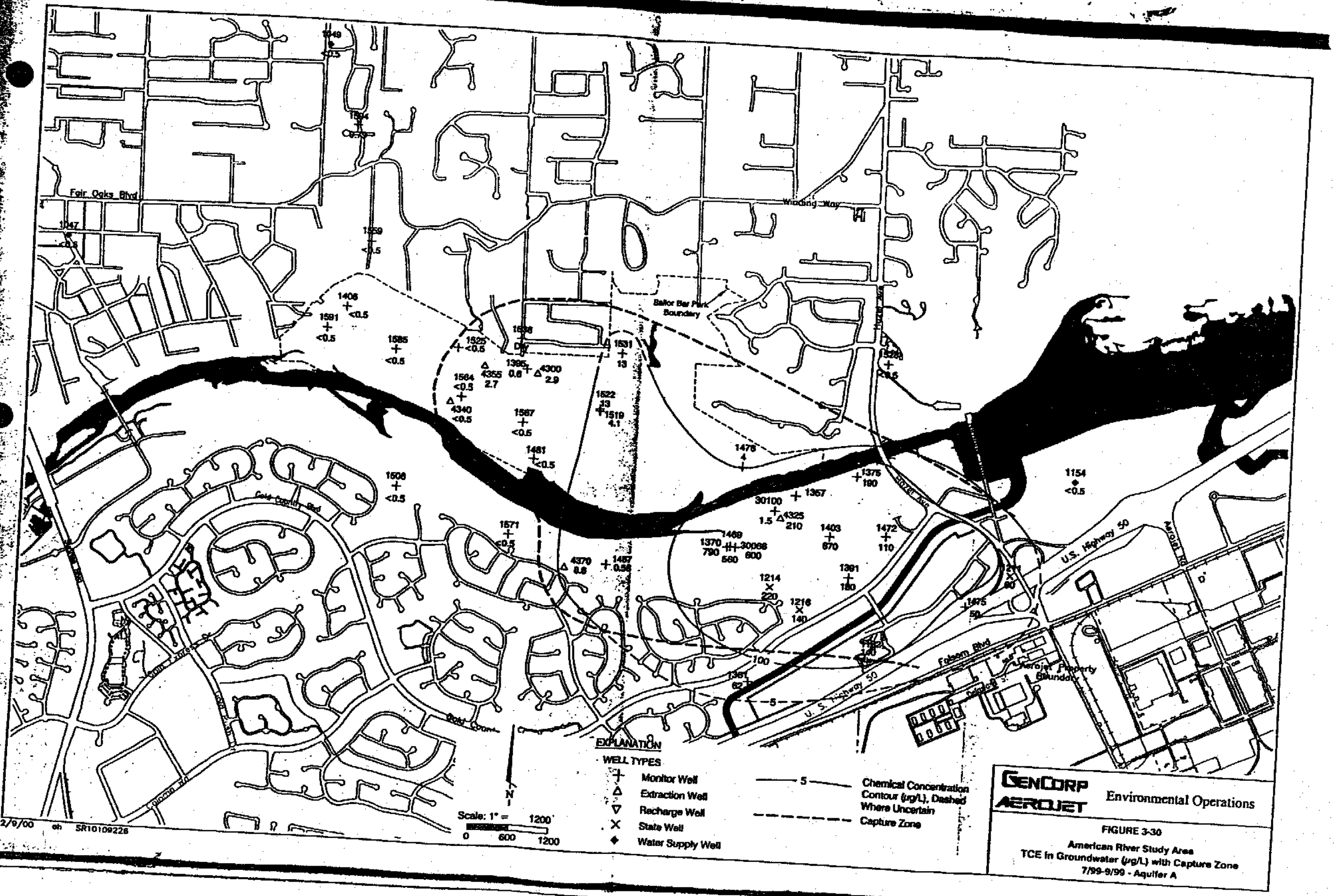

FIGURE 3-30

American River Study Area
TCE in Groundwater (µg/L) with Capture Zone
7/99-9/99 - Aquifer A

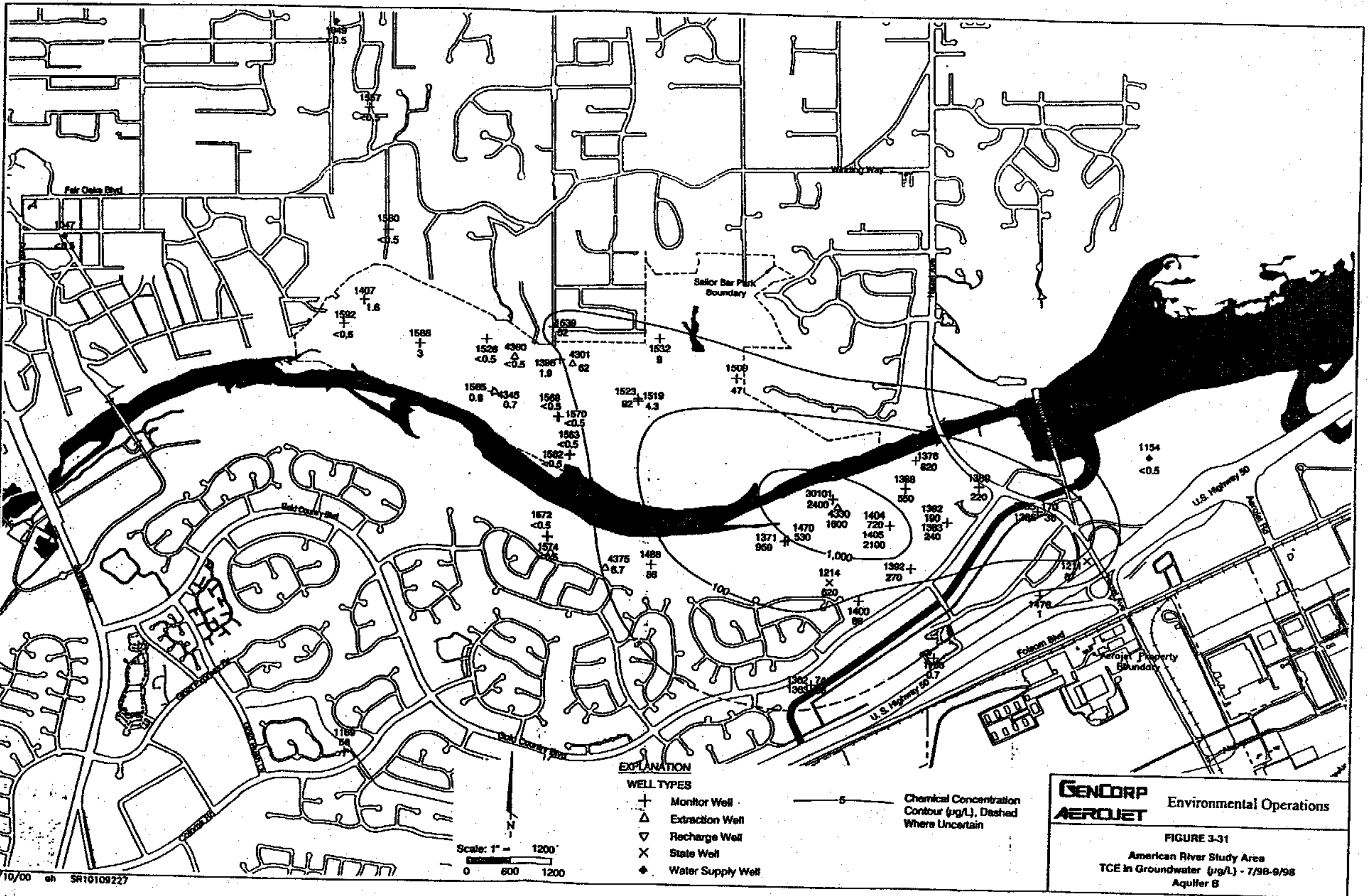

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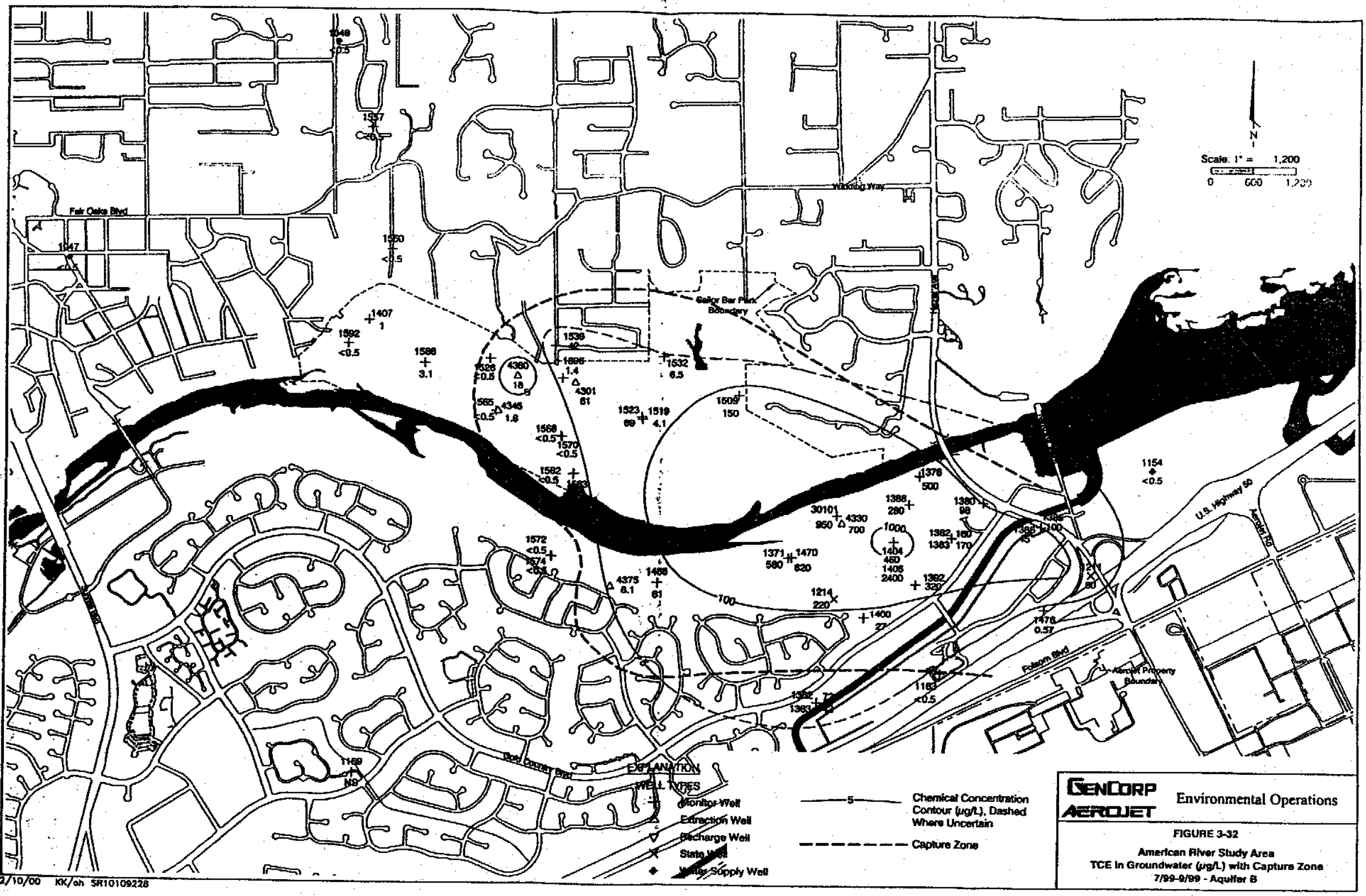
FIGURE 3-31

American River Study Area
TCE in Groundwater (µg/L) - 7/98-9/98
Aquifer B



Environmental Operations

FIGURE 3-32

American River Study Area
TCE in Groundwater (µg/L) with Capture Zone
7/99-9/99 - Aquifer B

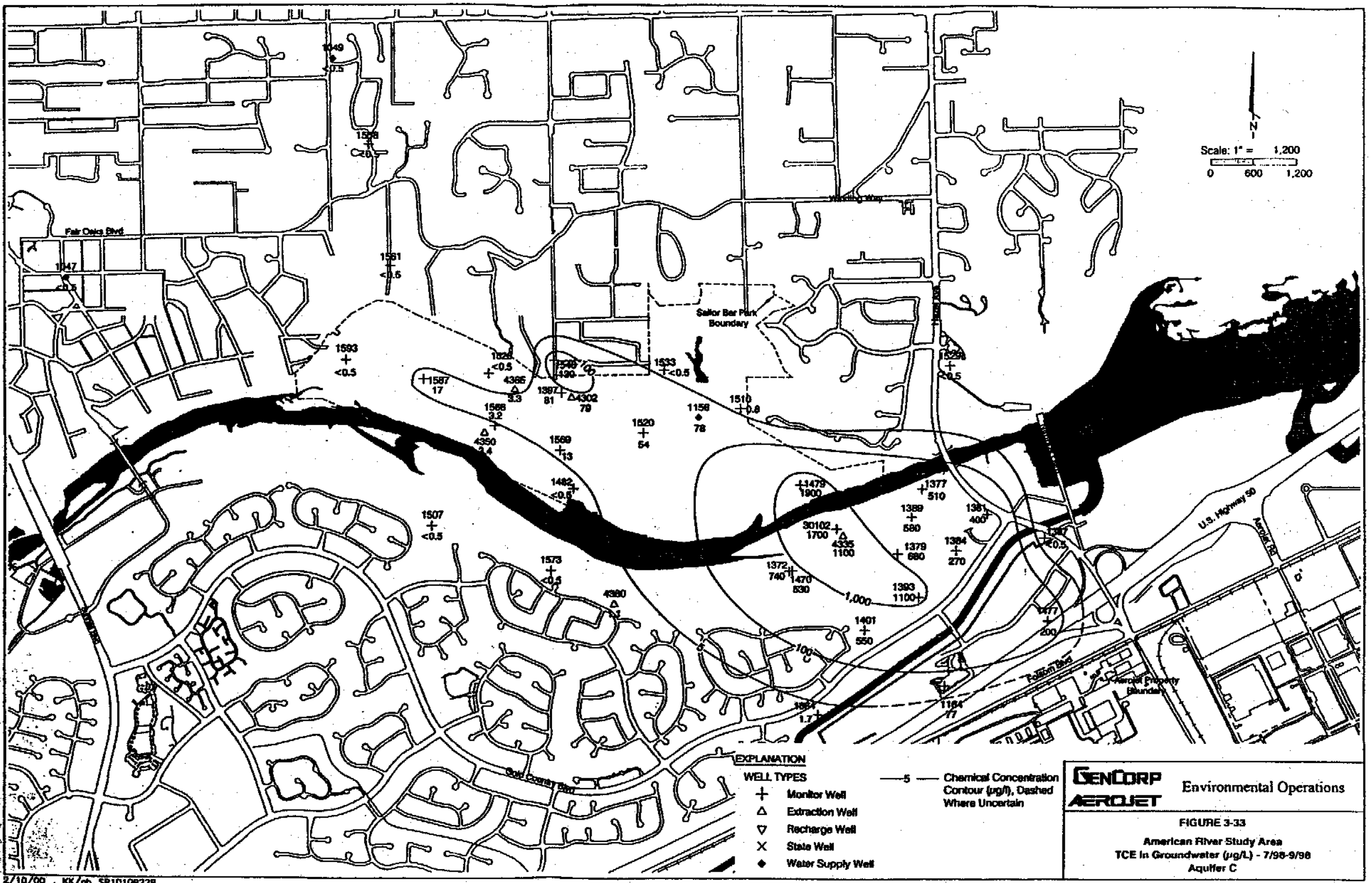


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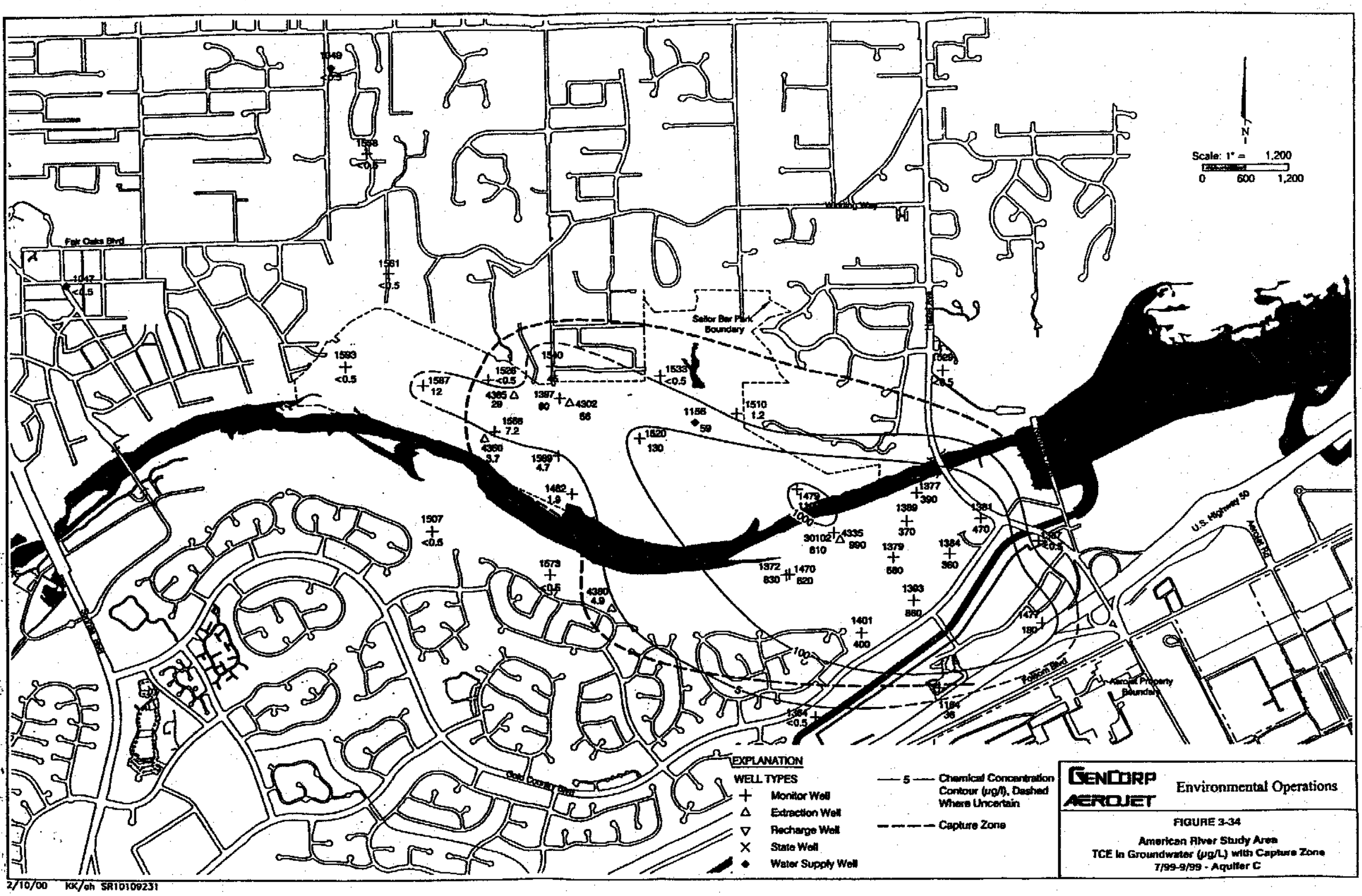
FIGURE 3-33

American River Study Area
TCE in Groundwater ($\mu g/L$) - 7/98-9/98
Aquifer C

2/10/00 KK/ch SR10109229

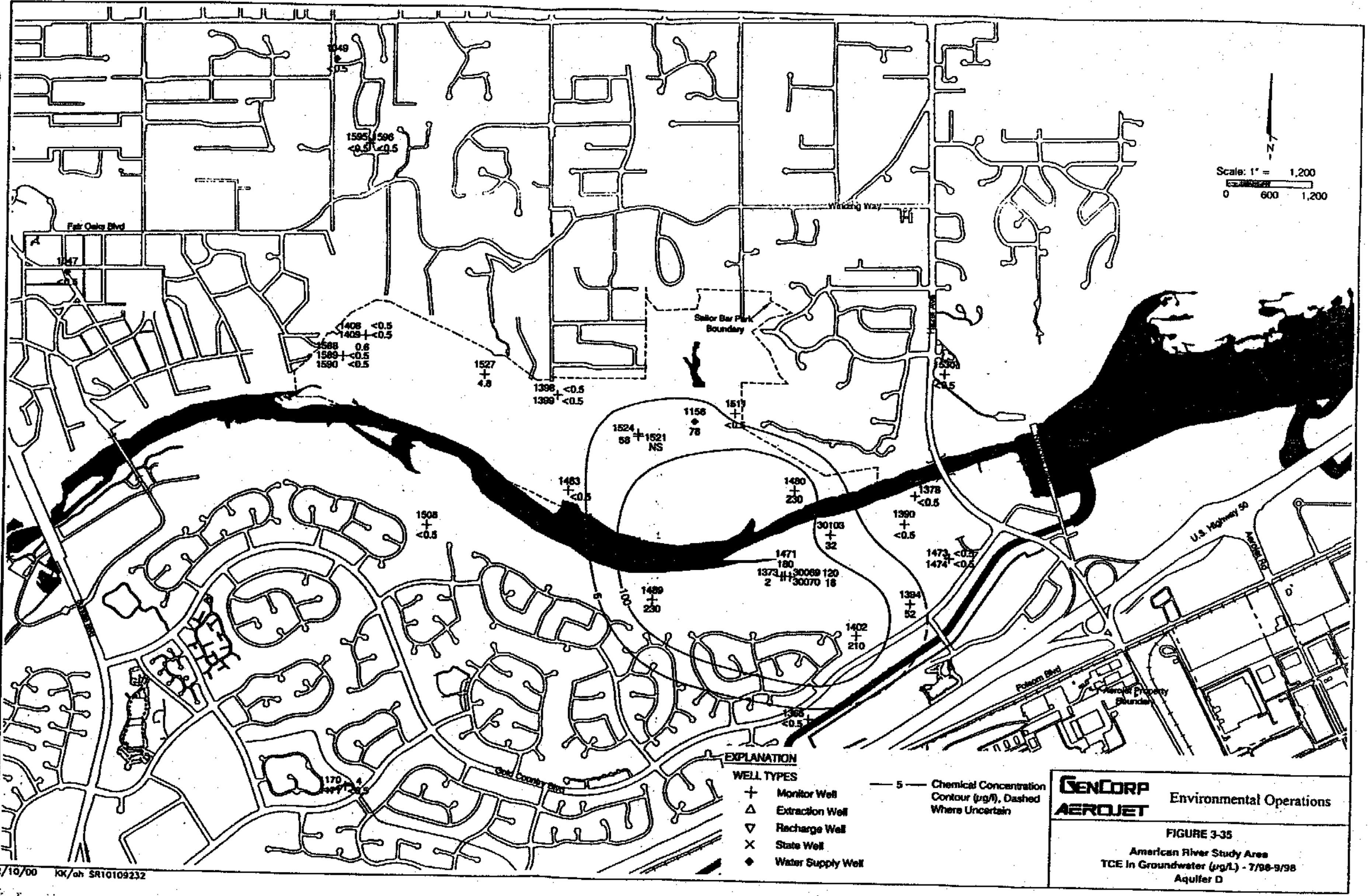


Environmental Operations

FIGURE 3-34

American River Study Area
TCE in Groundwater (µg/L) with Capture Zone
7/99-9/99 - Aquifer C

2/10/00 KK/sh SR10109231



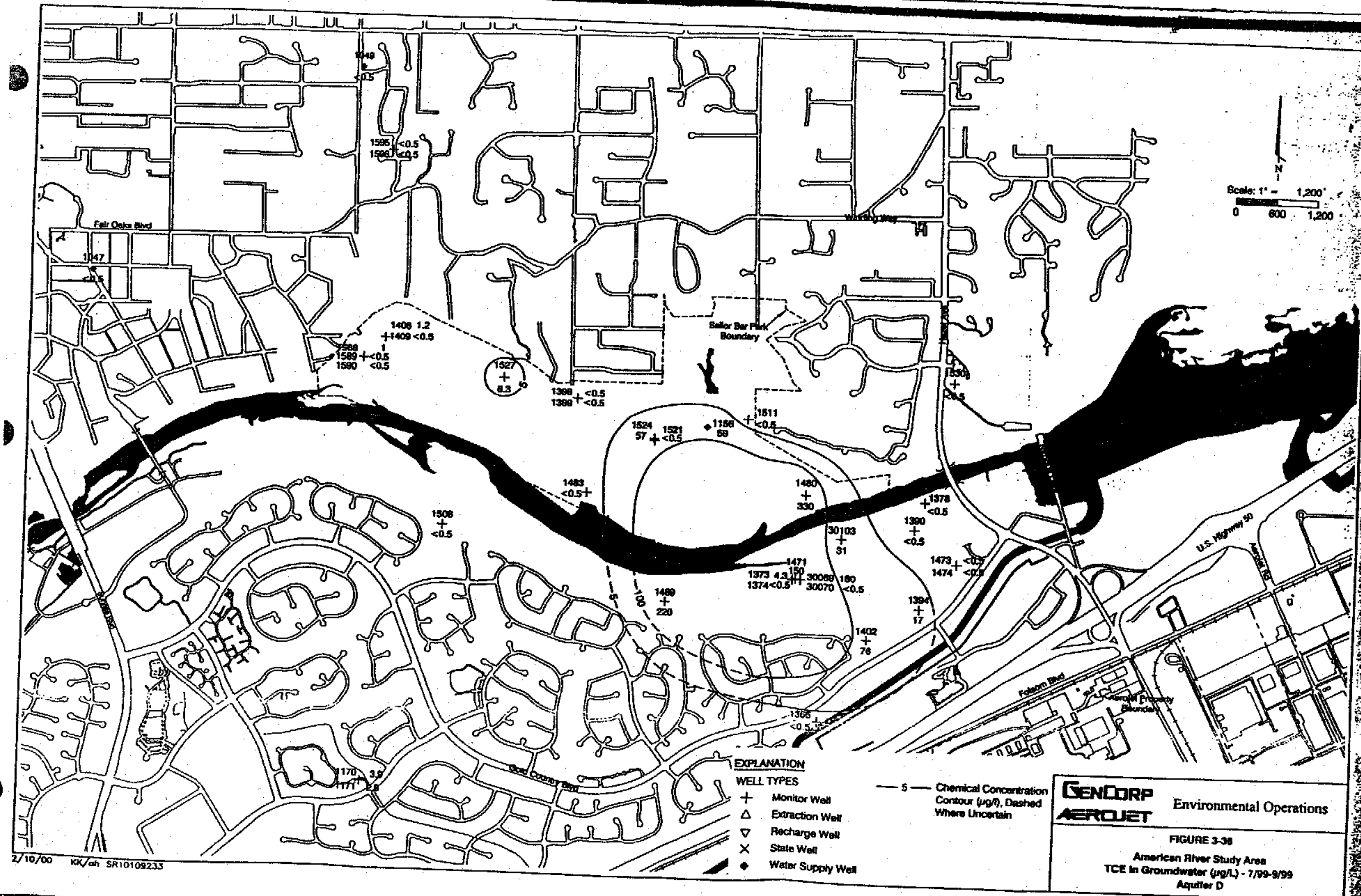
GENCORP
AEROJET

Environmental Operations

FIGURE 3-35

American River Study Area
TCE in Groundwater (µg/L) - 7/98-9/98
Aquifer D

2/10/00 KK/oh SR10109232



GENCORP
AEROJET

Environmental Operations

FIGURE 3-36

American River Study Area
TCE in Groundwater (µg/L) - 7/99-9/99
Aquifer D

2/10/00 KK/ah SR10109233

Figure 3-37
VOC Trend Wells 1531-33

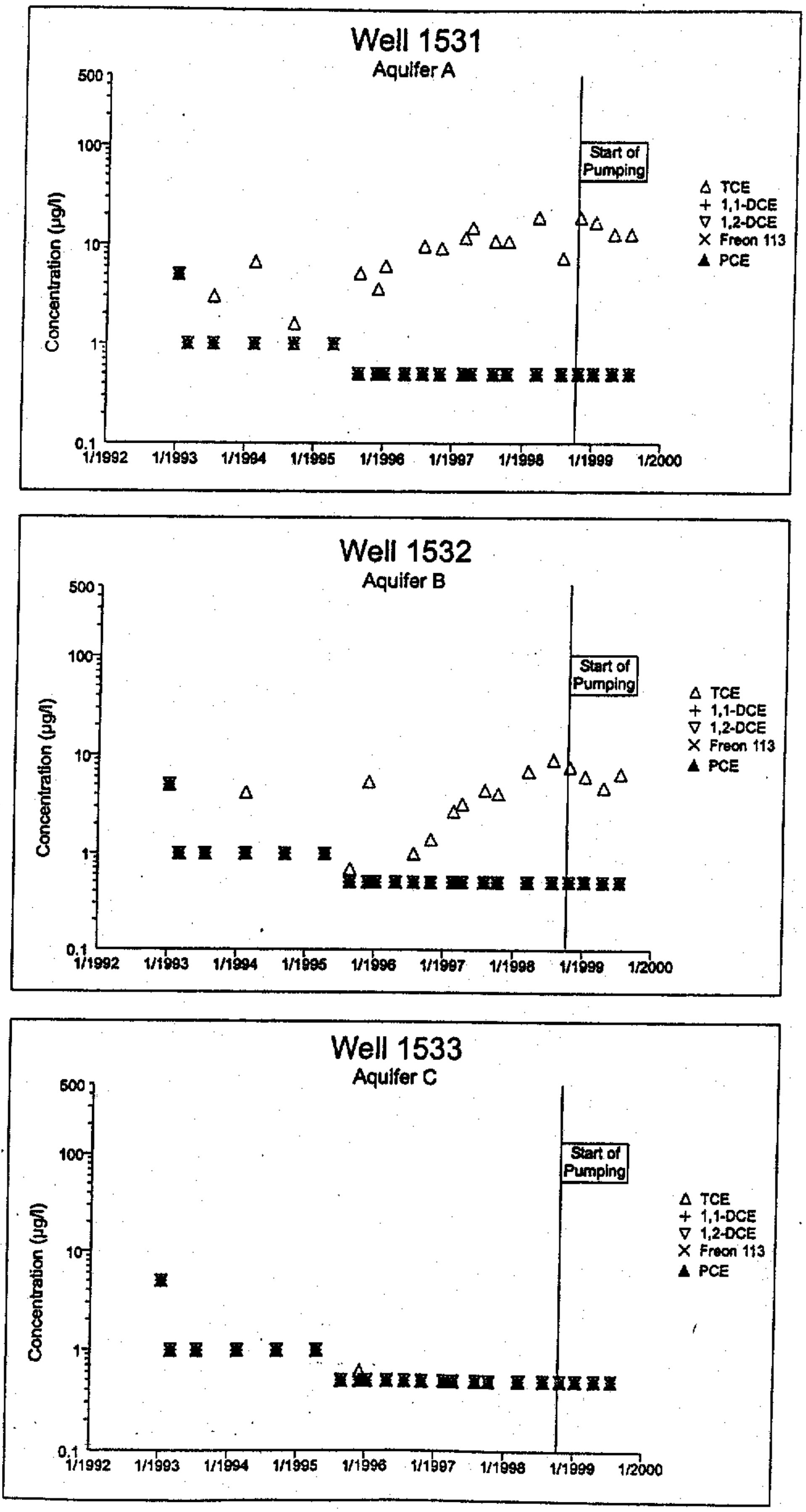


Figure 3-38
VOC Trend Wells 1538-40

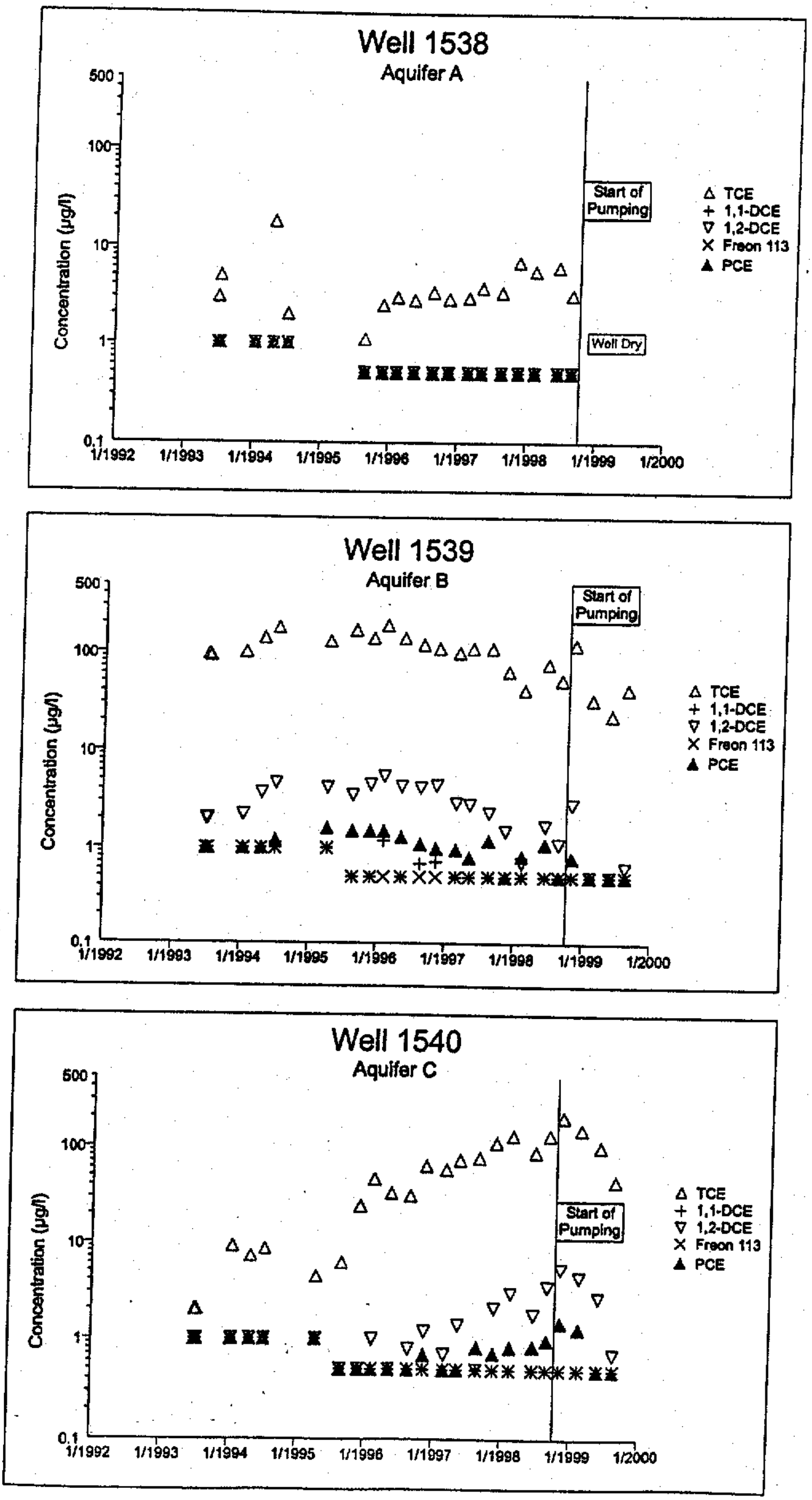


Figure 3-39
VOC Trend Wells 1525-27

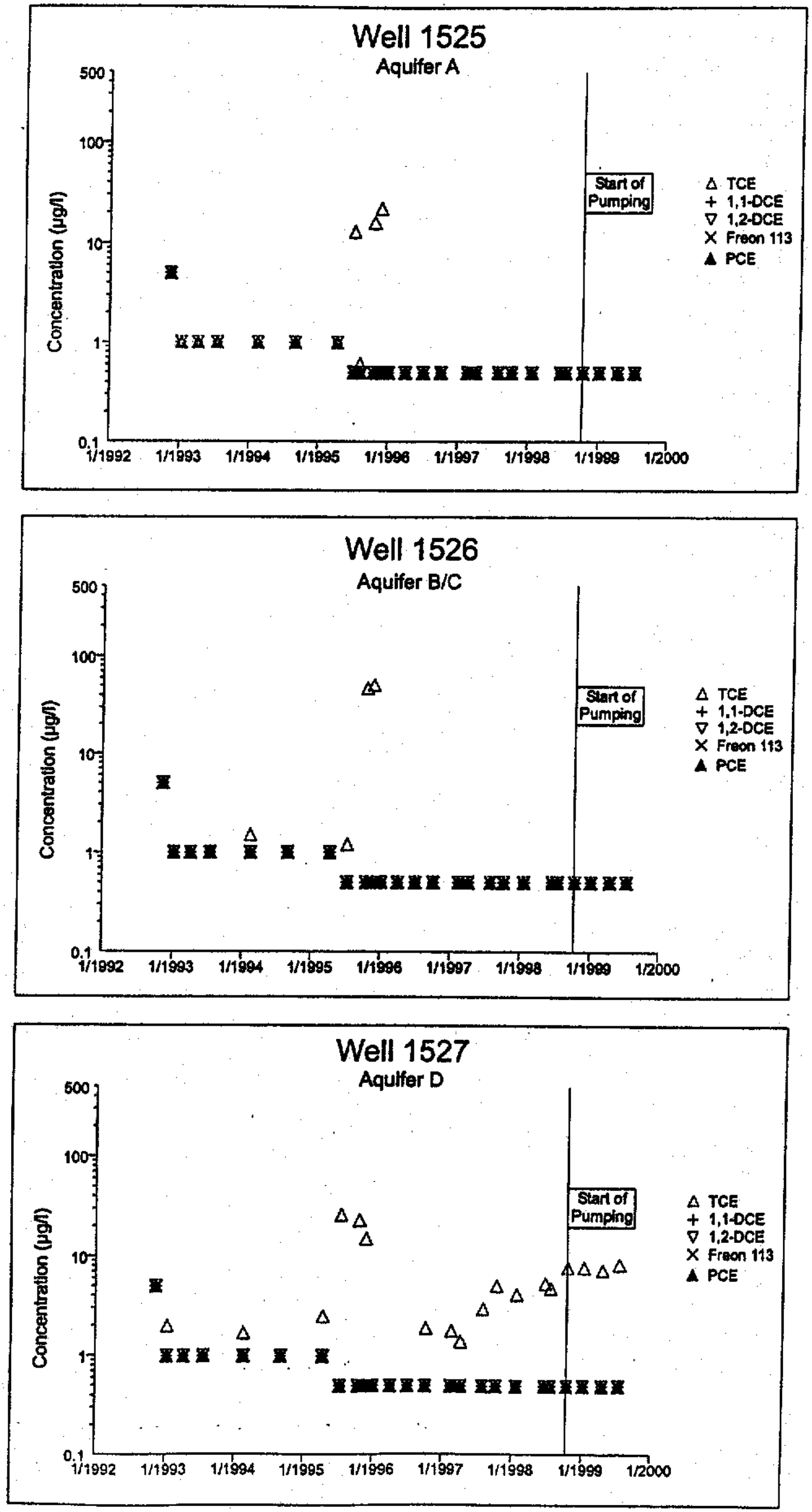


Figure 3-40
VOC Trend Wells 1585-87

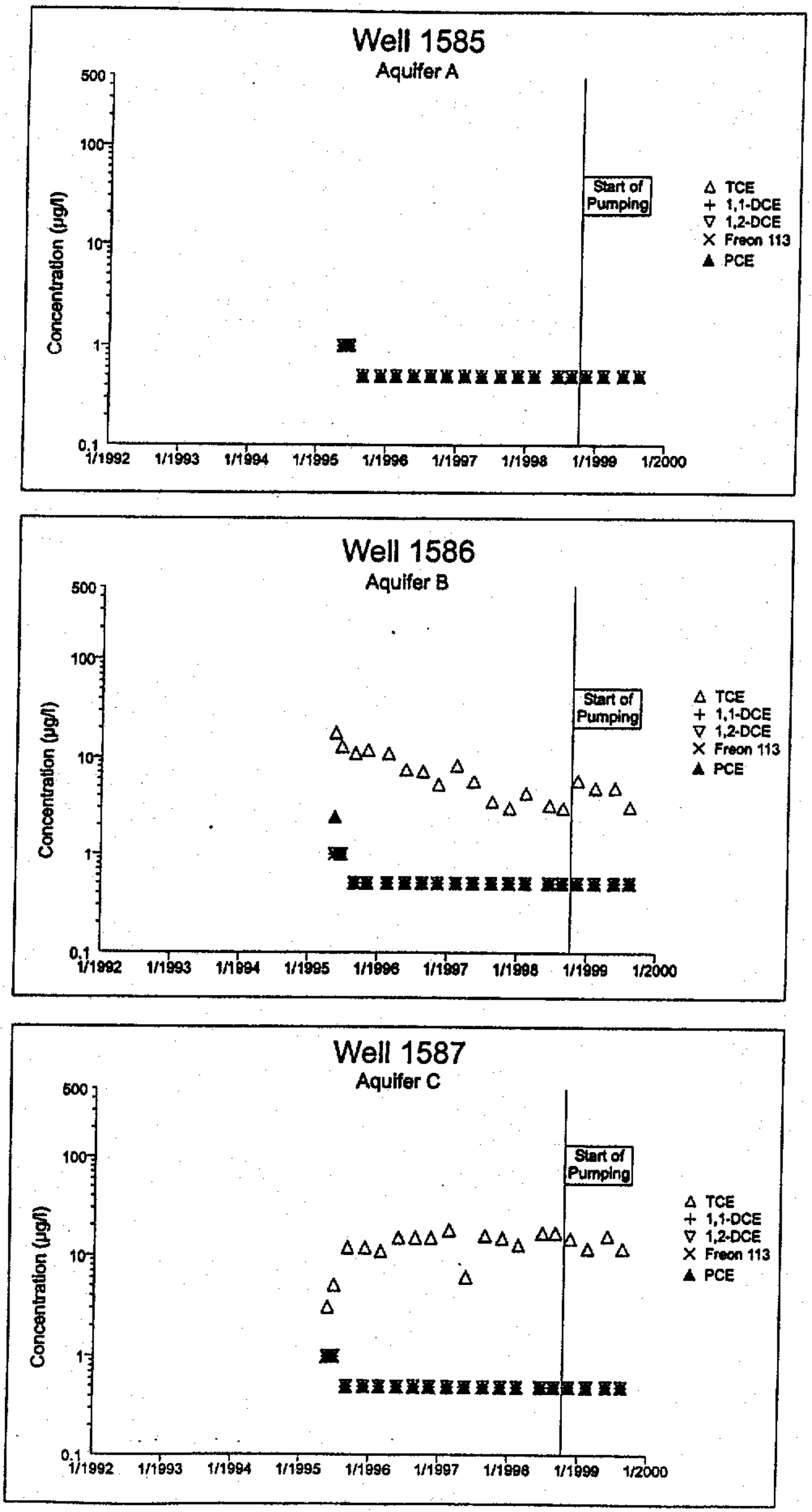


Figure 3-41
VOC Trend Wells 1509-11

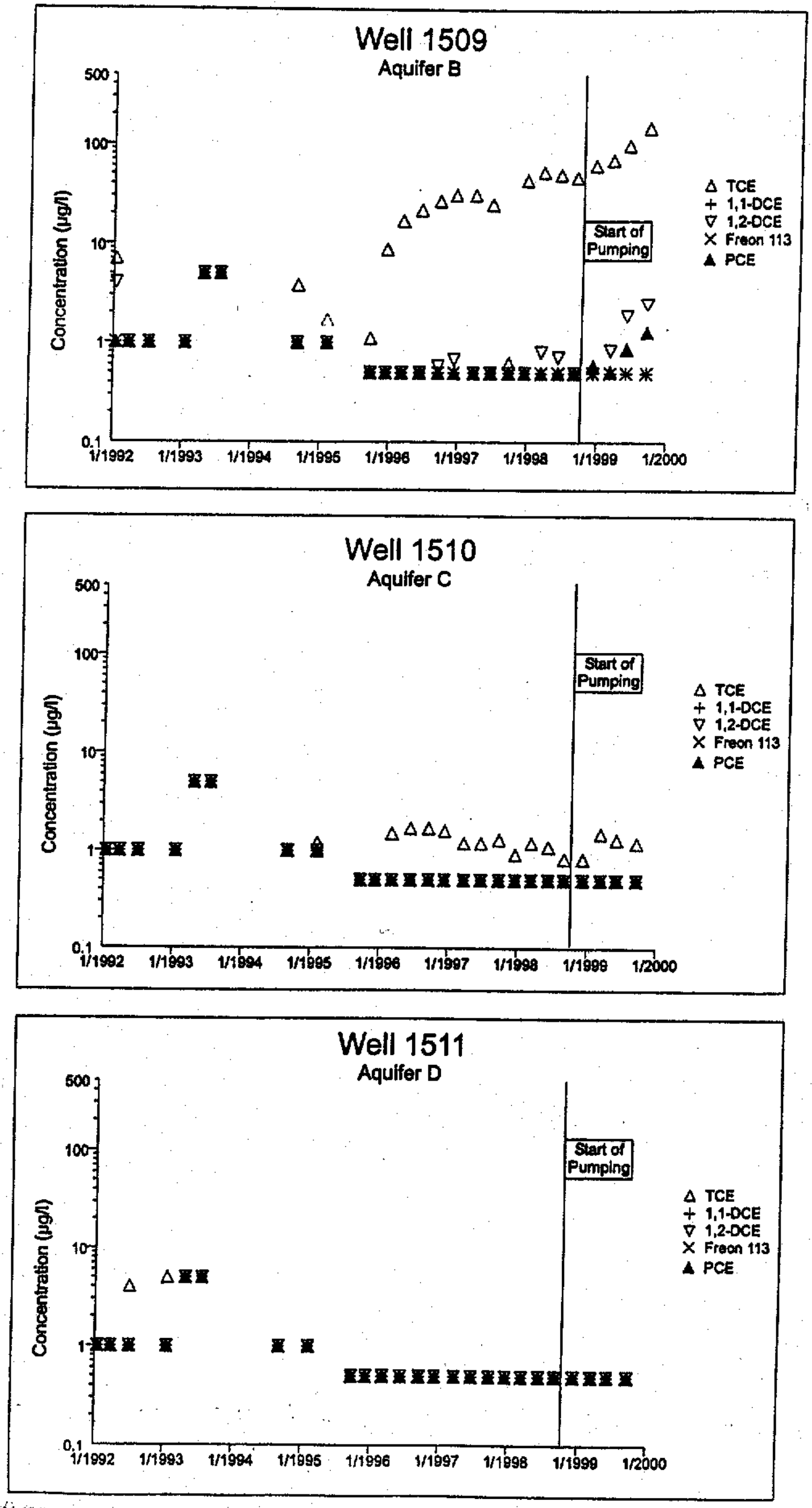


Figure 3-42
VOC Trend Selected Aquifer D Wells

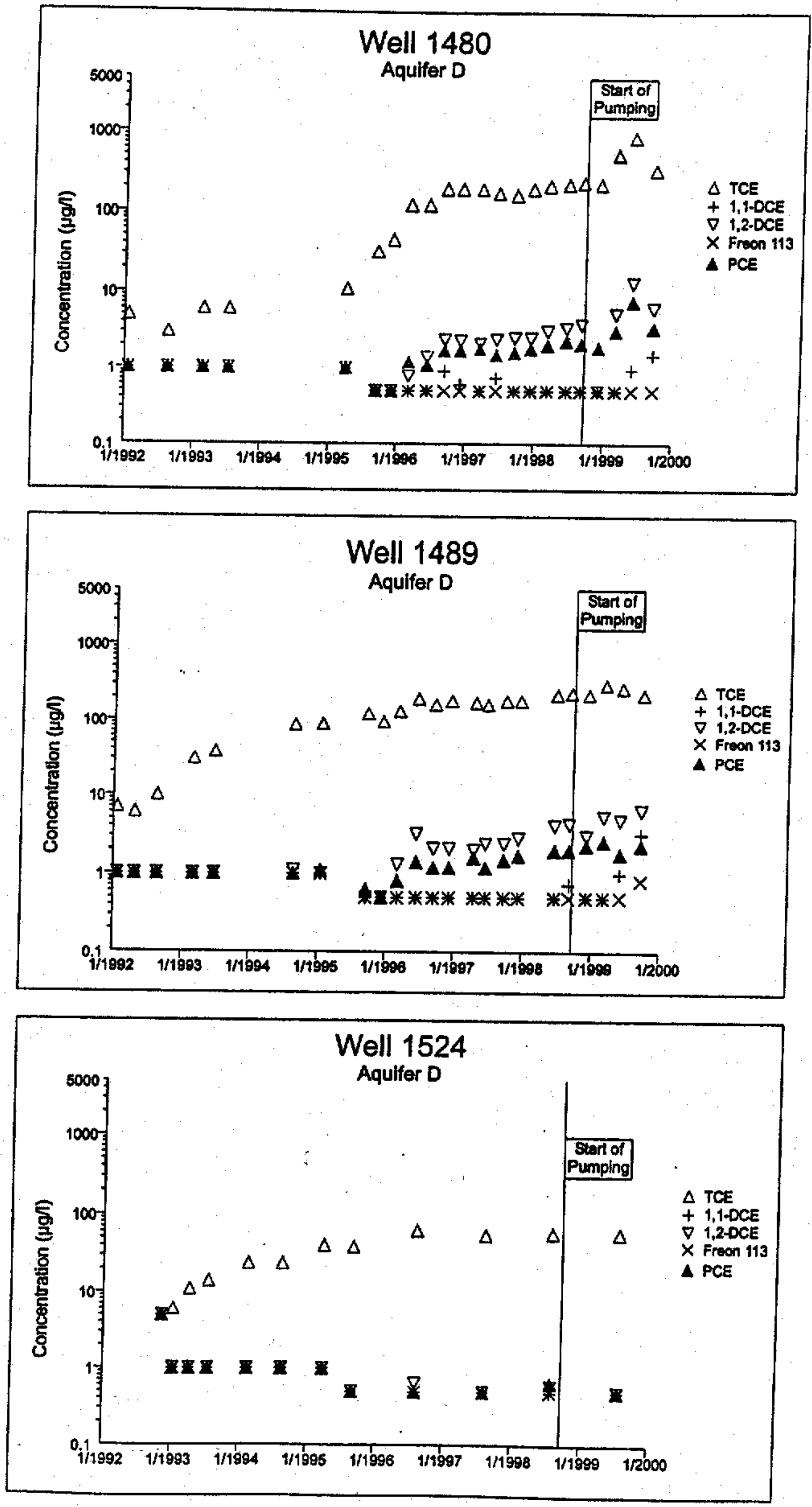


Figure 3-43
VOC Trend Selected Aquifer D Wells

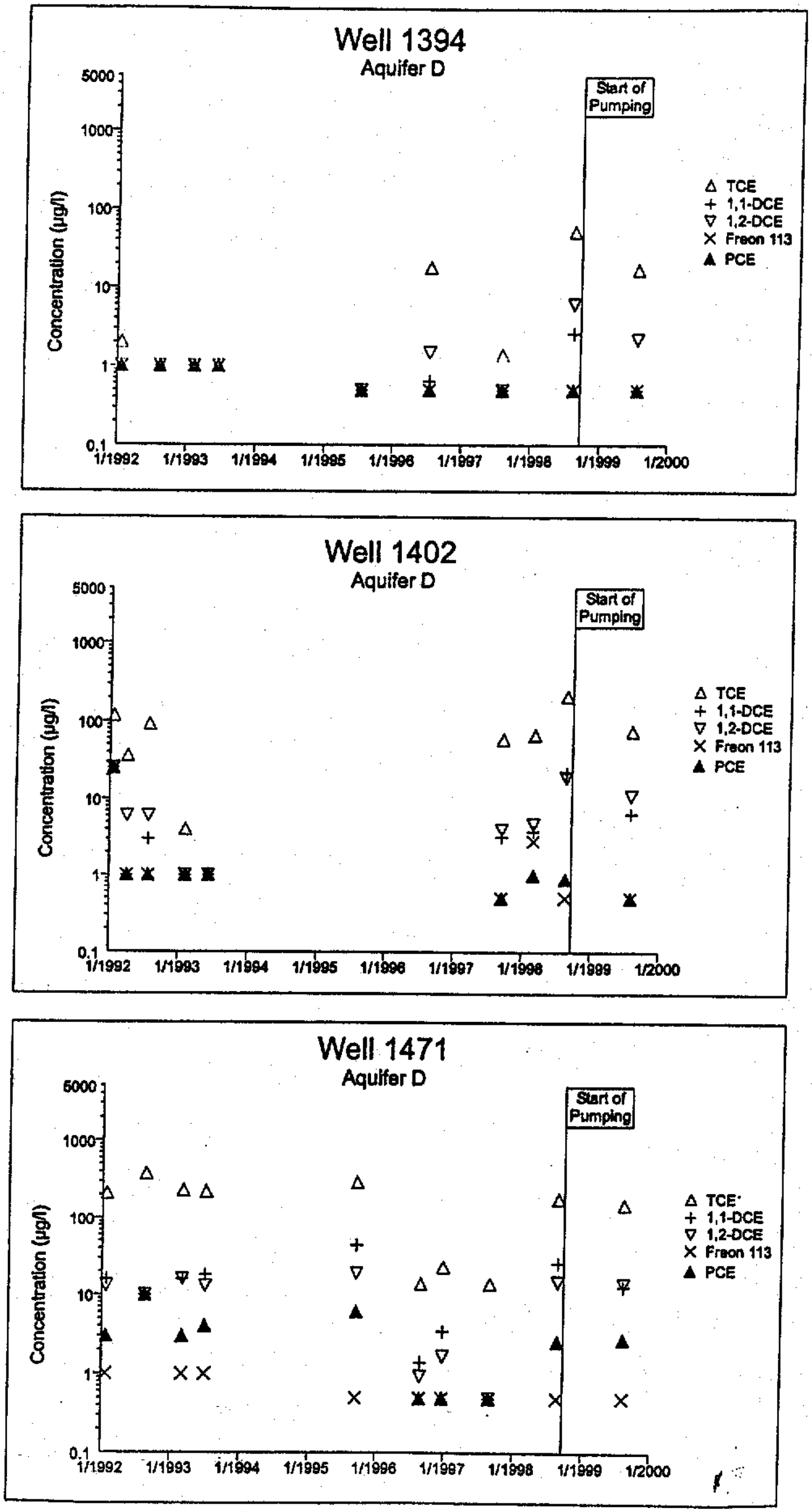


Table 2-1
American River Study Area
Flow Rates for Extraction Wells and Treatment Plant
August 1998 - August 1999

Well	Millions of Gallons Pumped	Average Flow Rate (gpm)	Aquifer
4300	137.8	262	A
4301	77.0	147	B
4302	12.2	23	C
4325	77.0	147	A
4330	110.0	209	B
4335	97.9	186	C
4340	4.7	9	A
4345	198.6	378	B
4350	18.8	36	C
4355	215.0	409	A
4360	182.4	347	B
4365	26.0	49	C
4370	158.8	302	A
4375	93.8	178	B
4380	29.4	56	C
Totals:	1,439.3	2,739	
Aquifer A	593.3	1,129	
Aquifer B	661.8	1,259	
Aquifer C	184.2	351	
Treatment Plant Sample Points			
7065 (influent)	271.8	517	Wells 4325, 4330, 4335
7067 (influent)	1,007.7	1,917	Remaining 12 Wells
7069 (effluent)	1,311.3	2,495	Combined effluent

Table 2-2
American River Study Area
Comparison of Estimated and Actual
ARGET Influent and Effluent Concentrations and Air Emission Rates

Chemical	Estimated Influent Concentration (µg/l) At Start-up 7065	Actual Influent Concentration (µg/l) 7065	Estimated Influent Concentration (µg/l) At Start-up 7067	Actual Influent Concentration (µg/l) 7067	Estimated Emission Rates (lb/day)	Actual Emission Rates (lb/day)
1,4-DIOXANE	12	16	<10	<10	NA	NA
TRICHLOROETHYLENE	993	904	31	11	1.49	0.21
1,2-DICHLOROETHYLENE	57	74	0.5	<0.5	0.07	0.00
1,1-DICHLOROETHYLENE	43	52	<0.5	<0.5	0.05	0.00
FREON 113*	20	27	<0.5	<0.5	0.14	0.38
TETRACHLOROETHYLENE	16	14	<0.5	<0.5	0.02	0.00
CHLOROFORM	7	5	<0.5	<0.5	0.05	0.05
1,1-DICHLOROETHANE	3	6	<0.5	<0.5	0.02	0.06
1,2-DICHLOROETHANE	2	3	<0.5	<0.5	0.00	0.00
1,1,1-TRICHLOROETHANE*	1	<0.5	<0.5	<0.5	0.00	0.00
CARBON TETRACHLORIDE	<0.5	2	<0.5	<0.5	0.00	0.01
AIR EMISSION RATE					1.84	0.71
TOTALS ROCS (LBS/DAY)					1.70	0.33
FLOW RATE (GPM)					3,445	2,740

- * - not considered as ROCs
- () –Influent sampling location

Table 3-2
American River Study Area
Summary of Water Level Changes

Well No.	Aquifer	Water Level Change (feet)		
		Apr-98 - Apr-99	Oct-98 - Oct-99	Apr-98 - Oct-99
1162	A	-2.6	-4.7	-7.8
1211	A	-6.4	-4.4	-9.7
1214	A	-3.4	-2.6	-6.2
1216	A	-2.9	-3.3	-6.7
1361	A	-1.4	-4.6	-5.7
1370	A	-3.7	-1.8	-5.7
1375	A	-1.4	0.4	-2.3
1391	A	-3.1	-3.2	-6.5
1395	A	-17.7	-4.3	-20.7
1403	A	-3.9	-2.2	-6.1
1406	A	-6.7	-4.5	-10.4
1469	A	-2.9	-1.4	-4.8
1472	A	-2.7	-2.7	-5.2
1475	A	NM	-4.8	-7.5
1478	A	-2.8	-1.8	-5.0
1481	A	-4.5	-1.5	-7.5
1487	A	-3.3	-1.7	-4.9
1506	A	-6.5	-3.9	-9.9
1519	A	-6.4	-3.6	-9.8
1522	A	-6.3	-3.7	-9.7
1525	A	-13.9	-5.0	-17.0
1528	A	0.0	-1.9	-1.6
1531	A	-7.0	-4.7	-10.2
1538	A	Dry	Dry	Dry
1559	A	-5.8	-4.1	-8.9
1564	A	-14.3	-3.7	-16.9
1567	A	-9.7	-3.2	-13.1
1571	A	-4.2	-1.8	-6.2
1585	A	-8.6	-4.5	-12.1
1591	A	NM	-4.4	NM
1594	A	-3.5	-3.9	-6.2
30068	A	-3.8	-1.6	-5.8
30100	A	-6.6	-1.2	-8.0
	Maximum	0.0	0.4	-1.6
	Minimum	-17.7	-5.0	-20.7
	Average	-5.5	-3.1	-8.3
1163	B	-2.6	-4.7	-7.9
1169	B	-2.5	NM	NM
1211	B	-6.4	-4.4	-9.7
1214	B	-3.4	-2.6	-6.2
1362	B	-1.5	-4.7	-6.0
1363	B	-1.4	-4.9	-6.8
1371	B	-3.7	-1.9	-5.8
1376	B	-2.0	-0.2	-3.2
1380	B	-2.9	-2.1	-5.0
1382	B	-2.7	-2.7	-5.5
1383	B	-3.0	-2.7	-5.9
1385	B	-3.0	-5.3	-7.8
1386	B	-3.0	-1.1	-3.8
1388	B	-2.8	-4.2	-4.4

Table 3-2
American River Study Area
Summary of Water Level Changes

Well No.	Aquifer	Water Level Change (feet) Apr-98 - Apr-99	Oct-98 - Oct-99	Apr-98 - Oct-99
1392	B	-3.2	-3.3	-6.5
1396	B	-16.7	-4.0	-19.6
1400	B	-3.3	-3.1	-6.7
1404	B	-3.9	-2.1	-6.3
1405	B	-3.8	-2.3	-6.3
1407	B	-6.6	-4.6	-10.3
1470	B	-7.3	-2.8	-11.9
1476	B	NM	-4.7	-7.3
1488	B	-3.5	-1.5	-5.3
1509	B	-3.9	-3.6	-7.1
1519	B	-6.4	-3.6	-9.8
1523	B	-7.0	-3.3	-10.1
1526	B	-13.7	-4.6	-16.7
1532	B	-6.9	-4.8	-10.1
1539	B	-13.5	-4.5	-16.1
1557	B	-3.2	-3.4	-6.1
1560	B	-5.8	-4.2	-9.0
1562	B	-8.1	-2.7	-11.2
1563	B	-8.1	-3.5	-11.2
1565	B	-23.6	-4.1	-26.5
1568	B	-9.6	-3.0	-12.7
1570	B	-9.4	-1.9	-12.5
1572	B	-4.7	-2.1	-7.1
1574	B	-4.3	-1.9	-6.4
1586	B	-8.3	-4.4	-11.8
1592	B	NM	-4.5	NM
30101	B	-7.4	-1.6	-8.8
	Maximum	-1.4	-0.2	-3.2
	Minimum	-23.6	-5.3	-26.5
	Average	-6.0	-3.3	-9.0
1164	C	-1.7	-3.6	-6.3
1364	C	-2.5	-4.1	-9.3
1372	C	-11.0	-3.9	-18.0
1377	C	-4.6	-2.4	-7.7
1379	C	-4.2	-2.6	-7.5
1381	C	-3.3	-2.5	-5.9
1384	C	-3.1	-2.8	-6.2
1387	C	-2.4	-3.0	-5.1
1389	C	-4.7	-2.5	-7.9
1393	C	-3.3	-3.3	-6.9
1397	C	-16.1	-3.3	-19.0
1401	C	-3.8	-3.2	-7.6
1470	C	-7.3	-2.8	-11.9
1477	C	NM	-4.1	-6.5
1479	C	-11.6	-6.0	-19.9
1482	C	-6.6	-10.6	-17.7
1507	C	-6.7	-3.8	-9.9
1510	C	-10.0	-7.3	-18.8
1520	C	-7.8	-4.4	-12.8
1526	C	-13.7	-4.6	-16.7

Table 3-2
American River Study Area
Summary of Water Level Changes

Well No.	Aquifer	Water Level Change (feet) Apr-98 - Apr-99	Oct-98 - Oct-99	Apr-98 - Oct-99
1529	C	-5.3	-3.9	-9.6
1533	C	-8.9	-6.5	-16.4
1540	C	-12.1	-4.7	-15.0
1558	C	-3.8	-5.0	-8.0
1561	C	-5.8	-4.3	-9.0
1566	C	-18.4	-3.5	-21.2
1569	C	-9.5	-3.0	-12.6
1573	C	-5.2	-2.5	-8.2
1587	C	-8.2	-4.5	-11.9
1593	C	NM	-4.5	NM
30102	C	-18.8	-2.9	-25.5
	Maximum	-1.7	-2.4	-5.1
	Minimum	-18.8	-10.6	-25.5
	Average	-7.6	-4.1	-12.0
1170	D	-4.1	NM	NM
1171	D	-4.1	NM	NM
1365	D	-1.4	-4.6	-8.6
1373	D	-11.5	-4.6	-18.9
1374	D	-6.7	-6.9	-12.1
1378	D	-3.6	-3.1	-6.8
1390	D	-3.1	-3.2	-6.4
1394	D	-2.1	-3.4	-5.4
1398	D	-7.8	-5.6	-12.3
1399	D	-8.7	-6.3	-16.1
1402	D	-1.9	-3.6	-5.4
1408	D	-6.7	-7.4	-11.3
1409	D	-4.5	-8.2	-11.8
1471	D	-6.9	-6.3	-12.3
1473	D	-2.7	-3.0	-5.6
1474	D	-2.6	-2.9	-5.6
1480	D	-11.8	-7.0	-21.1
1483	D	-9.0	-5.2	-17.3
1489	D	-8.7	-2.7	-15.9
1508	D	-5.3	-5.4	-10.4
1511	D	-9.9	-7.1	-18.9
1521	D	-10.0	-6.8	-18.9
1524	D	-9.8	-6.5	-18.4
1527	D	-6.5	-6.2	-11.6
1530	D	-4.3	-4.2	-8.3
1588	D	NM	-8.7	NM
1589	D	NM	-8.7	NM
1590	D	NM	-8.5	NM
1595	D	-7.2	-5.8	-8.9
1596	D	-7.2	-5.5	-8.6
30069	D	-11.8	-4.9	-19.3
30070	D	-6.6	-4.6	-10.5
30103	D	-6.0	-5.4	-9.5
	Maximum	-1.4	-2.7	-5.4
	Minimum	-11.8	-8.7	-21.1
	Average	-6.4	-5.6	-12.0

Table 3-3
American River Study Area
Extraction Well Water Level Corrections

			October 1998			April 1999			October 1999		
Extraction Well	Aquifer	Estimated Efficiency*	Measured Elevation (ft, MSL)	Corrected Elevation (ft, MSL)	Correction (feet)	Measured Elevation (ft, MSL)	Corrected Elevation (ft, MSL)	Correction (feet)	Measured Elevation (ft, MSL)	Corrected Elevation (ft, MSL)	Correction (feet)
4300	A	95%	34.0	35.5	1.5	36.1	37.5	1.4	33.7	35.3	1.7
4325	A	75%	60.4	66.6	6.2	62.8	68.5	5.7	58.6	66.0	7.4
4340	A	85%	30.0	34.4	4.4	37.9	41.1	3.3	30.0	34.8	4.9
4355	A	75%	25.5	33.7	8.2	22.5	31.5	9.0	17.4	28.4	11.0
4370	A	45%	38.6	58.7	20.2	37.6	58.4	20.9	30.4	56.8	26.4
4301	B	50%	7.9	35.8	27.9	3.0	33.5	30.5	-6.9	30.0	37.0
4330	B	50%	55.9	71.3	15.4	41.6	64.3	22.7	14.9	52.5	37.6
4345	B	50%	-4.9	27.4	32.3	-2.5	28.7	31.2	-12.2	25.4	37.6
4360	B	50%	3.9	31.3	27.4	2.3	30.6	28.3	2.2	32.1	29.9
4375	B	50%	19.1	46.9	27.8	17.6	46.3	28.7	16.7	47.3	30.7
4302	C	45%	-27.4	24.0	51.4	-18.5	27.8	46.3	-17.5	30.6	48.2
4335	C	35%	-32.5	39.3	71.8	-29.4	40.1	69.6	-39.1	39.6	78.7
4350	C	40%	-38.2	21.9	60.1	-27.3	26.0	53.4	-27.5	28.6	56.1
4365	C	35%	-33.0	28.1	61.0	-31.8	28.3	60.1	-34.4	30.2	64.6
4380	C	30%	-36.4	40.8	77.2	-14.6	47.1	61.7	-2.5	53.8	56.3

*Estimated efficiency based on the extraction well response compared to nearby wells during aquifer tests

Table 3-4
American River Study Area
Summary of Vertical Gradients

Well Pair	Vertical Distance (feet)	Water Level Difference (feet)		Vertical Gradient (negative denotes upward)	
		Apr-98	Apr-99	Apr-98	Apr-99
Aquifer A - Aquifer B					
1162-3	40.5	-0.36	-0.41	-0.009	-0.010
1361-2	38.0	-0.56	-0.53	-0.015	-0.014
1370-1	48.0	-0.14	-0.09	-0.003	-0.002
1375-6	53.5	-0.95	-0.35	-0.018	-0.007
1472-1382	59.9	-1.25	-1.25	-0.021	-0.021
1391-2	59.5	-0.14	-0.10	-0.002	-0.002
1395-6	43.0	0.22	-0.76	0.005	-0.018
1403-4	57.0	0.13	0.21	0.002	0.004
1406-7	55.0	0.13	0.06	0.002	0.001
1475-6	44.5	2.56	NM	0.058	NM
1481-1562	34.5	6.35	9.92	0.184	0.288
1487-8	64.5	0.23	0.45	0.004	0.007
1522-3	36.5	0.94	1.57	0.026	0.043
1525-6	36.5	0.19	0.00	0.005	0.000
1531-2	40.5	0.80	0.70	0.020	0.017
1538-9	58.5	-0.63	NM	-0.011	NM
1559-60	47.0	-0.01	-0.02	0.000	0.000
1564-5	53.0	0.75	9.98	0.014	0.188
1567-8	38.0	0.20	0.13	0.005	0.003
1571-2	63.0	1.70	2.18	0.027	0.035
1585-6	56.0	0.36	0.07	0.006	0.001
1591-2	55.0	NM	0.22	NM	0.004
1594-1557	52.2	0.34	0.05	0.007	0.001
30100-1	34.0	-0.07	0.68	-0.002	0.020
			Maximum	0.184	0.288
			Minimum	-0.021	-0.021
			Average	0.012	0.024
Aquifer B - Aquifer C					
1163-4	80.0	3.56	2.69	0.044	0.034
1363-4	33.0	5.69	6.87	0.172	0.208
1371-2	52.0	12.20	19.52	0.235	0.375
1376-7	78.5	-3.11	-0.54	-0.040	-0.007
1405-1379	45.8	1.17	0.74	0.026	0.016
1380-1	58.0	-0.18	0.25	-0.003	0.004
1383-4	46.5	0.09	0.20	0.002	0.004
1386-7	68.5	1.92	1.33	0.028	0.019
1388-9	83.0	-1.93	-0.01	-0.023	0.000
1392-3	59.0	-0.15	0.02	-0.003	0.000
1396-7	52.0	2.22	1.65	0.043	0.032
1400-1	46.5	1.59	2.05	0.034	0.044
1476-7	95.5	8.57	NM	0.090	NM
1563-1482	27.3	-0.81	-2.30	-0.030	-0.084
1509-10	80.5	3.49	9.59	0.043	0.119
1519-20	67.5	1.53	2.89	0.023	0.043
1532-3	61.0	0.60	2.56	0.010	0.042
1539-40	41.5	0.79	-0.58	0.019	-0.014
1557-8	48.0	0.64	1.26	0.013	0.026
1560-1	36.0	-0.02	-0.03	-0.001	-0.001
1565-6	32.0	-0.23	-5.36	-0.007	-0.168

Table 3-4
American River Study Area
Summary of Vertical Gradients

Well Pair	Vertical Distance (feet)	Water Level Difference (feet)		Vertical Gradient (negative denotes upward)	
		Apr-98	Apr-99	Apr-98	Apr-99
1568-9	48.0	-0.13	-0.27	-0.003	-0.006
1572-3	52.0	2.35	2.82	0.045	0.054
1586-7	25.5	0.14	0.09	0.005	0.004
1592-3	32.5	NM	0.87	NM	0.027
30101-2	80.5	11.24	22.64	0.140	0.281
			Maximum	0.235	0.375
			Minimum	-0.040	-0.168
			Average	0.035	0.042
Aquifer C / Aquifer D					
1364-5	36.0	-1.50	-2.66	-0.042	-0.074
1372-3	34.8	0.02	0.46	0.001	0.013
1377-8	71.0	-0.39	-1.37	-0.005	-0.019
1384-1473	67.6	1.50	1.03	0.022	0.015
1389-90	76.0	-0.04	-1.60	-0.001	-0.021
1393-4	110.5	2.44	1.22	0.022	0.011
1397-8	50.0	8.73	0.47	0.175	0.009
1401-2	144.0	2.24	0.39	0.016	0.003
1470-1	127.0	4.75	4.40	0.037	0.035
1479-80	70.0	0.07	0.23	0.001	0.003
1482-3	115.0	4.94	7.26	0.043	0.063
1507-8	89.0	12.92	11.57	0.145	0.130
1510-11	73.0	0.11	0.04	0.002	0.001
1520-21	76.0	0.09	2.37	0.001	0.031
1526-7	127.5	10.96	3.76	0.086	0.029
1529-30	53.0	-3.32	-4.28	-0.063	-0.081
1558-1595	20.8	0.19	3.64	0.009	0.175
1593-88	110.5	NM	10.67	NM	0.097
30102-3	80.5	-7.68	-20.47	-0.095	-0.254
			Maximum	0.175	0.175
			Minimum	-0.095	-0.254
			Average	0.020	0.009

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1047	03/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1047	06/04/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	< 0.02
1047	09/17/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1047	12/17/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1047	03/15/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1047	06/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1047	09/23/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1049	01/14/98	< 0.5	< 0.5	< 0.5				< 4	
1049	02/11/98	< 0.5	< 0.5	< 0.5					
1049	03/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1049	06/04/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	< 0.02
1049	09/17/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1049	12/17/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1049	03/15/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1049	06/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1049	09/23/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1154	01/14/98	< 0.5	< 0.5	< 0.5				< 4	
1154	04/15/98	< 0.5	< 0.5	< 0.5					
1154	07/09/98	< 0.5	< 0.5	< 0.5					
1154	12/15/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1154	03/11/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1154	06/17/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.0075
1154	09/23/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1156	03/17/98	74	0.8	< 0.5	< 0.5	< 0.5		< 4	
1156	06/19/98	75	1.0	< 0.5	< 0.5	< 0.5		< 4	
1156	09/17/98	78	0.9	< 0.5	< 0.5	< 0.5		< 4	
1156	12/11/98	82	0.7	< 0.5	< 0.5	< 0.5			
1156	03/15/99	100	0.64	< 0.5	< 0.5	< 0.5			
1156	06/04/99	90	0.57	< 0.5	< 0.5	< 0.5			
1156	09/17/99	59	0.51	< 0.5	< 0.5	< 0.5	< 10		
1162	03/06/98	52	< 1	4.1	< 1	< 1		19	
1162	06/01/98								< 0.0075
1162	07/22/98	67	< 0.5	5.5	< 0.5	1.3	< 10	28	< 10
1162	07/13/99	140	< 0.5	1.8	< 0.5	1.4	< 10	100	
1163	03/06/98	< 1	< 1	< 1	< 1	< 1		160	
1163	06/01/98								< 0.0075
1163	07/22/98	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 10	160	< 10
1163	07/13/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	160	
1164	03/06/98	79	< 1	66	7.1	3.4		< 4	
1164	06/01/98								< 0.0075
1164	07/21/98	77	< 0.5	62	7.4	3.9	22	< 4	< 10
1164	07/13/99	36	< 0.5	42	2.2	1.8	16		
1169	01/19/98	54	< 0.5	1.4	< 0.5	1		6.4	
1169	04/29/98								< 0.02
1169	06/23/98	55	0.7	1.0	< 0.5	1.6		5.8	
1169	07/17/98	56	0.7	1	< 0.5	1.7	< 10	7.3	< 10
1169	10/09/98	80	0.8	3.4	< 0.5	3.3			
1169	01/04/99	100	0.98	4.1	< 0.5	4			
1169	04/26/99	120	1.4	5.4	< 0.5	5.3			
1169	N/S								
1170	01/19/98	1.8	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1170	04/29/98								< 0.02
1170	06/22/98	4.4	< 0.5	< 0.5	< 0.5	< 0.5			
1170	07/17/98	4	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1170	10/12/98	1.1	< 0.5	< 0.5	< 0.5	< 0.5			
1170	01/04/99	3.1	< 0.5	< 0.5	< 0.5	< 0.5			
1170	04/26/99	6.5	< 0.5	< 0.5	< 0.5	< 0.5			
1170	07/23/99	3.9	< 0.5	< 0.5	< 0.5	< 0.5		< 4	< 0.0075
1171	01/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1171	04/29/98								< 0.02
1171	06/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1171	07/17/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1171	10/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1171	01/04/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1171	04/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1171	07/23/99	2.8	< 0.5	< 0.5	< 0.5	< 0.5		< 4	< 0.0075
1211	03/05/98	120	6.5	7	4.8	15		37	
1211	07/22/98	87	5.4	5.3	3.7	11	< 10	26	< 10
1211	07/19/99	60	3.6	3.7	2.8	7.1	< 10	11	
1214	08/31/98	620	9.5	27	< 0.5	33	16	22	< 10
1214	09/16/99	220	3.6	11	< 0.5	14	< 10	86	
1216	08/31/98	400	6.7	15	< 0.5	19	11	12	< 10
1216	08/05/99	140	2.3	6.1	< 0.5	9.8	< 10	32	

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1361	03/19/98	52	< 0.5	2.7	< 0.5	0.8		48	
1361	06/23/98	53	< 0.5	1.7	< 0.5	0.8			
1361	07/24/98	57	< 0.5	1.5	< 0.5	1	< 10	69	< 10
1361	10/20/98	59	< 0.5	3.4	< 0.5	0.9			
1361	01/04/99	66	< 0.5	2	< 0.5	< 0.5			
1361	04/19/99	66	< 0.5	2.6	< 0.5	1.1			
1361	07/29/99	62	< 0.5	2.2	< 0.5	1.1	< 10	58	
1362	03/19/98	67	0.9	3	< 0.5	4.6		39	
1362	06/23/98	77	1.8	3.5	< 0.5	5.1			
1362	07/23/98	74	0.8	3.3	< 0.5	5.1	< 10	51	< 10
1362	10/20/98	81	0.7	5.6	< 0.5	6.6			
1362	01/04/99	86	0.63	4.4	< 0.5	5.9			
1362	04/19/99	71	0.56	3.3	< 0.5	4.8			
1362	07/29/99	72	0.68	2.3	< 0.5	5	< 10	54	
1363	03/19/98	74	1.6	5.3	3.5	7		27	
1363	06/23/98	68	1.2	4.8	3.3	6.7			
1363	07/23/98	66	1.3	5.4	3.2	6.5	< 10	36	< 10
1363	10/20/98	66	0.8	7.1	< 0.5	6.7			
1363	01/04/99	63	< 0.5	5.5	< 0.5	5.9			
1363	04/19/99	52	0.64	4.5	0.7	5.6			
1363	07/29/99	42	0.5	3.1	< 0.5	4.6	< 10	65	
1364	03/19/98	3.9	< 0.5	< 0.5	< 0.5	< 0.5		4.8	
1364	06/10/98	4.8	< 0.5	< 0.5	< 0.5	< 0.5		6.9	
1364	07/24/98	1.7	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1364	10/23/98	1.1	< 0.5	< 0.5	< 0.5	< 0.5			
1364	01/04/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1364	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1364	07/29/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1365	03/19/98	0.9	< 0.5	< 0.5	< 0.5	< 0.5		6.5	
1365	06/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1365	07/24/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1365	10/23/98	1.4	< 0.5	< 0.5	< 0.5	< 0.5			
1365	01/04/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1365	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1365	07/29/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1370	07/28/98	870	16	54	9.3	70	26	15	< 10
1370	07/14/99	790	14	45	4	68	21	25	
1371	07/28/98	950	12	30	9.6	58	12	19	< 10
1371	07/14/99	580	8.5	28	6.4	43	13	25	
1372	07/28/98	740	7.8	15	4.9	33	< 10	10	< 10
1372	07/14/99	830	7.7	22	3.9	43	< 10		
1373	07/28/98	2	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1373	07/14/99	4.3	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1374	07/22/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1375	06/01/98								< 0.0075
1375	07/31/98	200	13	19	34	29	13	17	< 10
1375	07/20/99	190	9	13	12	42	10		
1376	06/01/98								< 0.0075
1376	07/31/98	620	61	58	440	26	23	14	< 10
1376	07/20/99	500	50	54	270	23	25	17	
1377	06/01/98								< 0.0075
1377	07/31/98	510	26	39	350	17	10	< 4	< 10
1377	07/19/99	390	21	36	250	13	10	4.1	
1378	07/31/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1378	07/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1379	08/03/98	680	7.6	80	59	57	26	29	< 10
1379	08/04/99	560	6.4	78	54	49	28	18	
1380	07/31/98	220	24	1.7	130	9.2	23	23	< 10
1380	07/23/99	98	7.5	18	26	4.9	17	25	
1381	07/31/98	400	14	24	120	11	12	< 4	< 10
1381	07/23/99	470	28	40	210	16	14		
1382	02/27/98	230	6.1	9.6	< 1	45		67	
1382	07/31/98	190	4	7.9	< 0.5	38	11	81	< 10
1382	07/15/99	160	3.1	5.5	< 0.5	31	< 10	89	
1383	02/27/98							49	
1383	08/03/98	240	12	28	120	23	19	58	< 10
1383	07/15/99	170	6.4	18	53	18	14	69	
1384	02/27/98							21	
1384	08/03/98	270	8.7	48	240	16	16	24	< 10
1384	07/15/99	360	8	52	210	17	13	24	
1385	03/25/98	170	11	18	66	4.5		7.3	
1385	08/03/98	170	10	21	64	4.5	10	9.3	< 10
1385	08/09/99	100	6.8	18	40	3.2	< 10	9	

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1386	03/25/98	37	1.2	3.7	10	< 1		< 4	
1386	08/03/98	38	1	3.9	9.8	0.6	< 10	< 4	< 10
1386	08/09/99	45	1.4	6.3	12	0.54	< 10		
1387	03/25/98	< 1	< 1	< 1	< 1	< 1		< 4	
1387	08/03/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1387	08/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1388	08/10/98	550	18	72	160	72	30	40	< 10
1388	08/06/99	280	8.3	18	25	50	12	68	
1389	08/10/98	580	6.5	110	140	39	25	7.7	< 10
1389	08/05/99	370	3.2	71	53	29	20	4.4	
1390	08/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1390	08/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1391	06/02/98								< 0.0075
1391	08/14/98	220	3.4	13	< 0.5	16	11	56	< 10
1391	07/21/99	180	2.9	7.5	< 0.5	15	11	49	
1392	06/02/98								< 0.0075
1392	08/14/98	270	4	12	6	24	12	78	< 10
1392	07/21/99	320	4.8	12	1.4	29	10	53	
1393	06/02/98								< 0.0075
1393	08/14/98	1100	17	87	120	89	40	28	< 10
1393	07/21/99	860	13	65	55	75	32	22	
1394	08/14/98	52	< 0.5	2.6	< 0.5	6.1	< 10	< 4	< 10
1394	07/21/99	17	< 0.5	< 0.5	< 0.5	2.2	< 10		
1395	04/08/98								< 0.02
1395	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1395	08/24/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1395	11/05/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1395	02/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1395	05/28/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1395	08/10/99	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1396	04/08/98								< 0.02
1396	06/08/98	0.9	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1396	08/24/98	1.9	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1396	11/05/98	1.1	< 0.5	< 0.5	< 0.5	< 0.5			
1396	02/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1396	05/28/99	1.1	< 0.5	< 0.5	< 0.5	< 0.5			
1396	08/10/99	1.4	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1397	04/07/98								< 0.02
1397	06/08/98	91	1	< 0.5	< 0.5	2.4		< 4	
1397	08/24/98	81	0.8	< 0.5	< 0.5	2.1	< 10	< 4	< 10
1397	11/05/98	99	0.7	< 0.5	< 0.5	2.1			
1397	02/12/99	75	< 0.5	< 0.5	< 0.5	2			
1397	05/28/99	81	< 0.5	< 0.5	< 0.5	2			
1397	08/10/99	60	0.84	< 0.5	< 0.5	1.1	< 10		
1398	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1398	08/24/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1398	11/05/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1398	02/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1398	05/28/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1398	08/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1399	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1399	08/24/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1399	11/05/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1399	02/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1399	05/28/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1399	08/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1400	03/03/98	250	4.6	12	8	24		35	
1400	08/18/98	88	1.2	2.3	3.2	6.9	< 10	86	< 10
1400	08/04/99	27	< 0.5	0.76	< 0.5	2.4	< 10	130	
1401	03/02/98	300	4.8	41	13	30		17	
1401	08/18/98	550	5.4	43	20	31	16	19	< 10
1401	08/04/99	400	4.5	35	8.6	28	< 10	15	
1402	03/02/98	68	< 1	3.8	2.8	4.7		4.1	
1402	08/19/98	210	0.9	22	< 0.5	19	< 10	9.2	< 10
1402	08/05/99	76	< 0.5	6.4	< 0.5	11	< 10		
1403	08/05/98	200	5.7	14	3.6	34	10	< 4	< 10
1403	08/04/99	670	15	36	6.4	120	< 10	14	
1404	08/05/98	720	19	73	91	80	33	32	< 10
1404	08/04/99	460	10	34	31	52	11	59	
1405	08/05/98	2100	30	80	69	160	26	39	< 10
1405	08/04/99	2400	49	70	46	150	23	41	
1406	01/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1406	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1406	07/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1406	10/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1406	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1406	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1406	07/22/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1407	01/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1407	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1407	07/21/98	1.6	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1407	10/21/98	0.6	< 0.5	< 0.5	< 0.5	< 0.5			
1407	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1407	04/19/99	0.98	< 0.5	< 0.5	< 0.5	< 0.5			
1407	07/22/99	1	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1408	01/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1408	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1408	07/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1408	10/21/98	0.8	< 0.5	< 0.5	< 0.5	< 0.5			
1408	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1408	04/19/99	0.65	< 0.5	< 0.5	< 0.5	< 0.5			
1408	07/22/99	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1409	01/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1409	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1409	07/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1409	10/23/98	3	< 0.5	< 0.5	< 0.5	< 0.5			
1409	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1409	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1409	07/22/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1469	08/19/98	1100	18	58	< 0.5	42	18		< 10
1469	08/05/99	560	5.7	18	< 0.5	18	10		
1470	08/19/98	530	5	11	3.3	23	< 10	9.1	< 10
1470	08/05/99	620	4.9	15	< 0.5	27	< 10	10	
1471	08/20/98	180	2.6	26	< 0.5	15	11	6.9	< 10
1471	08/06/99	150	2.8	13	< 0.5	14	10		
1472	08/21/98	210	7.2	12	3.7	38	10	< 4	< 10
1472	08/12/99	110	4.2	5.6	2.8	16	< 10		
1473	08/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1473	08/13/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1474	08/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1474	08/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1475	02/25/98	66	1.6	< 1	< 1	4.3		30	
1475	08/20/98	67	1.4	0.6	< 0.5	4.6	< 10	28	< 10
1475	08/12/99	50	1.2	< 0.5	< 0.5	3.3	< 10	39	
1476	02/25/98	1.3	< 1	< 1	< 1	< 1		170	
1476	08/20/98	1	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1476	08/12/99	0.57	< 0.5	< 0.5	< 0.5	< 0.5	< 10	180	
1477	02/25/98	190	9.5	26	88	13		63	
1477	08/20/98	200	9.4	28	91	12	16	< 4	< 10
1477	08/12/99	180	8.1	27	90	12	14	69	
1478	03/10/98	39	1.1	< 0.5	< 0.5	< 0.5		< 4	
1478	06/18/98	24	0.5	< 0.5	< 0.5	< 0.5			
1478	09/04/98	16	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1478	12/03/98	5.4	< 0.5	< 0.5	< 0.5	< 0.5			
1478	03/05/99	11	< 0.5	< 0.5	< 0.5	< 0.5			
1478	06/01/99	5.2	< 0.5	< 0.5	< 0.5	< 0.5			
1478	09/20/99	4	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1479	03/10/98	430	16	36	17	56		13	
1479	06/18/98	1800	18	18	19	50			
1479	09/04/98	1900	19	41	19	64	< 10	13	< 10
1479	12/03/98	1700	16	36	19	52			
1479	03/05/99	2300	20	49	35	65			
1479	06/01/99	670	9.9	22	21	33			
1479	09/20/99	1100	13	28	17	41	< 10	11	
1480	03/09/98	210	2	< 0.5	< 0.5	3.1		< 4	
1480	06/18/98	220	2.3	< 0.5	< 0.5	3.4			
1480	09/04/98	230	2.1	< 0.5	< 0.5	3.8	< 10	< 4	< 10
1480	12/03/98	220	1.9	< 0.5	< 0.5	< 0.5			
1480	03/05/99	510	3.1	< 0.5	< 0.5	5.1			
1480	03/05/99	530	3.1	< 0.5	< 0.5	5.2			
1480	06/01/99	860	7.5	0.95	< 0.5	13			
1480	09/20/99	330	3.4	1.5	< 0.5	6.1	< 10		
1481	07/31/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1481	07/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1482	07/31/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1482	07/19/99	1.9	< 0.5	< 0.5	< 0.5	< 0.5	< 10		

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1483	07/31/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1483	07/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1487	03/12/98	3.5	< 0.5	< 0.5	< 0.5	< 0.5			
1487	04/06/98								< 0.02
1487	06/19/98	2.9	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1487	09/03/98	5.1	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1487	12/04/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1487	03/09/99	7.4	< 0.5	< 0.5	< 0.5	< 0.5			
1487	06/02/99	2.4	< 0.5	< 0.5	< 0.5	< 0.5			
1487	09/22/99	0.56	< 0.5	< 0.5	< 0.5	< 0.5			
1488	03/13/98	110	0.7	< 0.5	< 0.5	3.3		5.5	
1488	04/06/98								< 0.02
1488	06/19/98	88	0.6	< 0.5	< 0.5	2.8		4.8	
1488	09/03/98	86	0.9	< 0.5	< 0.5	2.5	< 10	4.4	< 10
1488	12/04/98	79	< 0.5	< 0.5	< 0.5	1.5			
1488	03/09/99	170	< 0.5	< 0.5	< 0.5	3			
1488	06/02/99	89	< 0.5	< 0.5	< 0.5	3.2			
1488	09/22/99	61	< 0.5	< 0.5	< 0.5	1.9		< 4	
1489	06/19/98	220	2	< 0.5	< 0.5	4.1		< 4	
1489	09/03/98	230	2	0.7	< 0.5	4.3	< 10	< 4	< 10
1489	12/04/98	220	2.3	< 0.5	< 0.5	3			
1489	03/05/99	300	2.6	< 0.5	< 0.5	5.3			
1489	06/02/99	270	1.8	< 1	< 0.5	4.8			
1489	09/22/99	220	2.3	3.2	0.83	6.4			
1506	03/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1506	06/01/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.0075
1506	09/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1506	12/04/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1506	03/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1506	06/08/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1506	09/27/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1507	03/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1507	06/01/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.0075
1507	09/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		< 10
1507	12/04/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1507	03/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1507	06/08/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1507	09/22/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1508	03/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1508	06/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1508	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		< 10
1508	12/04/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1508	03/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1508	06/08/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1508	09/22/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1509	03/13/98	53	< 0.5	< 0.5	< 0.5	0.8			
1509	06/10/98	50	< 0.5	< 0.5	< 0.5	0.7		< 4	
1509	09/03/98	47	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1509	12/10/98	62	0.6	< 0.5	< 0.5	< 0.5			
1509	03/12/99	71	0.52	< 0.5	< 0.5	0.85			
1509	06/03/99	100	0.87	< 0.5	< 0.5	1.9			
1509	09/17/99	150	1.3	< 0.5	< 0.5	2.5	< 10		
1510	03/13/98	1.2	< 0.5	< 0.5	< 0.5	< 0.5			
1510	06/10/98	1.1	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1510	09/03/98	0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1510	12/08/98	0.8	< 0.5	< 0.5	< 0.5	< 0.5			
1510	03/12/99	1.5	< 0.5	< 0.5	< 0.5	< 0.5			
1510	06/03/99	1.3	< 0.5	< 0.5	< 0.5	< 0.5			
1510	09/17/99	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1511	03/13/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1511	06/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1511	09/03/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1511	12/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1511	03/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1511	06/03/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1511	09/17/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1519	07/29/98	4.3	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1519	07/20/99	4.1	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1520	07/28/98	54	< 0.5	< 0.5	< 0.5	0.9	< 10	< 4	< 10
1520	07/20/99	130	0.81	< 0.5	< 0.5	2.1	< 10		
1521	07/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1522	07/29/98	6.1	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1522	07/21/99	13	< 0.5	< 0.5	< 0.5	< 0.5	< 10		

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1523	07/29/98	92	1.1	< 0.5	< 0.5	3.1	< 10	< 4	< 10
1523	07/21/99	69	0.58	< 0.5	< 0.5	2.4	< 10		
1524	07/29/98	58	0.7	< 0.5	< 0.5	0.6	< 10	< 4	< 10
1524	07/21/99	57	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1525	01/20/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1525	06/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1525	07/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1525	10/13/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1525	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1525	04/15/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1525	07/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1526	01/20/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1526	06/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1526	07/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1526	10/13/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1526	01/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1526	01/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1526	04/15/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1526	07/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1527	01/20/98	4.2	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1527	06/18/98	5.4	< 0.5	< 0.5	< 0.5	< 0.5			
1527	07/16/98	4.8	< 0.5	< 0.5	< 0.5	< 0.5	< 10		< 10
1527	10/13/98	7.8	< 0.5	< 0.5	< 0.5	< 0.5			
1527	01/05/99	7.8	< 0.5	< 0.5	< 0.5	< 0.5			
1527	04/15/99	7.3	< 0.5	< 0.5	< 0.5	< 0.5			
1527	07/12/99	8.3	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1528	01/20/98	< 0.5	0.8	< 0.5	< 0.5	< 0.5		< 4	
1528	06/11/98	< 0.5	1.0	< 0.5	< 0.5	< 0.5		< 4	
1528	07/22/98	< 0.5	0.9	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1528	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1528	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1528	07/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1529	01/20/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1529	06/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1529	07/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1529	10/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1529	01/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1529	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1529	07/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1530	01/20/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1530	06/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1530	07/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1530	10/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1530	01/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1530	04/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1530	07/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1531	03/12/98	19	< 0.5	< 0.5	< 0.5	< 0.5			
1531	07/20/98	7.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1531	10/19/98	19	< 0.5	< 0.5	< 0.5	< 0.5			
1531	01/07/99	17	< 0.5	< 0.5	< 0.5	< 0.5			
1531	04/16/99	13	< 0.5	< 0.5	< 0.5	< 0.5			
1531	07/13/99	13	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1532	03/12/98	6.9	< 0.5	< 0.5	< 0.5	< 0.5			
1532	07/20/98	9	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1532	10/19/98	7.7	< 0.5	< 0.5	< 0.5	< 0.5			
1532	01/07/99	6.1	< 0.5	< 0.5	< 0.5	< 0.5			
1532	04/16/99	4.7	< 0.5	< 0.5	< 0.5	< 0.5			
1532	07/13/99	6.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1533	03/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1533	07/20/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1533	10/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1533	01/07/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1533	04/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1533	07/13/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1538	02/12/98	5.7	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1538	04/06/98								< 0.02
1538	06/16/98	6.3	< 0.5	< 0.5	< 0.5	< 0.5			
1538	08/28/98	3.2	< 0.5	< 0.5	< 0.5	< 0.5	< 10		< 10
1538	Dry								
1539	02/12/98	41	0.8	< 0.5	< 0.5	0.7		< 4	
1539	04/06/98								< 0.02
1539	06/15/98	76	1.1	< 0.5	< 0.5	1.7			
1539	08/28/98	52	< 0.5	< 0.5	< 0.5	1.1	< 10	< 4	< 10

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1539	11/06/98	120	0.8	< 0.5	< 0.5	2.8			
1539	02/10/99	33	< 0.5	< 0.5	< 0.5	< 0.5			
1539	05/24/99	23	< 0.5	< 0.5	< 0.5	< 0.5			
1539	08/16/99	42	< 0.5	< 0.5	< 0.5	0.62	< 10		
1540	02/12/98	130	0.9	< 0.5	< 0.5	3		< 4	
1540	04/06/98								< 0.02
1540	06/15/98	88	0.9	< 0.5	< 0.5	1.8			
1540	08/28/98	130	1	< 0.5	< 0.5	3.3	< 10		< 10
1540	11/06/98	200	1.5	< 0.5	< 0.5	5.4			
1540	02/10/99	150	1.3	< 0.5	< 0.5	4.4			
1540	05/24/99	100	< 0.5	< 0.5	< 0.5	2.7			
1540	08/16/99	45	< 0.5	< 0.5	< 0.5	0.72	< 10		
1557	01/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1557	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1557	03/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1557	06/15/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1557	09/14/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1557	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1557	03/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1557	06/01/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1557	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	01/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	03/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1558	06/15/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	09/14/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1558	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	03/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	06/01/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1558	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	01/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	02/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	03/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	04/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	06/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1559	09/14/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1559	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	03/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	06/04/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1559	09/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1560	01/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	02/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	03/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	04/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	06/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1560	09/14/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		< 10
1560	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	03/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	06/04/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1560	09/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1561	01/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	02/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	03/18/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	04/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	06/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1561	09/14/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1561	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	03/05/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	06/04/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1561	09/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1562	07/30/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1562	07/19/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1563	07/30/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1563	07/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1564	03/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1564	04/07/98								< 0.02
1564	06/17/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1564	07/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1564	10/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1564	01/07/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1564	04/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1564	07/23/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	---
1565	03/11/98	1.0	< 0.5	< 0.5	< 0.5	< 0.5		< 4	

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1565	04/07/98								< 0.02
1565	06/17/98	0.7	< 0.5	< 0.5	< 0.5	< 0.5			
1565	07/21/98	0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1565	10/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1565	01/07/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1565	04/12/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1565	07/23/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1566	03/11/98	4.7	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1566	04/07/98								< 0.02
1566	06/17/98	3.9	< 0.5	< 0.5	< 0.5	< 0.5			
1566	07/21/98	3.2	< 0.5	< 0.5	< 0.5	< 0.5	< 10		< 10
1566	10/16/98	9.7	< 0.5	< 0.5	< 0.5	< 0.5			
1566	01/07/99	14	< 0.5	< 0.5	< 0.5	< 0.5			
1566	04/12/99	12	< 0.5	< 0.5	< 0.5	< 0.5			
1566	07/23/99	7.2	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1567	03/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1567	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1567	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1567	12/03/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1567	03/08/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1567	06/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1567	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1568	03/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1568	06/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1568	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1568	12/03/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1568	03/08/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1568	06/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1568	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1569	03/11/98	15	0.7	< 0.5	< 0.5	< 0.5		< 4	
1569	06/08/98	16	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1569	09/02/98	13	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1569	12/03/98	13	< 0.5	< 0.5	< 0.5	< 0.5			
1569	03/08/99	7.3	< 0.5	< 0.5	< 0.5	< 0.5			
1569	06/09/99	7.5	< 0.5	< 0.5	< 0.5	< 0.5			
1569	09/21/99	4.7	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1570	03/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1570	06/08/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1570	09/15/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1570	12/03/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1570	03/08/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1570	06/09/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1570	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1571	03/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1571	06/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1571	09/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1571	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1571	03/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1571	06/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1571	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1572	03/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1572	06/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1572	09/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1572	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1572	03/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1572	06/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1572	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1573	03/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1573	04/07/98								< 0.02
1573	06/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.0075
1573	09/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1573	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1573	03/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1573	06/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1573	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1574	03/12/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1574	06/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1574	09/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1574	12/07/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1574	03/15/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1574	09/21/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1585	02/11/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1585	06/16/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1585	08/24/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1585	11/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1585	02/10/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1585	05/25/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1585	08/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1586	02/11/98	4.3	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1586	06/16/98	3.2	< 0.5	< 0.5	< 0.5	< 0.5			
1586	08/24/98	3	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1586	11/09/98	5.8	< 0.5	< 0.5	< 0.5	< 0.5			
1586	02/10/99	4.9	< 0.5	< 0.5	< 0.5	< 0.5			
1586	05/25/99	4.9	< 0.5	< 0.5	< 0.5	< 0.5			
1586	08/13/99	3.1	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1587	02/11/98	13	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1587	06/16/98	17	< 0.5	< 0.5	< 0.5	< 0.5			
1587	08/24/98	17	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1587	11/09/98	15	< 0.5	< 0.5	< 0.5	< 0.5			
1587	02/10/99	12	< 0.5	< 0.5	< 0.5	< 0.5			
1587	05/24/99	16	< 0.5	< 0.5	< 0.5	< 0.5			
1587	08/13/99	12	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1588	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1588	06/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1588	08/25/98	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1588	11/10/98	1	< 0.5	< 0.5	< 0.5	< 0.5			
1588	02/16/99	0.95	< 0.5	< 0.5	< 0.5	< 0.5			
1588	05/25/99	2	< 0.5	< 0.5	< 0.5	< 0.5			
1588	08/13/99	1	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1589	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1589	06/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1589	08/25/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1589	11/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1589	02/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1589	05/26/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1589	08/13/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1590	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1590	06/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1590	08/25/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1590	11/10/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1590	02/11/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1590	05/26/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1590	08/13/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1591	02/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1591	08/25/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1591	11/06/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1591	02/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1591	05/27/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1591	08/25/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1592	02/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1592	08/25/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1592	11/06/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1592	02/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1592	05/28/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1592	08/25/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1593	02/09/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1593	08/25/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1593	11/06/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1593	02/16/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1593	05/27/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1593	08/25/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1594	01/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1594	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1594	03/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1594	06/15/98	0.8	< 0.5	< 0.5	< 0.5	< 0.5			
1594	07/30/98	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1594	10/21/98	1	< 0.5	< 0.5	< 0.5	< 0.5			
1594	01/06/99	0.8	< 0.5	< 0.5	< 0.5	< 0.5			
1594	04/20/99	1.2	< 0.5	< 0.5	< 0.5	< 0.5			
1594	07/28/99	0.79	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
1595	01/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1595	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1595	03/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1595	06/15/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1595	07/30/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1595	10/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			

Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
1595	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1595	04/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1595	07/28/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
1596	01/22/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
1596	02/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1596	03/19/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1596	06/15/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1596	07/30/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
1596	10/21/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1596	01/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1596	04/20/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
1596	07/28/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	
4300	06/25/98	< 1	< 1	< 1	< 1	< 1			
4300	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 0.0075
4300	10/14/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4300	11/15/98	0.6	< 0.5	< 0.5	< 0.5	< 0.5			
4300	02/06/99	0.8	< 0.5	< 0.5	< 0.5	< 0.5			
4300	04/25/99	1.5	< 0.5	< 0.5	< 0.5	< 0.5			< 0.0075
4300	07/15/99	2.9	< 0.5	< 0.5	< 0.5	< 0.5			
4301	09/02/98	62	< 0.5	< 0.5	< 0.5	1.3	< 10	< 4	< 10
4301	10/14/98	86	0.8	< 0.5	< 0.5	1.5			
4301	02/06/99	84	0.93	< 0.5	< 0.5	1.3			
4301	04/25/99	61	< 0.5	< 0.5	< 0.5	1.2			
4301	07/15/99	61	< 0.5	< 0.5	< 0.5	1.7			
4302	09/02/98	79	0.8	< 0.5	< 0.5	1.4	< 10	< 4	< 10
4302	10/14/98	68	0.6	< 0.5	< 0.5	0.8			
4302	02/06/99	77	< 0.5	< 0.5	< 0.5	1			
4302	04/25/99	53	< 0.5	< 0.5	< 0.5	0.83			
4302	07/15/99	56	< 0.5	< 0.5	< 0.5	1.4			
4325	09/23/98	450	14	29	< 0.5	55	12	12	< 0.0075
4325	10/29/98	460	12	33	2.8	53			
4325	02/05/99	360	10	34	1.2	46			
4325	04/22/99	270	7.5	20	2.8	33			
4325	07/09/99	210	6.5	19	< 0.5	31			
4330	09/23/98	1600	24	59	43	120	19	26	< 0.0075
4330	10/29/98	1800	21	72	24	150			
4330	02/05/99	1300	18	110	76	91			
4330	04/22/99	950	14	74	64	81			
4330	07/09/99	700	12	38	14	76			
4335	09/23/98	1100	16	72	41	89	18	21	< 0.0075
4335	10/29/98	1500	16	84	44	94			
4335	02/05/99	1100	22	68	26	110			
4335	04/22/99	800	14	41	13	82			
4335	07/09/99	990	14	71	52	75			
4340	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
4340	10/28/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4340	02/06/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4340	04/29/99	5.2	< 0.5	< 0.5	< 0.5	< 0.5			
4340	07/15/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4345	09/02/98	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
4345	10/28/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4345	02/06/99	0.9	< 0.5	< 0.5	< 0.5	< 0.5			
4345	04/29/99	1.5	< 0.5	< 0.5	< 0.5	< 0.5			
4345	07/15/99	1.6	< 0.5	< 0.5	< 0.5	< 0.5			
4350	09/02/98	3.4	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
4350	10/28/98	3.7	< 0.5	< 0.5	< 0.5	< 0.5			
4350	02/06/99	3.5	< 0.5	< 0.5	< 0.5	< 0.5			
4350	04/29/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4350	07/15/99	3.7	< 0.5	< 0.5	< 0.5	< 0.5			
4355	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
4355	10/28/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5			
4355	02/06/99	3.2	< 0.5	< 0.5	< 0.5	< 0.5			
4355	04/28/99	2.9	< 0.5	< 0.5	< 0.5	< 0.5			
4355	07/15/99	2.7	< 0.5	< 0.5	< 0.5	< 0.5			
4360	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
4360	10/28/98	1.8	< 0.5	< 0.5	< 0.5	< 0.5			
4360	02/06/99	8.4	< 0.5	< 0.5	< 0.5	< 0.5			
4360	04/28/99	16	< 0.5	< 0.5	< 0.5	< 0.5			
4360	07/15/99	18	< 0.5	< 0.5	< 0.5	< 0.5			
4365	09/02/98	3.3	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 10
4365	10/28/98	5.4	< 0.5	< 0.5	< 0.5	< 0.5			
4365	02/06/99	14	< 0.5	< 0.5	< 0.5	< 0.5			
4365	04/28/99	25	< 0.5	< 0.5	< 0.5	< 0.5			

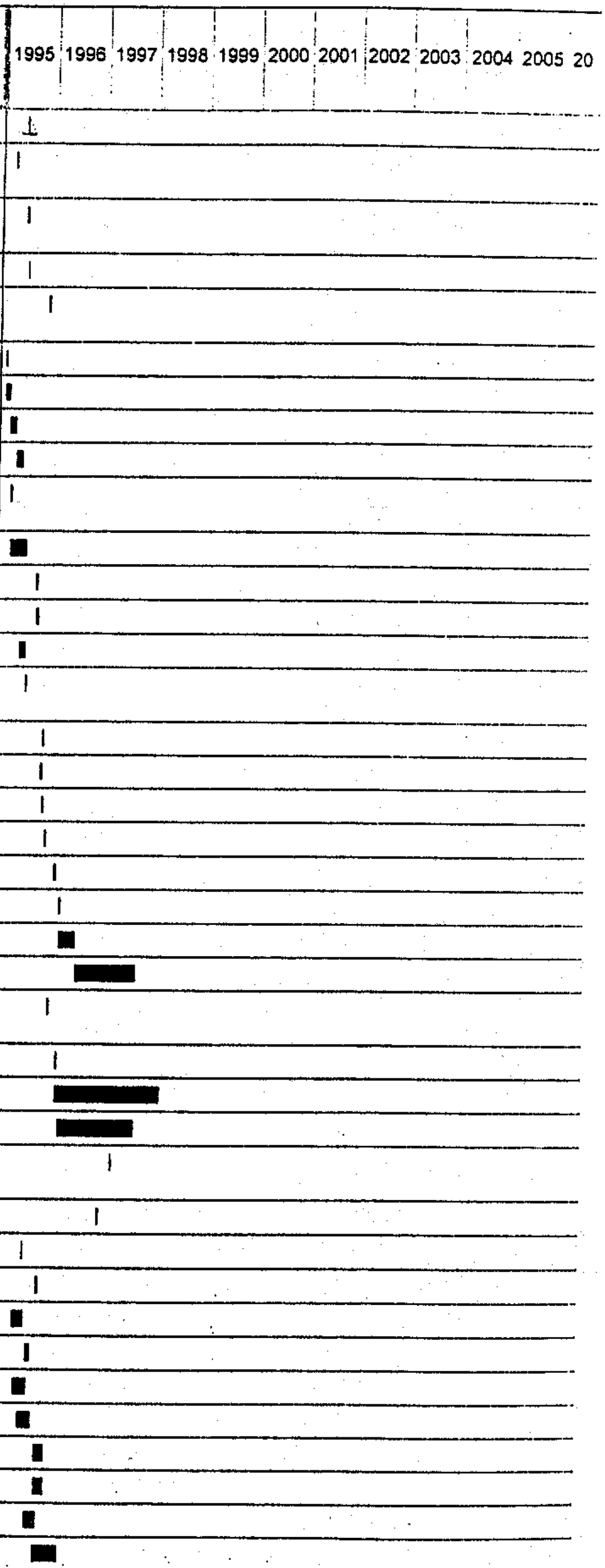
Table 3-5
American River Study Area
Analytical Results for Selected Chemicals - 1998-1999

Well Number	Sample Date	TCE (ug/l)	PCE (ug/l)	1,1-DCE (ug/l)	Freon 113 (ug/l)	1,2-DCE (ug/l)	1,4-Dioxane (ug/l)	Perchlorate (ug/l)	NDMA (ug/l)
4365	07/15/99	29	< 0.5	< 0.5	< 0.5	< 0.5			
4370	09/02/98	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 0.1
4370	11/15/98	5.6	< 0.5	< 0.5	< 0.5	< 0.5			
4370	01/23/99	5.7	< 0.5	< 0.5	< 0.5	< 0.5			
4370	04/24/99	8.9	< 0.5	< 0.5	< 0.5	< 0.5			
4370	07/09/99	8.6	< 0.5	< 0.5	< 0.5	< 0.5			
4375	09/02/98	6.7	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 0.1
4375	11/15/98	2.1	< 0.5	< 0.5	< 0.5	< 0.5			
4375	01/23/99	4.4	< 0.5	< 0.5	< 0.5	< 0.5			
4375	04/24/99	7	< 0.5	< 0.5	< 0.5	< 0.5			
4375	07/09/99	6.1	< 0.5	< 0.5	< 0.5	< 0.5			
4380	09/02/98	1.1	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 4	< 0.1
4380	11/15/98	1.7	< 0.5	< 0.5	< 0.5	< 0.5			
4380	01/23/99	1.6	< 0.5	< 0.5	< 0.5	< 0.5			
4380	04/24/99	2.6	< 0.5	< 0.5	< 0.5	< 0.5			
4380	07/09/99	4.9	< 0.5	< 0.5	< 0.5	< 0.5			
30068	02/16/98	930	20	63	15	71		20	
30068	06/17/98	360	19	67	11	79			
30068	08/27/98	750	16	61	< 0.5	74	23	27	< 10
30068	11/09/98	920	13	42	4.8	69			
30068	02/11/99	830	10	34	6.6	60			
30068	05/26/99	710	12	39	5.5	62			
30068	08/24/99	600	8.8	29	5.9	44	16	32	
30069	02/02/98	78	< 0.5	1.8	< 0.5	3.8		< 4	
30069	06/17/98	100	< 0.5	2.8	< 0.5	5.4			
30069	08/26/98	120	0.8	3	< 0.5	5.8	< 10	< 4	< 10
30069	11/09/98	140	1.1	3.3	< 0.5	7.2			
30069	02/11/99	160	1	4	< 0.5	9.7			
30069	05/27/99	200	1.6	6.5	< 0.5	13			
30069	08/24/99	180	1.7	5.6	< 0.5	11	< 10		
30070	02/02/98	12	< 0.5	< 0.5	< 0.5	< 0.5		10	
30070	06/17/98	20	< 0.5	< 0.5	< 0.5	1.6			
30070	08/27/98	18	< 0.5	0.6	< 0.5	1.6	< 10	< 4	< 10
30070	11/10/98	4.3	< 0.5	< 0.5	< 0.5	< 0.5			
30070	02/12/99	36	< 0.5	0.83	< 0.5	2.5			
30070	05/27/99	12	< 0.5	< 0.5	< 0.5	< 0.5			
30070	08/25/99	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10		
30100	03/16/98	290	13	40	6.7	47			
30100	04/06/98								< 0.02
30100	05/06/98								< 0.0075
30100	06/11/98	700	19	46	7.9	66			
30100	09/10/98	480	12	33	7.2	61	17	22	< 10
30100	12/08/98	150	3.8	10	< 0.5	16			
30100	03/08/99	83	1.9	3.4	< 0.5	16			
30100	06/04/99	4.6	< 0.5	< 0.5	< 0.5	1.4			
30100	09/23/99	1.5	< 0.5	< 0.5	< 0.5	< 0.5		< 4	
30101	03/16/98	430	19	80	52	120			
30101	04/06/98								< 0.02
30101	06/11/98	2400	37	81	63	150			
30101	09/10/98	2400	29	99	63	150	25	30	< 10
30101	12/08/98	3300	32	100	48	160			
30101	03/08/99	2700	27	81	40	140			
30101	06/07/99	820	21	63	23	110			
30101	09/23/99	950	17	52	16	77		28	
30102	03/16/98	400	28	88	51	150			
30102	04/06/98								< 0.02
30102	06/11/98	1800	20	47	55	100		26	
30102	09/10/98	1700	21	76	68	110	27	26	< 10
30102	12/08/98	1100	15	95	110	85			
30102	03/08/99	1100	13	76	88	71			
30102	06/07/99	940	15	72	120	61			
30102	09/23/99	810	12	53	110	44		15	
30103	03/18/98	40	< 0.5	3.4	< 0.5	17		< 4	
30103	06/12/98	37	< 0.5	0.9	< 0.5	7.3		< 4	
30103	09/11/98	32	< 0.5	< 0.5	< 0.5	4.3	< 10	< 4	< 10
30103	12/09/98	16	< 0.5	< 0.5	< 0.5	1.8			
30103	03/09/99	16	< 0.5	< 0.5	< 0.5	< 0.5			
30103	06/08/99	7.3	< 0.5	< 0.5	< 0.5	< 0.5			
30103	09/24/99	31	< 0.5	0.61	< 0.5	1.6		< 4	

Project: ARSA
Time Now: 07Feb00
Start: 01Jan95
Finish: 18Aug03
Run: 02/14/2000

Table 4-1
American River Study Area
Project Schedule

ID	Activity Desc.	Dur	Start	Finish
D30001	ADMINISTRATIVE ORDER EFFECTIVE	0	23May95	23May95
D30002	NOTIFY AGENCIES OF CONTRACTORS	14d	15Mar95	15Mar95
D30003	SUBMIT NOTICE OF PROJECT MANAGER	1d	01Jun95	01Jun95
D30004	SUBMIT NOTICE TO COMPLY	1d	16Jun95	16Jun95
D30005	ADMINISTRATIVE ORDER WITHDRAWN	1d	27Nov95	27Nov95
D3A101	SUBMIT 60% BASIS OF DESIGN	30d	20Jan95	20Jan95
D3A102	AGEN REV 60% DESIGN	30d	23Jan95	21Feb95
D3A103	SUBMIT 90% BASIS OF DESIGN	45d	01Mar95	17Apr95
D3A104	AGEN REV 90% DESIGN	30d	18Apr95	09Jun95
D3A201	SUBMIT DRAFT REMOVAL ACTION WP	1d	06Mar95	06Mar95
D3A202	AGEN REV DRAFT RA WORKPLAN	30d	07Mar95	12Jul95
D3C002	SUBMIT MONITORING PLAN	30d	22Sep95	22Sep95
D3C003	AGEN REV & APPROVE MONIT PLAN	30d	23Sep95	12Oct95
D4A000	PREP SOUTH RA ASSESSMENT RPT	45d	23May95	07Jul95
D4A001	SUBMIT SOUTH RA ASSESSMENT RPT	1d	10Jul95	10Jul95
D5A001	RB ISSUES CLEANUP AND ABATE OR	1d	22Nov95	22Nov95
[illegible]A002	SUBMIT PRELIM FACILITIES PLAN	1d	13Nov95	13Nov95
[illegible]A003	RB APPROVES PRELIM FAC PLAN	1d	22Nov95	22Nov95
D5A004	SUBMIT INTERIM SYS MON PLAN	1d	22Dec95	22Dec95
D5A005	SUBMIT O&M PLAN	1d	01Mar96	01Mar96
D5A006	BD OF SUPS GRANT ACCESS	1d	09Apr96	09Apr96
D5A007	CONSTRUCT INTERIM SYSTEM	60d	10Apr96	02Aug96
D5A008	OPERATE INTERIM SYSTEM	500d	04Aug96	13Oct97
D5A009	SUBMIT APP FOR WASTE DISCHARGE	1d	24Jan96	24Jan96
D5A010	RB HEARING FOR NPDES PERMIT	1d	22Mar96	22Mar96
D5A011	INTERIM SYSTEM NPDES PERMIT	1825d	23Mar96	17Apr98
D5A012	COUNTY EASEMENT	500d	19Apr96	19Oct97
D5A013	SUBMIT MONTHLY MONITOR RESULTS	1d	25Apr97	25Apr97
D5A015	SUBMIT ANNUALLY WRITTEN RPT	1d	30Jan97	30Jan97
D6A001	SUBMIT PROPOSED AMEND TO EE/CA	1d	18Aug95	18Aug95
D6A002	SUBMIT OUT/SCH FOR REV EE/CA	1d	01Dec95	01Dec95
D6A101	CONDUCT AQUIFER TESTS	42d	15Jun95	15Sep95
D6A102	EVALUATE AQUIFER TEST RESULTS	25d	18Sep95	01Nov95
D6A103	SAMPLE MONITOR WELLS	67d	05Jul95	05Oct95
D6A104	RECEIVE MONITOR WELL DATA	67d	07Aug95	15Nov95
D6A105	UPDATE PLUME DIAGRAMS	45d	04Dec95	13Feb96
[illegible]A106	UPDATE X-SECTIONS	45d	04Dec95	13Feb96
[illegible]A107	RIVER CROSSING PROJECT PLAN	75d	01Oct95	22Dec95
D6A108	CONDUCT AIR RISK ASSESSSMENT	45d	02Dec95	30May96

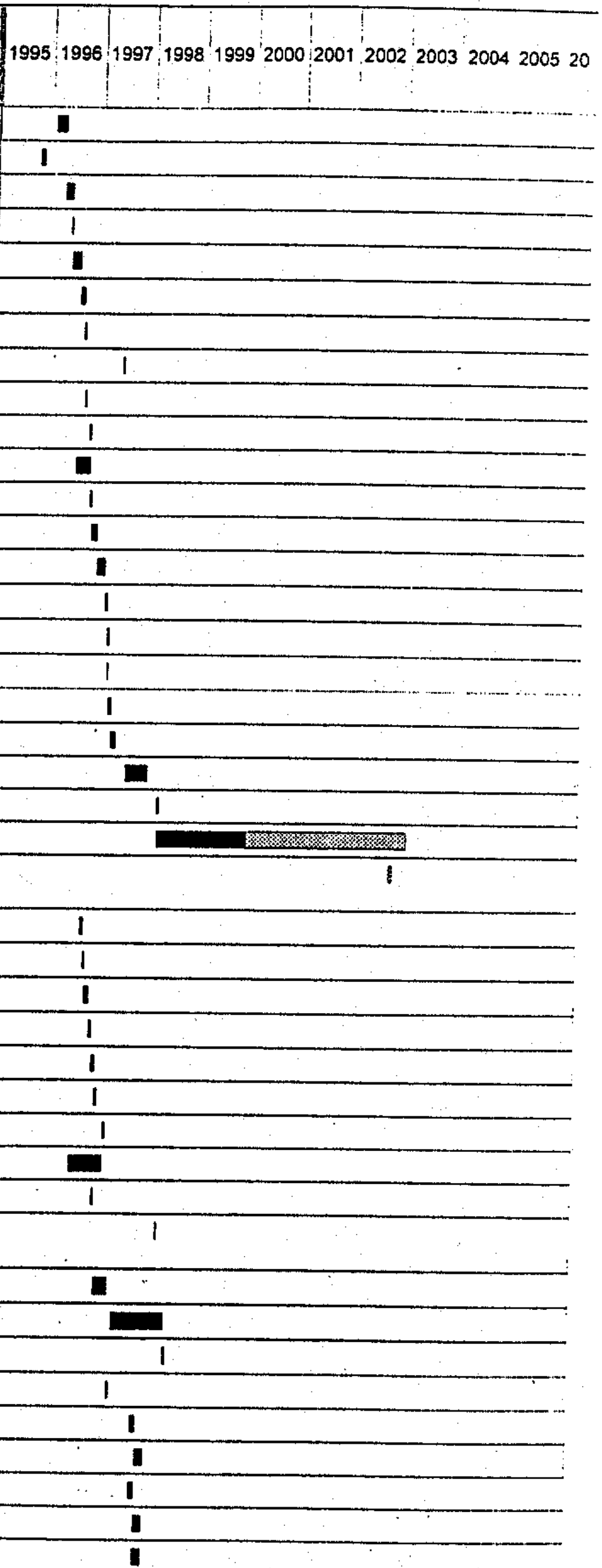


Planned ▨
Critical ▨
Milestone ■
Progress ■
Summary ▨

Project: ARSA
Time Now: 07Feb00
Start: 01Jan95
Finish: 18Aug03
Run: 02/14/2000

Table 4-1
American River Study Area
Project Schedule

ID	Activity Desc.	Dur	Start	Finish
D6A109	EVAL TRMT/DISCHG ALTERNATIVES	59d	23Jan96	29Mar96
D6A110	COMPLETE NATIONAL ENV SURVEY	30d	01Oct95	15Nov95
D6A111	PREPARE REVISED EE/CA	30d	01Apr96	28May96
D6A112	SUBMIT DRAFT REVISED EE/CA	1d	28May96	28May96
D6A113	AGEN COMM ON DRAFT REV EE/CA	30d	29May96	08Aug96
D6A114	REVISE SUBMIT FINAL REV EE/CA	30d	09Aug96	13Sep96
D6A115	CONDUCT PUBLIC MTG	1d	05Sep96	05Sep96
D6A119	BOARD OF SUPERVISORS HEARING	45d	17Jun97	24Jun97
D6A120	RB ISSUES CLEAN & ABATE ORDER	1d	20Sep96	20Sep96
D6A121	SUBMIT SCHEDULE	1d	01Nov96	01Nov96
D6A201	PREPARE INITIAL STUDY	39d	26Jul96	14Nov96
D6A202	SUBMIT INITIAL STUDY TO DERA	1d	15Nov96	15Nov96
D6A203	DERA REVIEWS INITIAL STUDY	30d	16Nov96	06Jan97
D6A204	REVISE & SUBMIT INITIAL STUDY	60d	07Jan97	06Mar97
D6A205	DERA REV, PROVIDES COM ON IS	30d	07Mar97	28Mar97
D6A205A	ESA REVISES INITIAL STUDY	5d	01Apr97	13Apr97
D6A205B	DERA REV IS; ISS MIT NEG DEC	4d	08Apr97	14Apr97
D6A206	CEQA PUBLIC COMMENT	30d	14Apr97	14May97
D6A207	RESPOND TO PUBLIC COMMENTS	30d	14May97	16Jun97
A301	PREPARE AND SUBMIT NPDES APP	14d	02Sep97	31Jan98
6A302	RB HEARING FOR NPDES PERMIT	1d	17Apr98	17Apr98
D6A303	NPDES PERMIT	1809d	17Apr98	01Apr03
D6A304	SUBMIT NPDES RENEWAL APPLICATION	30d	01Dec02	30Dec02
D6B001	SUBMIT 10% DESIGN	27d	01Nov96	25Nov96
D6B002	AGENCIES REVIEW 10% DESIGN	14d	26Nov96	04Dec96
D6B003	REVISE/SUBMIT 60% DESIGN	20d	05Dec96	10Jan97
D6B004	AGEN REVIEW 60% DESIGN	14d	13Jan97	03Feb97
D6B005	REVISE/SUBMIT 90% DESIGN	28d	04Feb97	23Feb97
D6B006	AGEN REVIEW 90% DESIGN	14d	24Feb97	17Mar97
D6B106	AGEN APPROVE FINAL DESIGN	14d	06May97	21May97
D6B200	OBTAIN PERMITS & EASEMENTS	180d	13Sep96	15May97
D6B201	REQUEST STORMWATER PERMIT	15d	01Mar97	15Mar97
D6B202	COUNTY GRANTS LONG-TERM LEASE	1d	02Jun98	02Jun98
D6C001	BID & AWARD CONSTRUCTION	90d	24Mar97	22Jun97
D6C002	CONSTRUCT TREATMENT PLANT	240d	02Aug97	18Aug98
D6C003	AGENCIES INSPECT CONSTRUCTION	27d	19Aug98	19Aug98
D6C004	SUBMIT HEALTH & SAFETY PLAN	30d	14Jul97	14Jul97
D6C008	SUBMIT O&M PLAN	30d	01Jan98	31Jan98
D6C009	AGENCY REVIEW OF O&M PLAN	30d	01Feb98	30Mar98
C010	SUB GW MON PLAN, QAPP EFF WP	30d	01Jan98	31Jan98
6C011	AGEN REV OF GW MON PLAN	30d	01Feb98	30Mar98
D6C0110	AGEN REV OF QAPP	30d	01Feb98	30Mar98

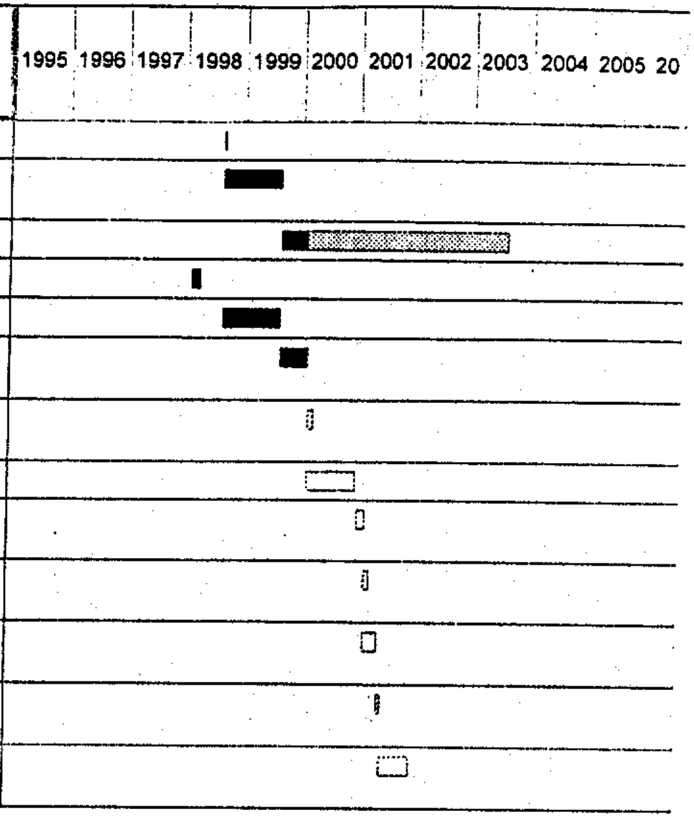


Planned	▭
Critical	▨
Milestone	▬
Progress	▬
Summary	▭

Project: ARSA
Time Now: 07Feb00
Start: 01Jan95
Finish: 18Aug03
Run: 02/14/2000

Table 4-1
American River Study Area
Project Schedule

ID	Activity Desc.	Dur	Start	Finish
D6D001	BEGIN FULL-SCALE OPERATION	9d	19Aug98	19Aug98
D6D002	OPERATE TREATMENT PLANT FOR 1 YEAR	365d	19Aug98	19Aug99
D6D003	OPERATE TREATMENT PLANT	1460d	20Aug99	18Aug03
D70001	AGEN APP EFF WORK PLAN	30d	01Feb98	30Mar98
D70002	EVALUATE EFFECTIVENESS	365d	19Aug98	19Aug99
D70003	PREPARE EFF RPT/REC MODIFICATION	180d	20Aug99	15Feb00
D70003A	AGENCIES REVIEW AND COMMENT ON EFFECTIVENESS EVALUATION	30d	16Feb00	16Mar00
D70004	EVALUATE AQUIFER D	320d	16Feb00	31Dec00
D70005	PREPARE & SUBMIT LETTER RPT ON AQUIFER D	60d	02Jan01	02Mar01
D70005A	AGENCIES REVIEW AND APPROVE LETTER REPORT	30d	03Mar01	01Apr01
D70006	PREPARE REMEDIAL ACTION DOCUMENTATION (RAP) WORKPLAN	90d	03Mar01	31May01
D70007	AGENCIES APPROVE REMEDIAL ACTION (RAP) WORKPLAN	30d	01Jun01	30Jun01
D70008	PREPARE AND SUBMIT REMEDIAL ACTION DOCUMENTATION	180d	01Jul01	04Jan02

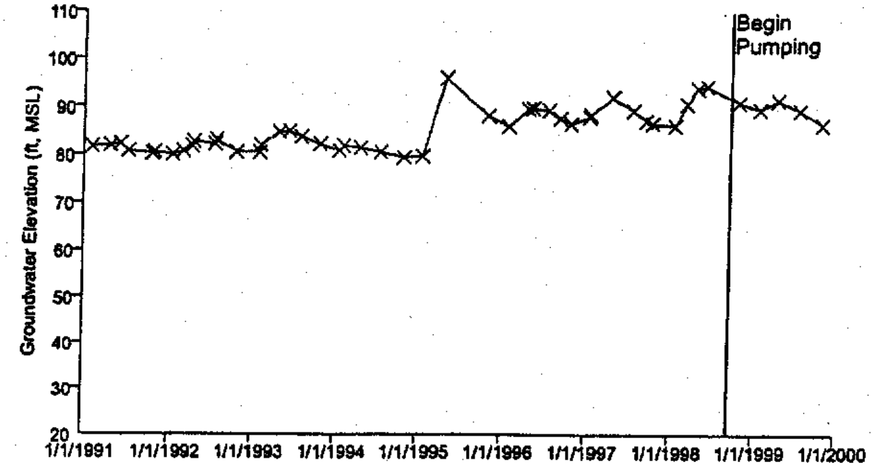


Planned	▨
Critical	▨
Milestone	■
Progress	■
Summary	▭

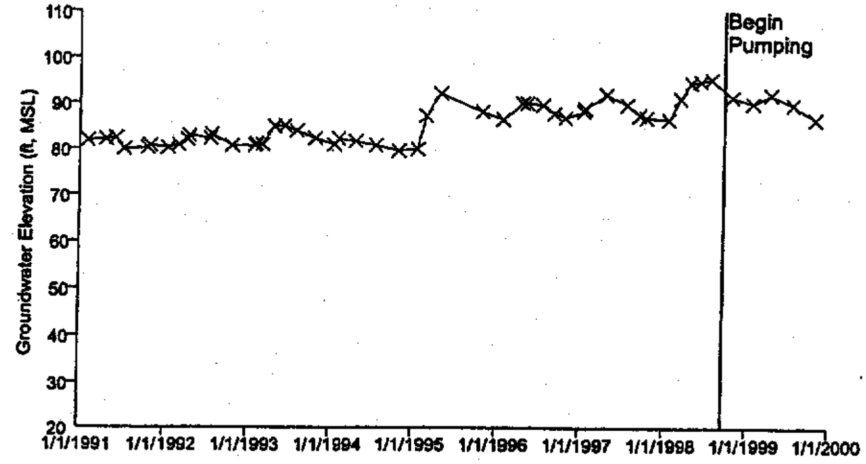
APPENDIX A

HYDROGRAPHS

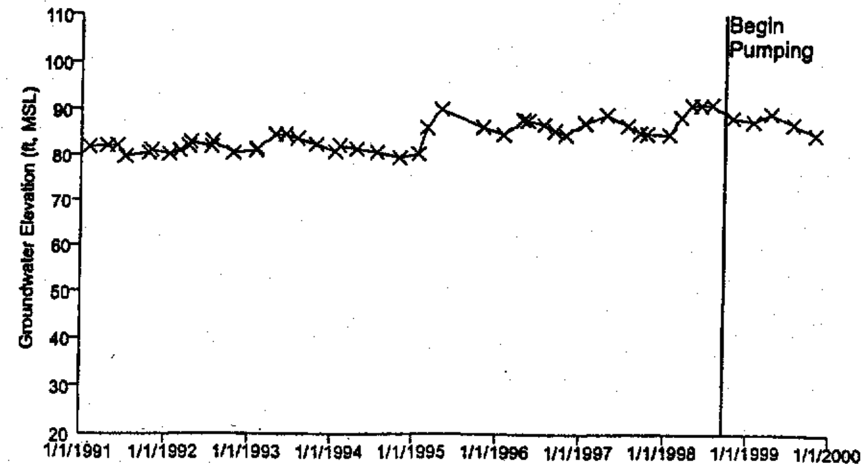
Well 1162



Well 1163



Well 1164



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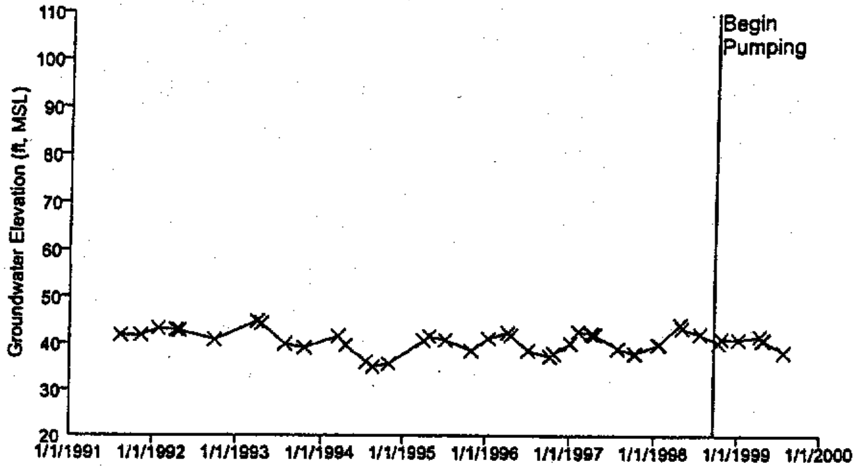

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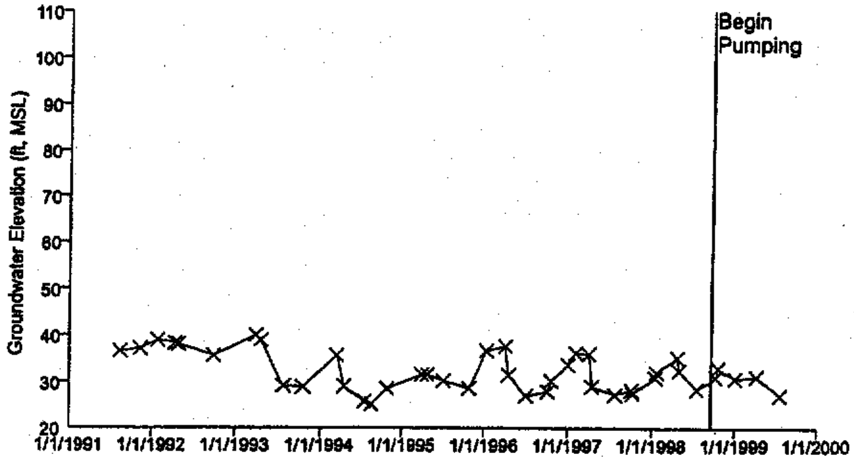

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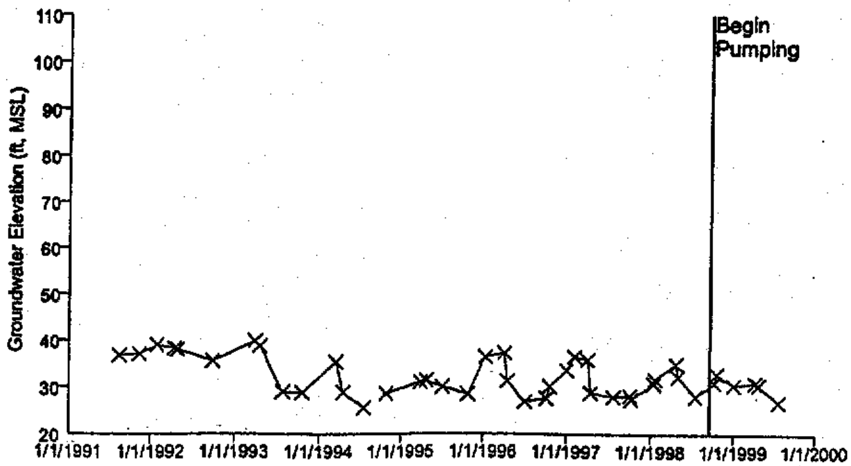

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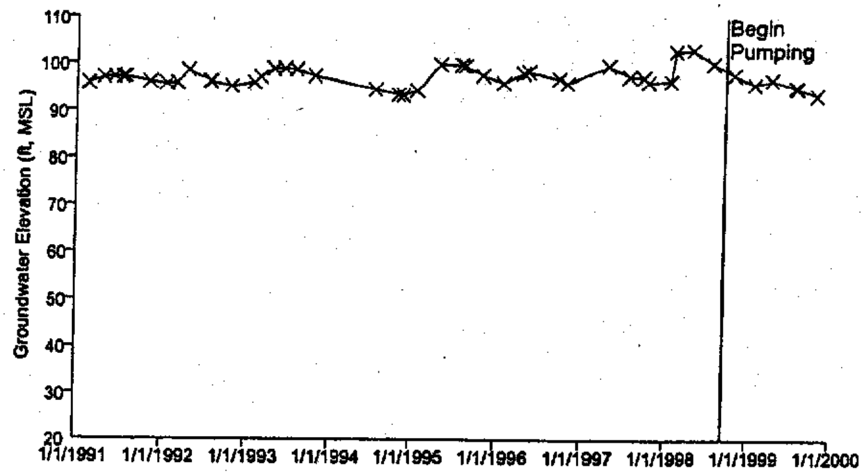

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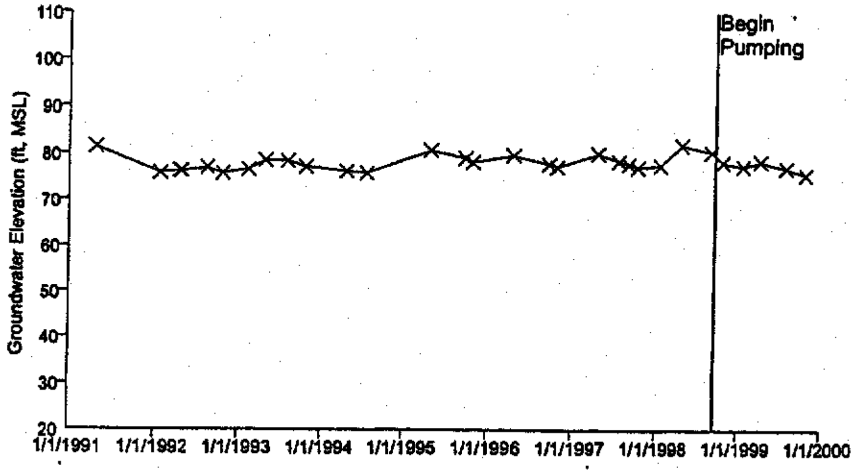

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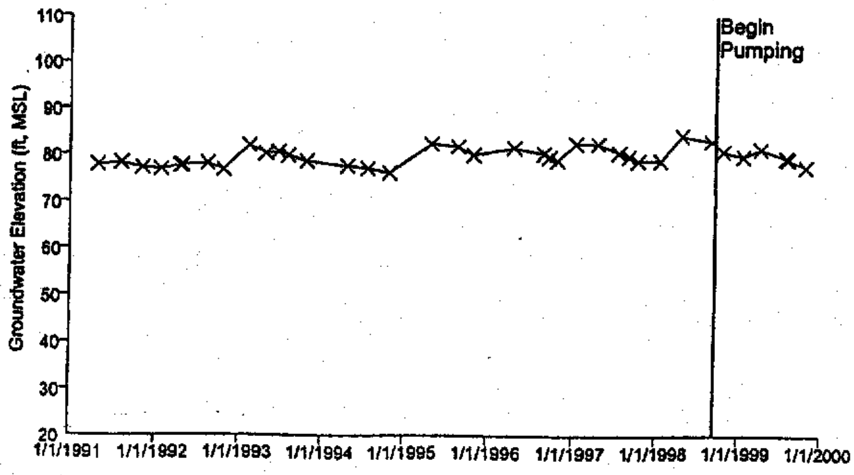

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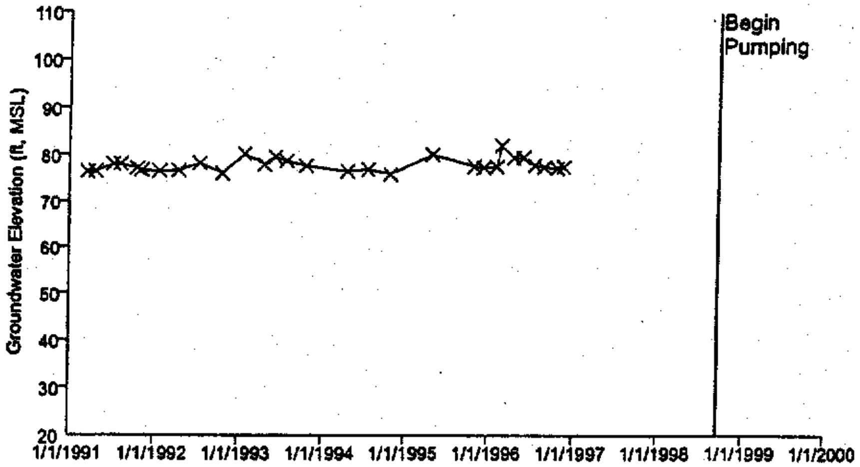

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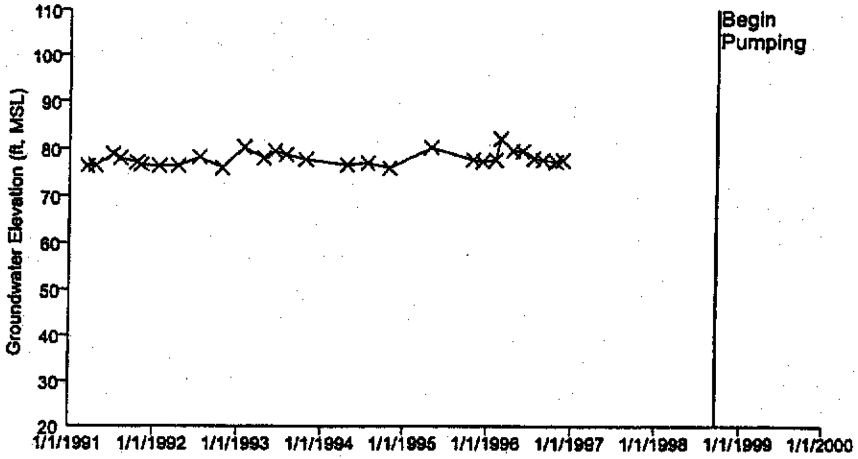

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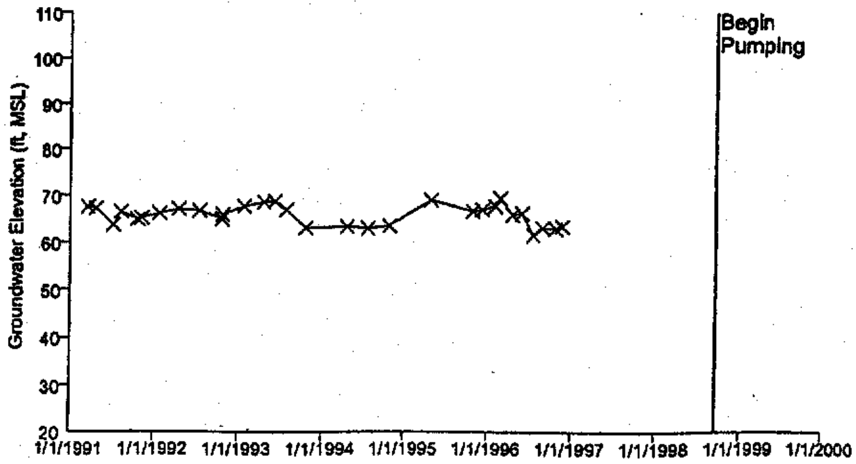

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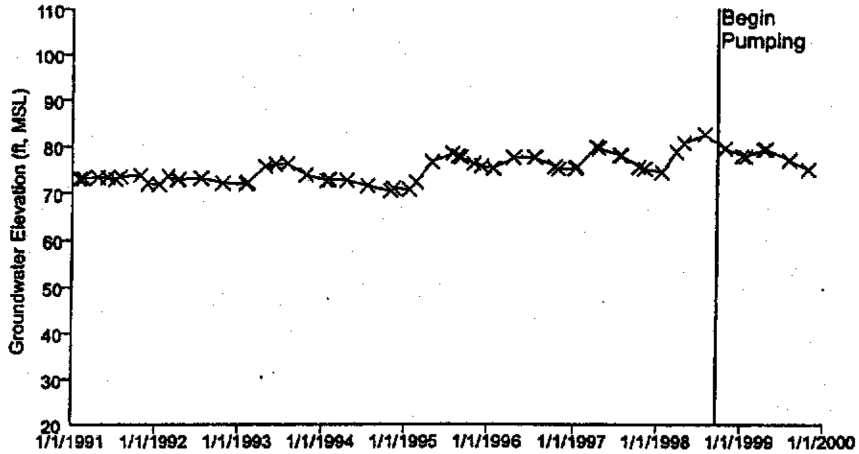

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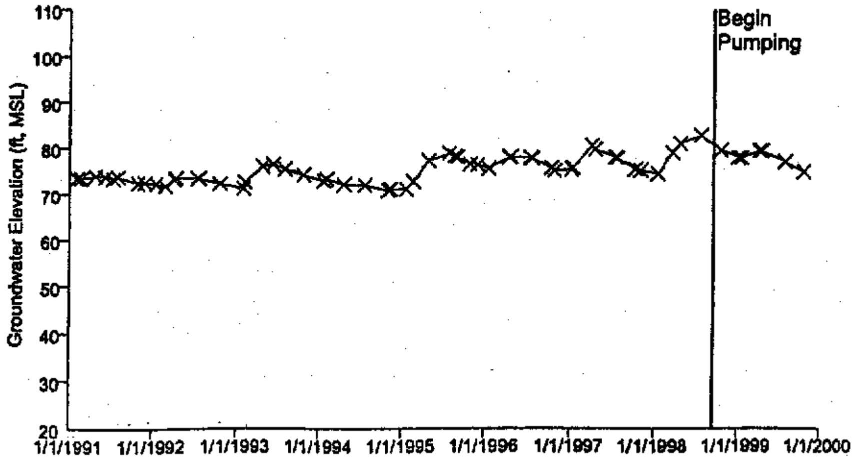

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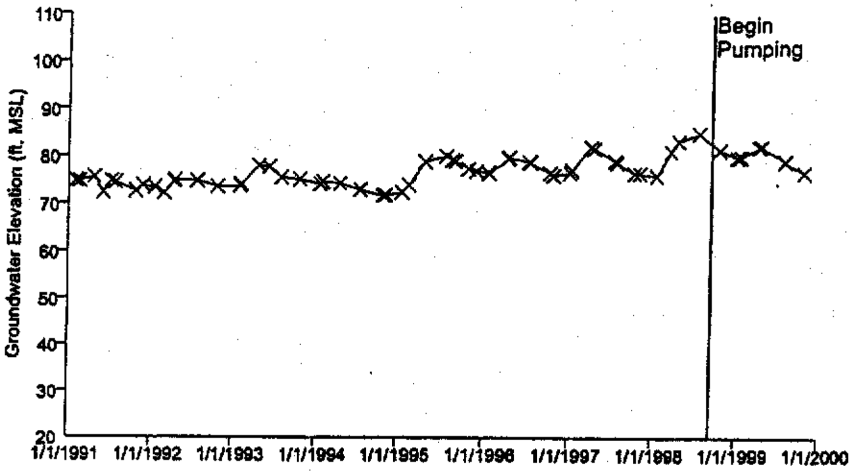

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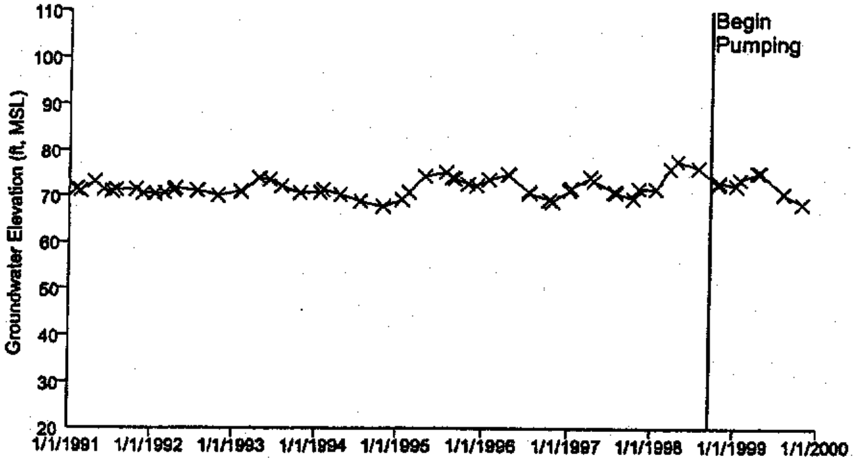

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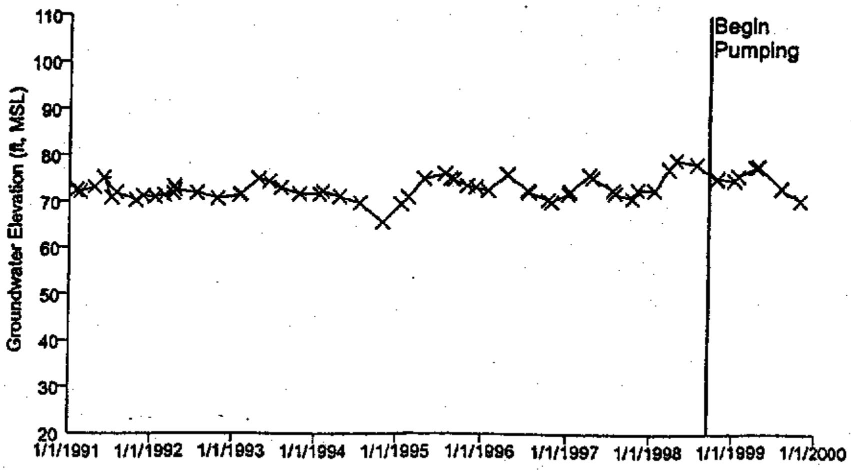

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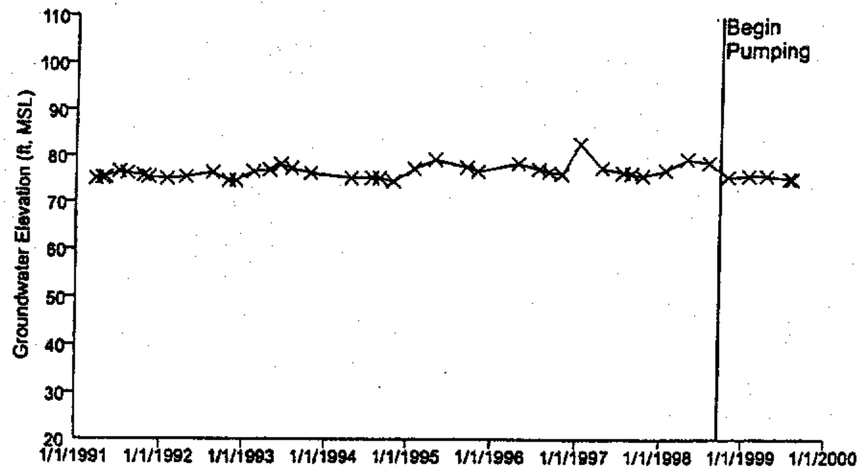

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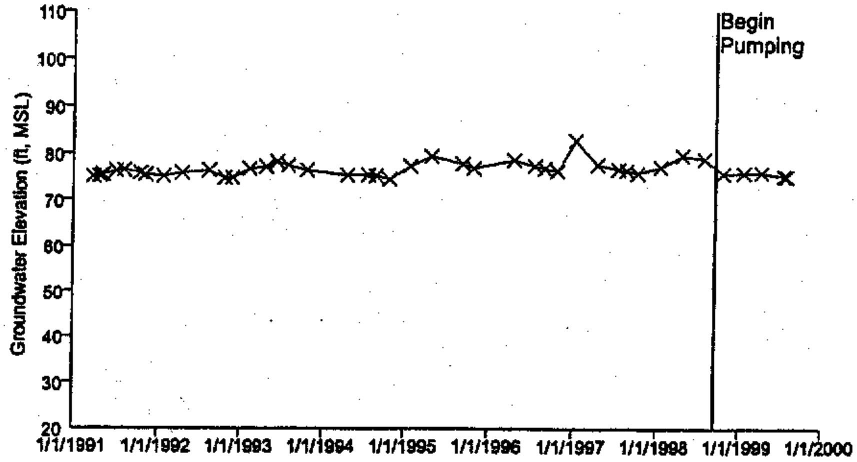

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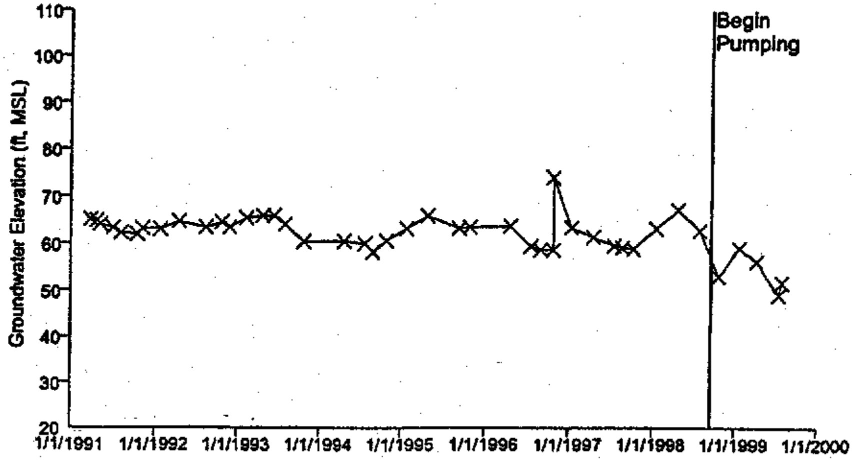

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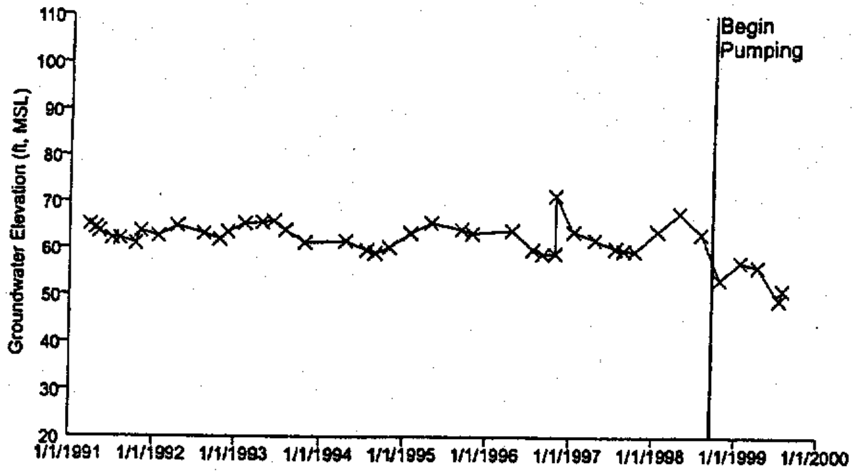

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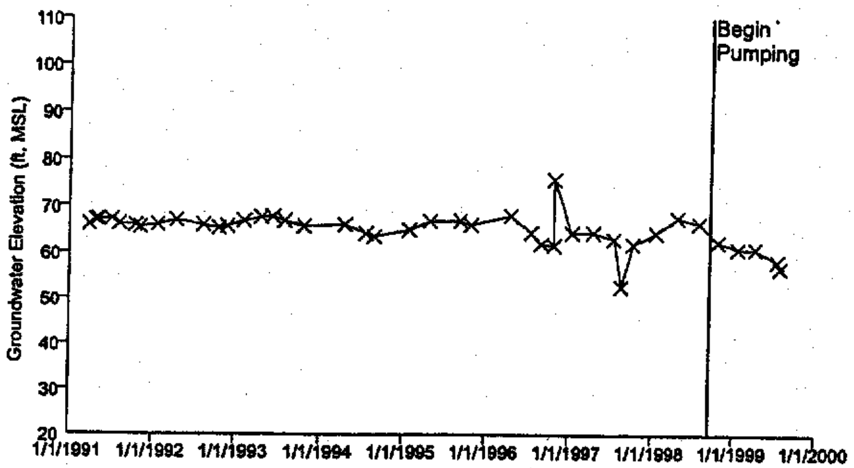

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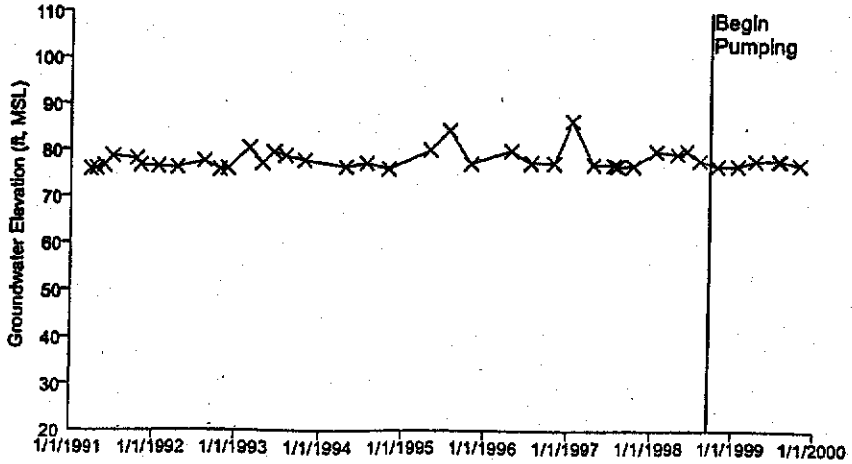

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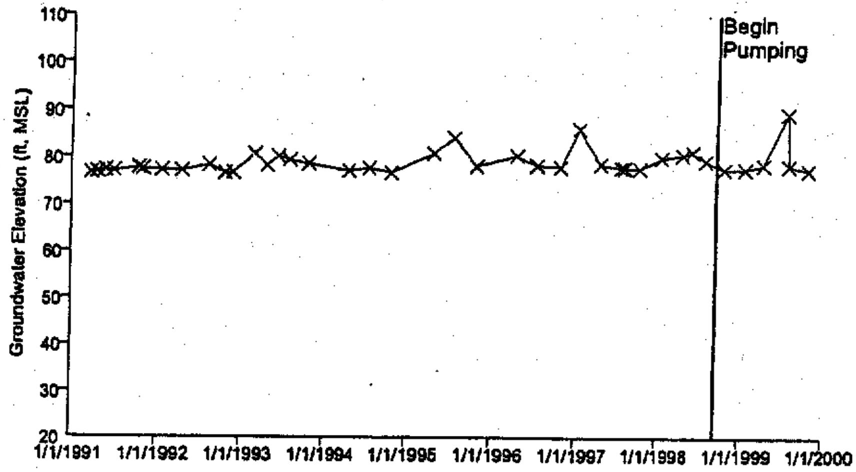

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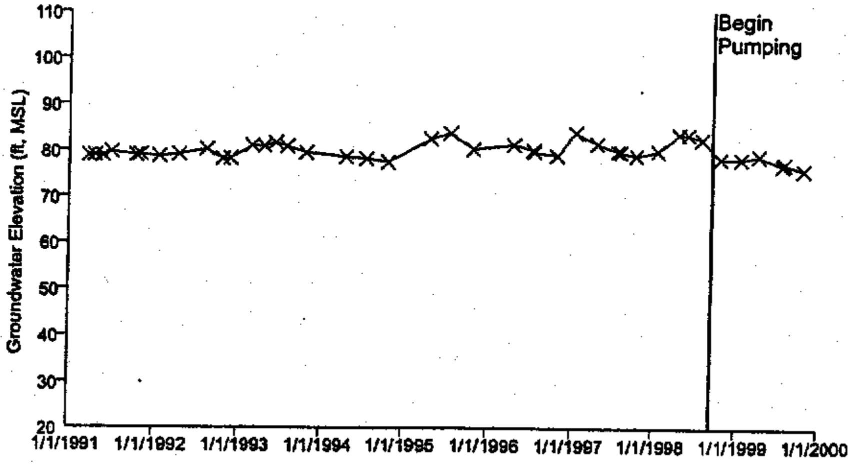

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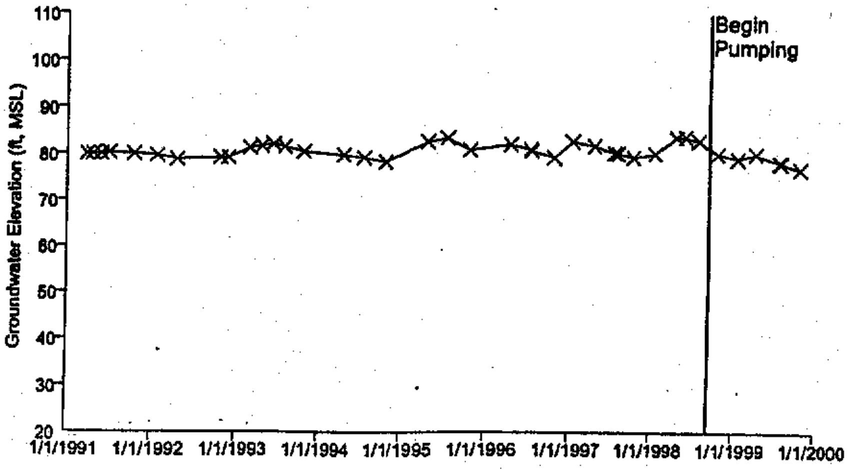

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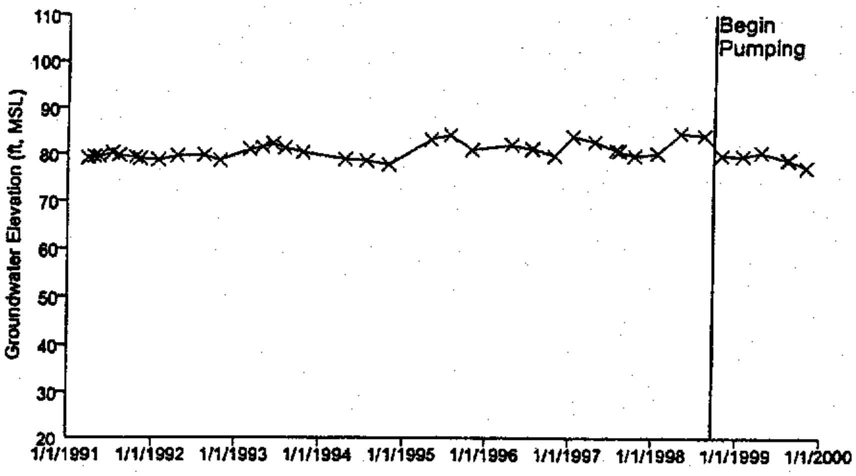

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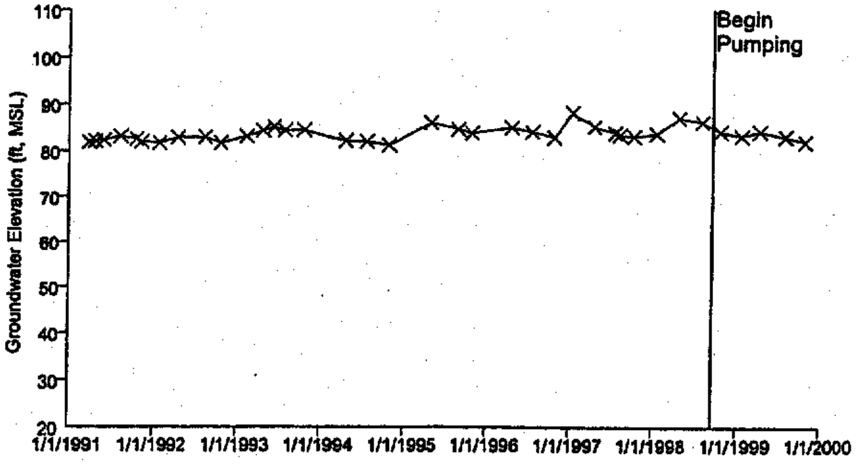

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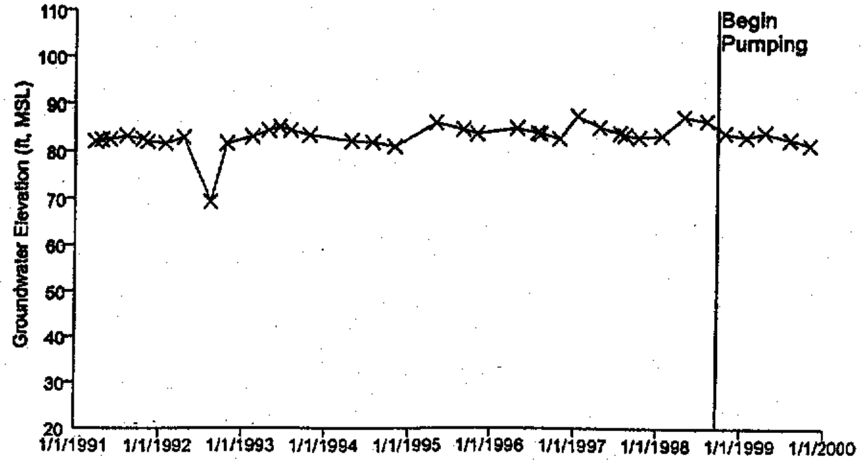

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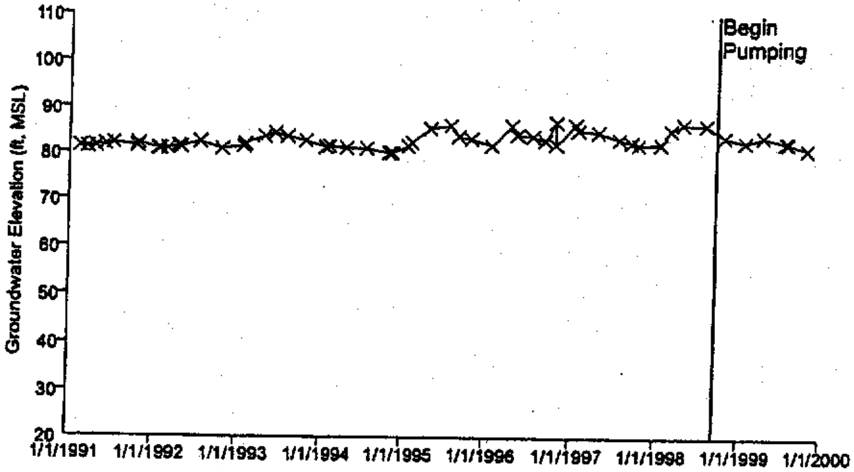

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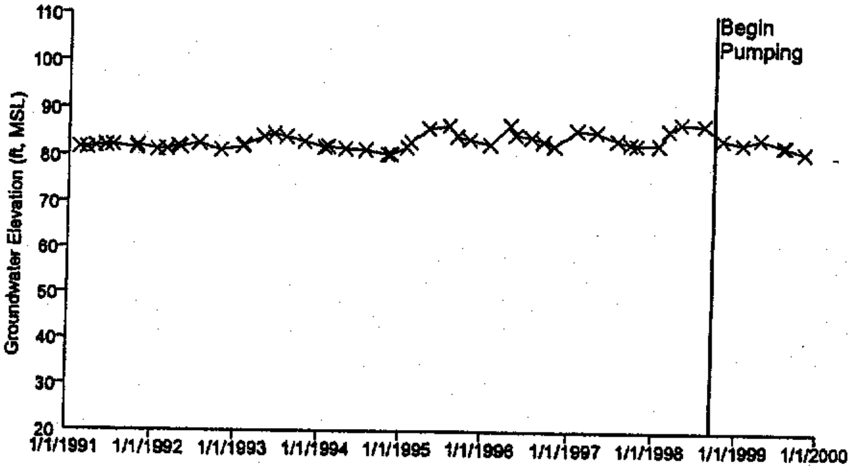

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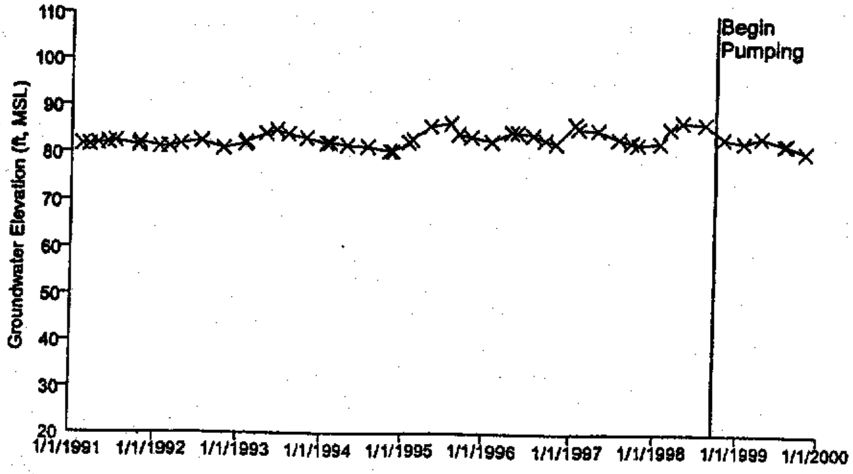

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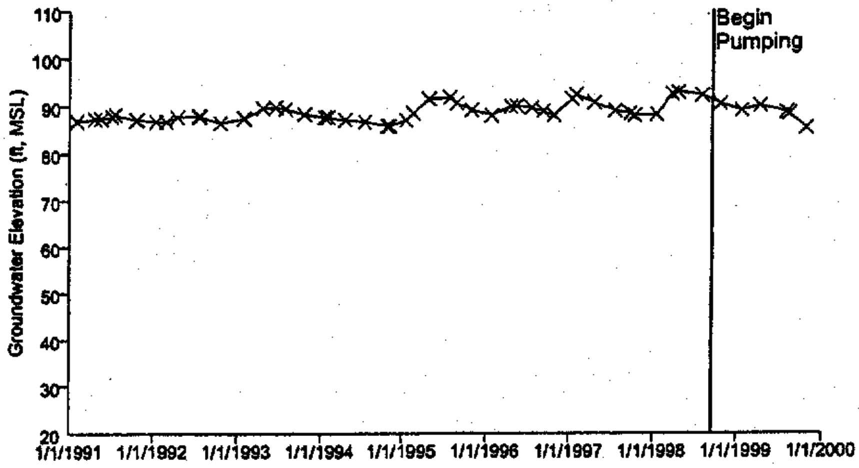

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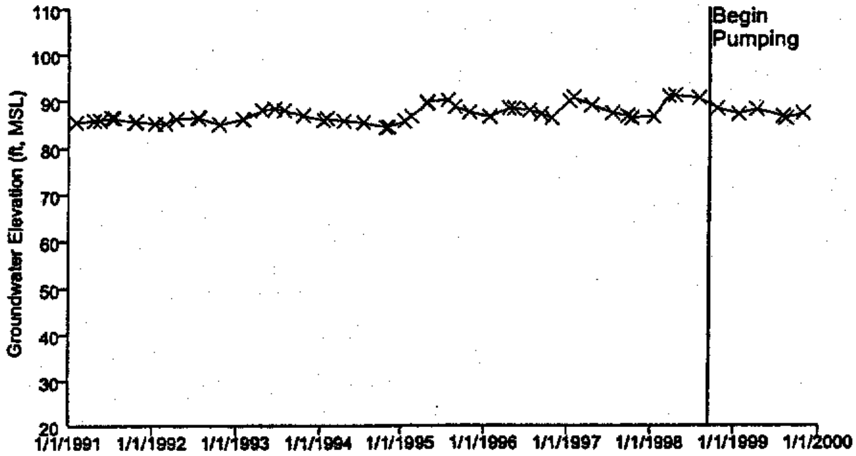

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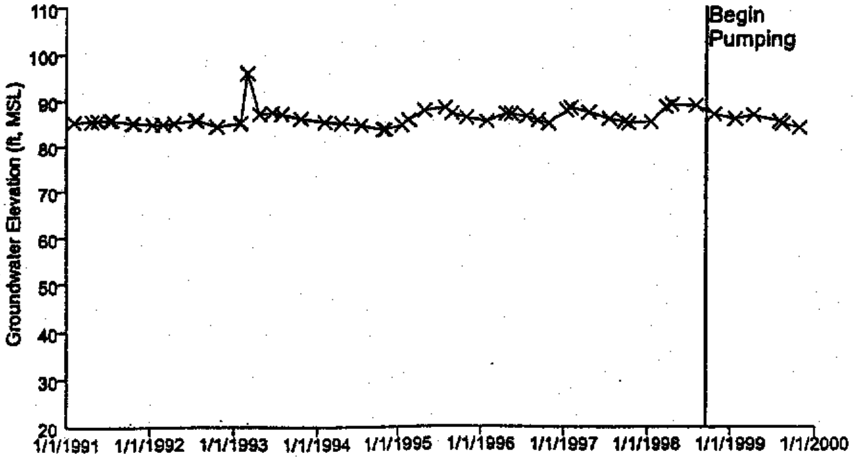

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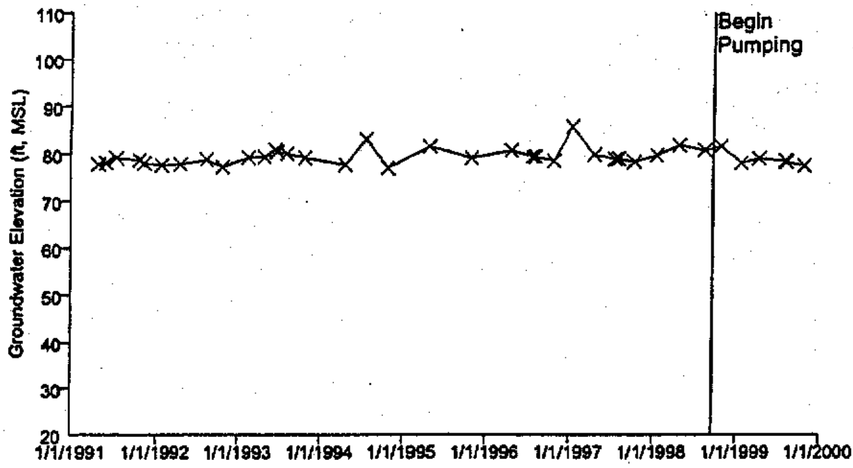

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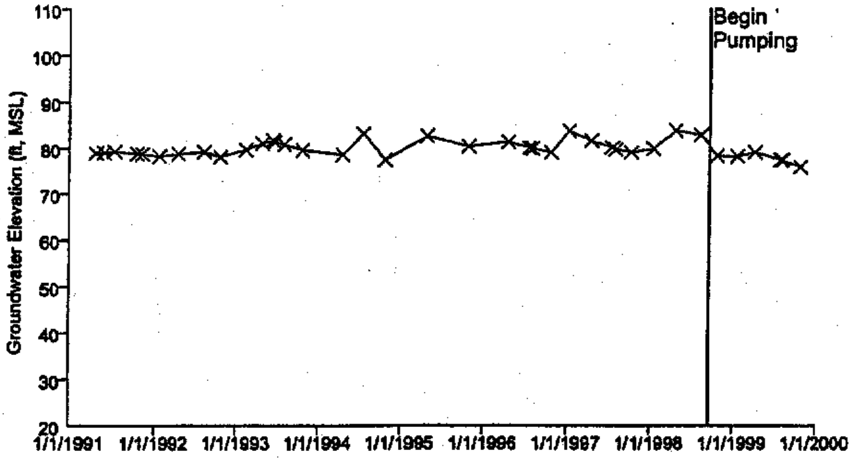

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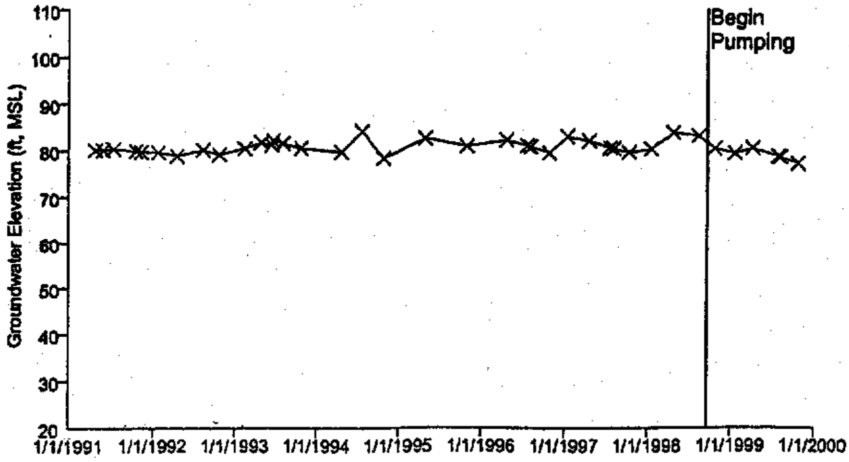

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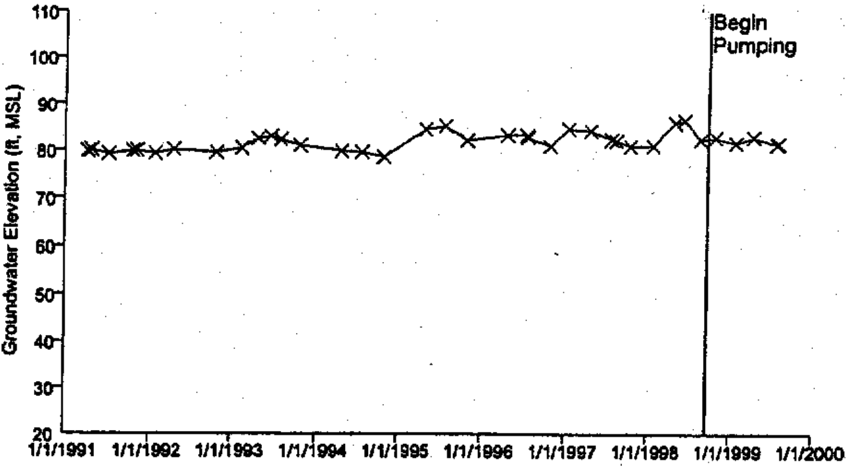

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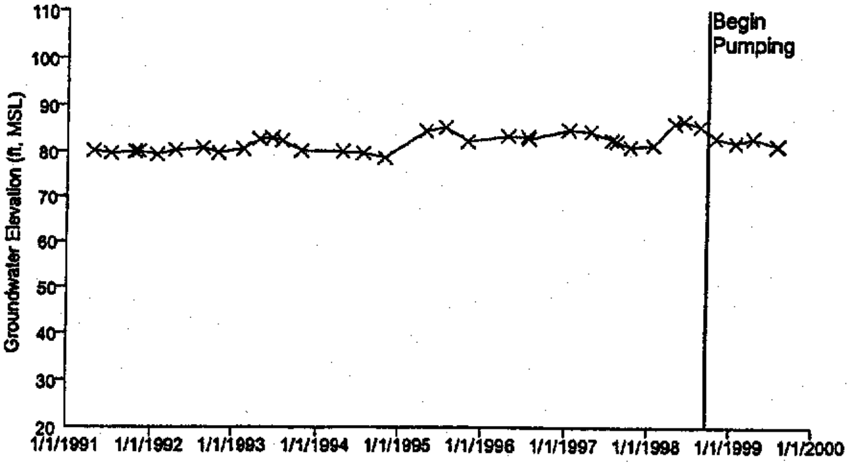

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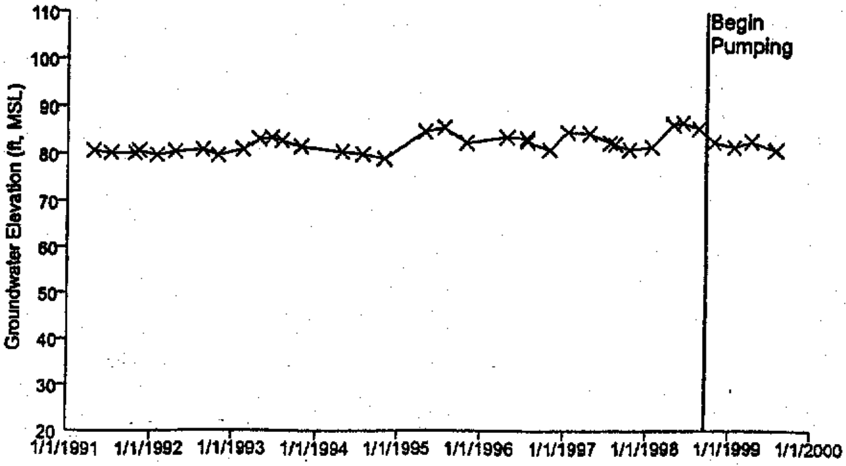

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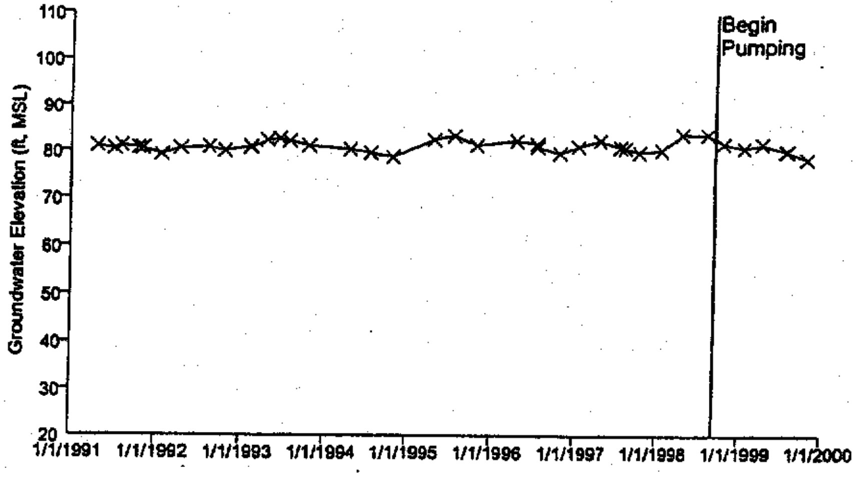

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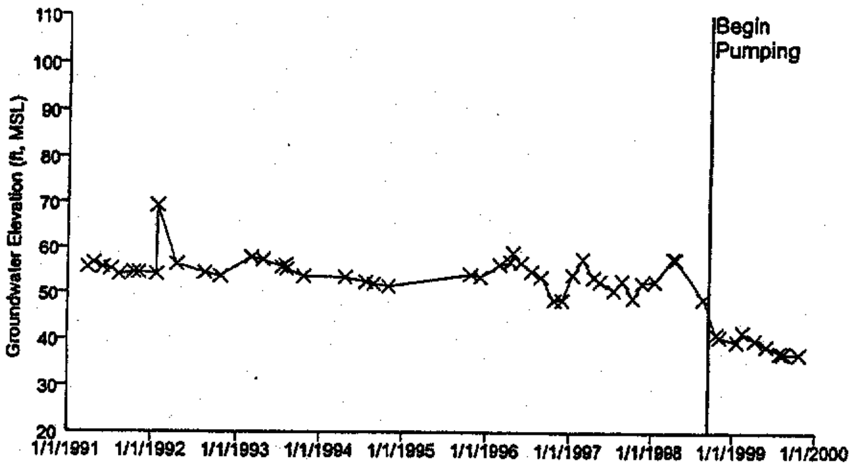

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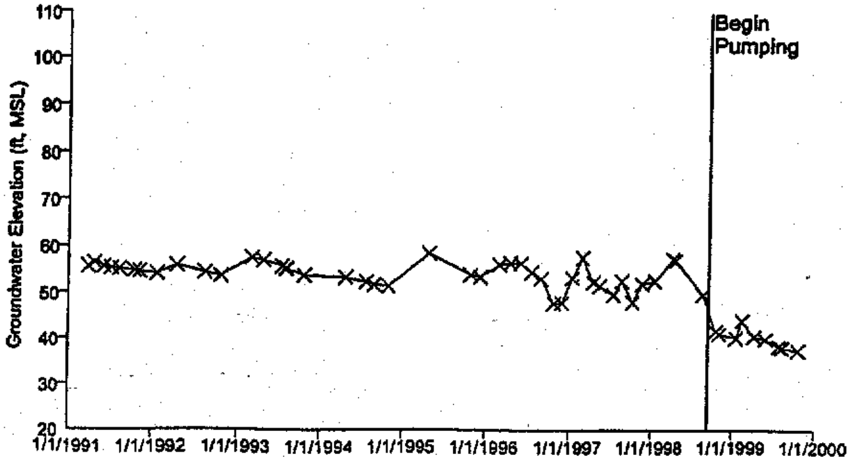

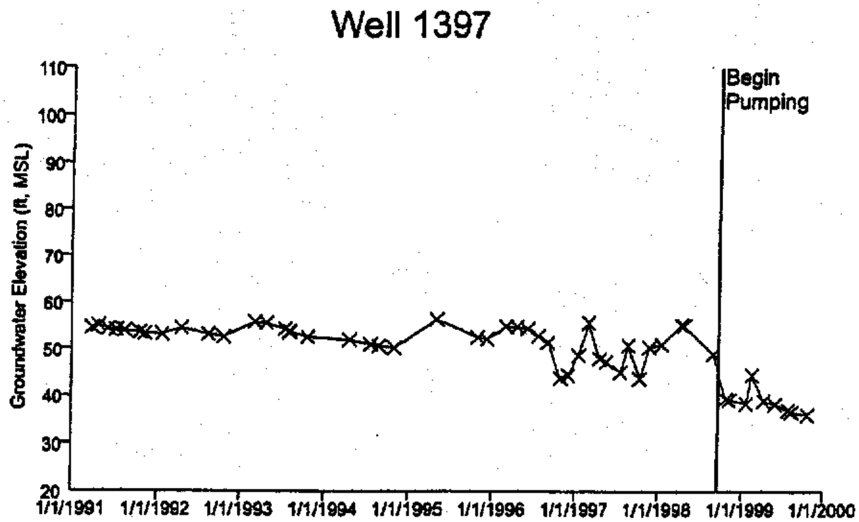
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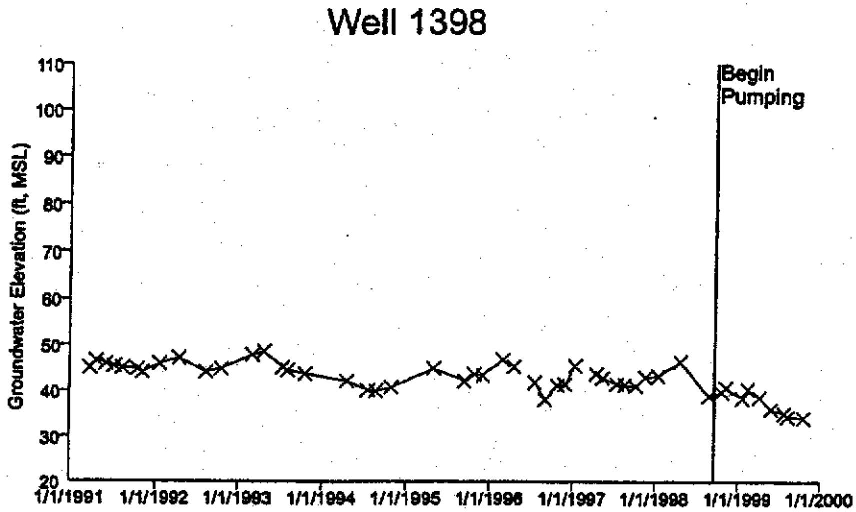
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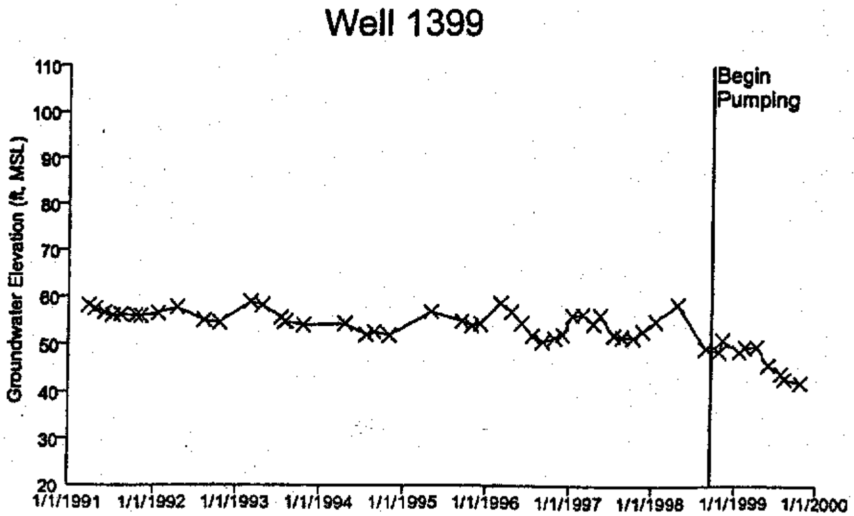
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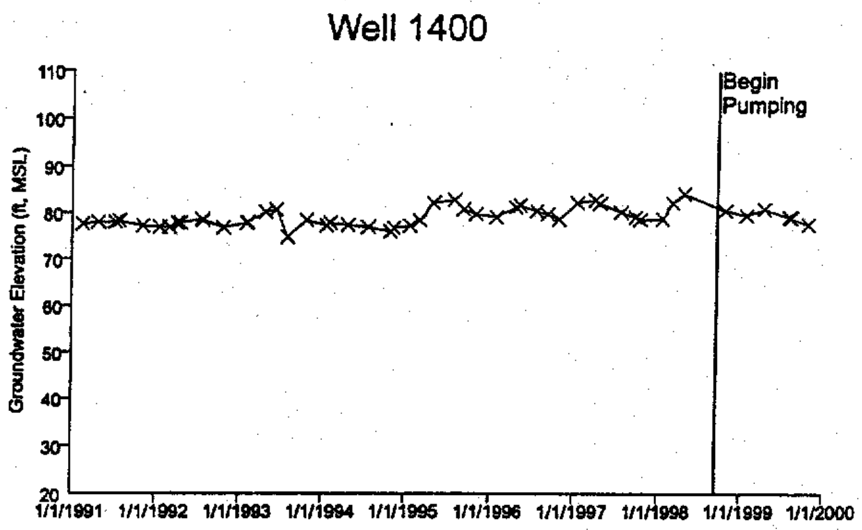
Well 1400
Groundwater Elevation (ft, MSL)
110
100
90
80
70
60
50
40
30
20
1/1/1991
1/1/1992
1/1/1993
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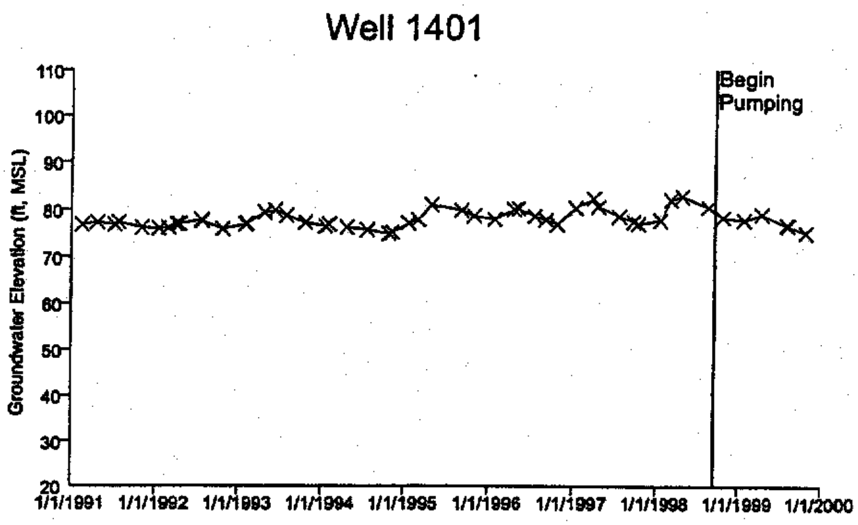
1/1/2000
Begin Pumping


Well 1401
Groundwater Elevation (ft, MSL)
110
100
90
80
70
60
50
40
30
20
1/1/1991
1/1/1992
1/1/1993
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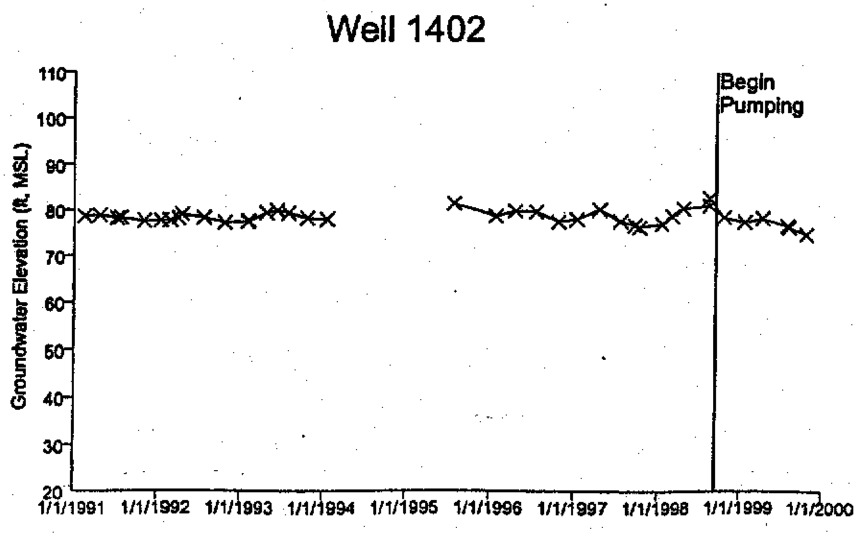
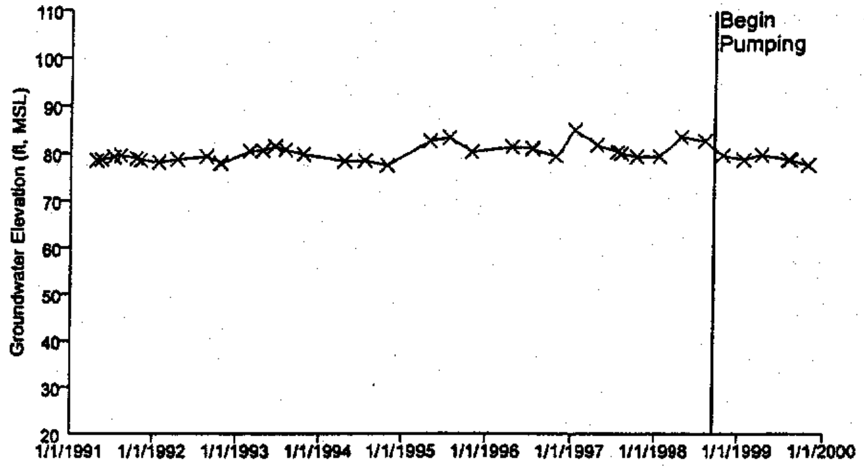
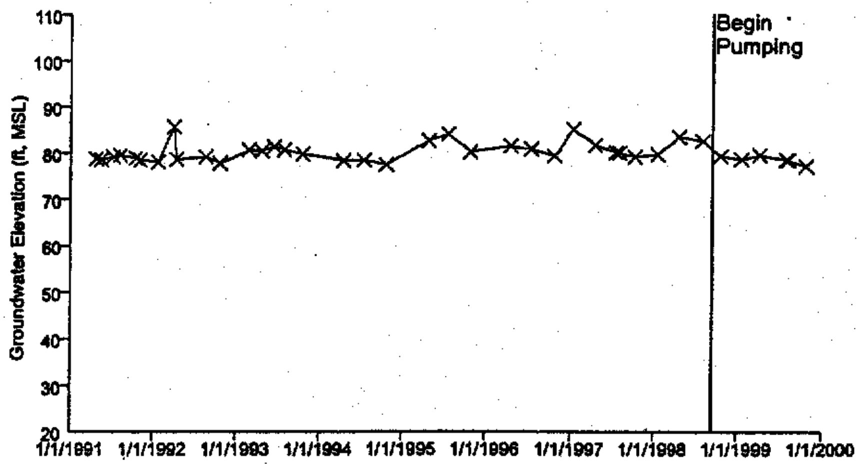
1/1/2000
Begin Pumping


Well 1402
Groundwater Elevation (ft, MSL)
110
100
90
80
70
60
50
40
30
20
1/1/1991
1/1/1992
1/1/1993
1/1/1994
1/1/1995
1/1/1996
1/1/1997
1/1/1998
1/1/1999
1/1/2000
Begin Pumping

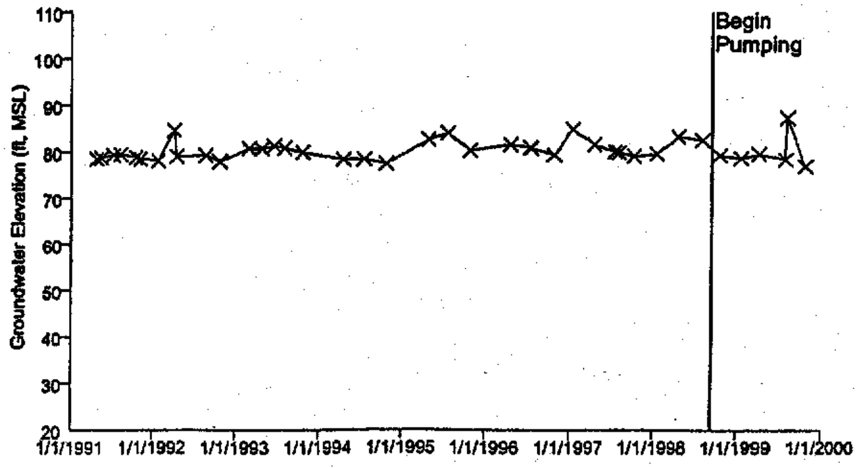
Well 1403



Well 1404



Well 1405



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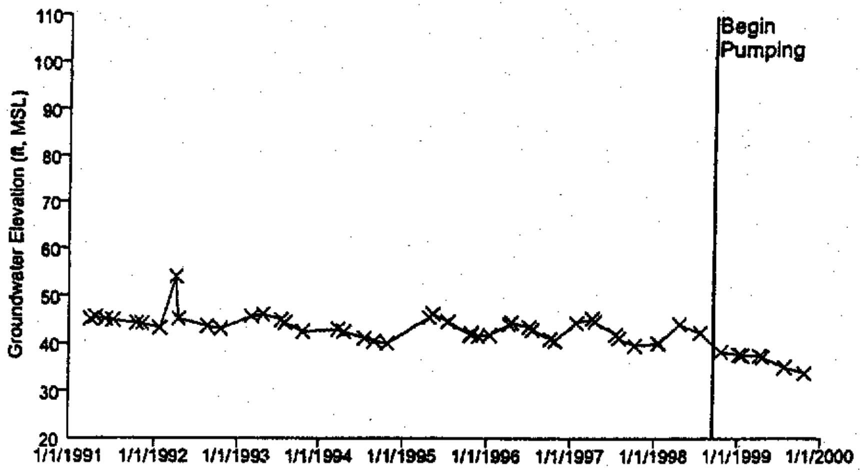

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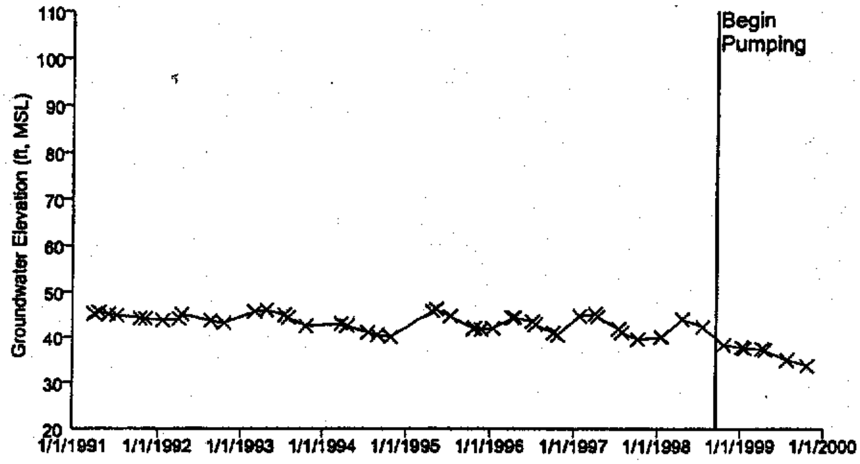
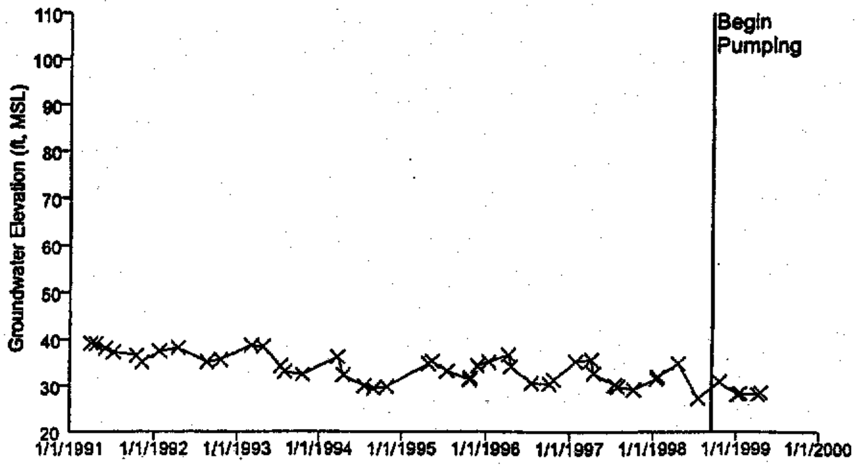


Well 1408



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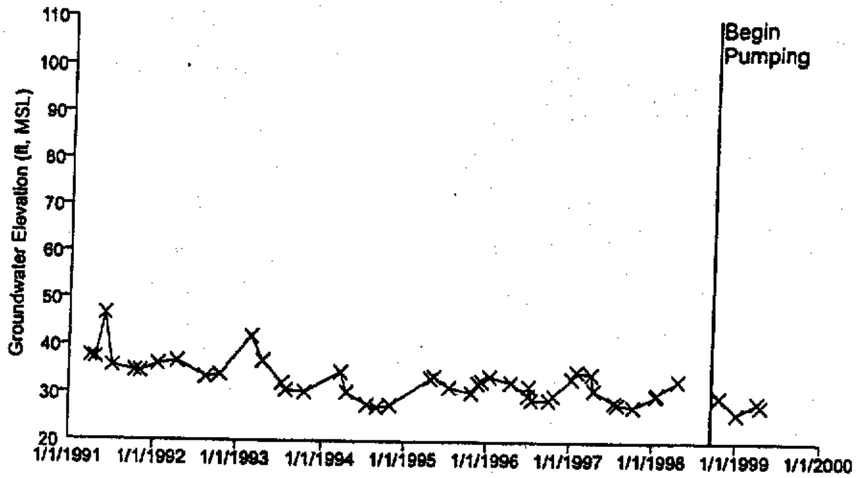
Groundwater Elevation (ft, MSL)
110
100
90
80
70
60
50
40
30
20
1/1/1991
1/1/1992
1/1/1993
1/1/1994
1/1/1995
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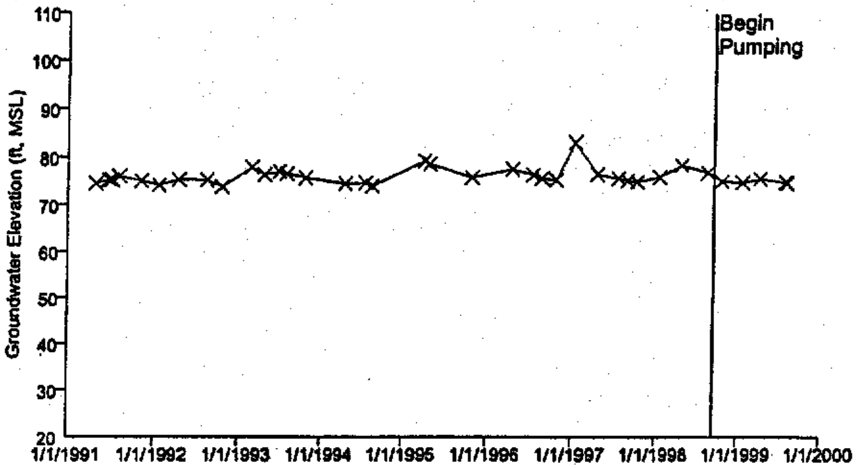
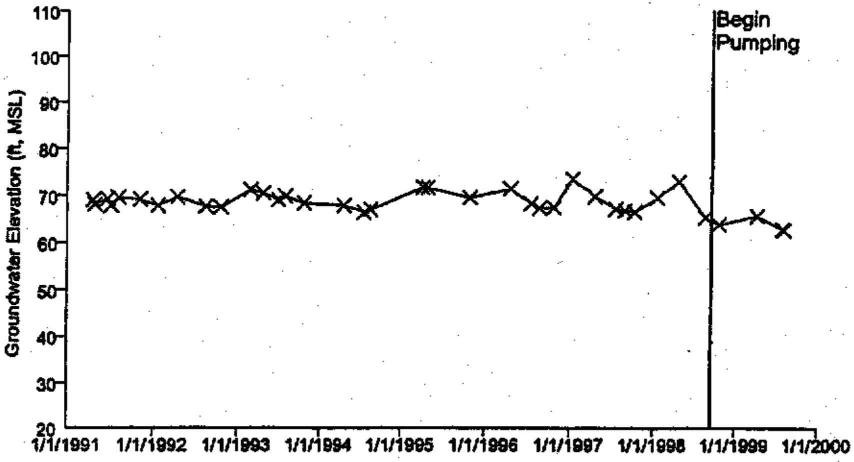
1/1/1997
1/1/1998
1/1/1999
1/1/2000
Begin Pumping

Well 1469

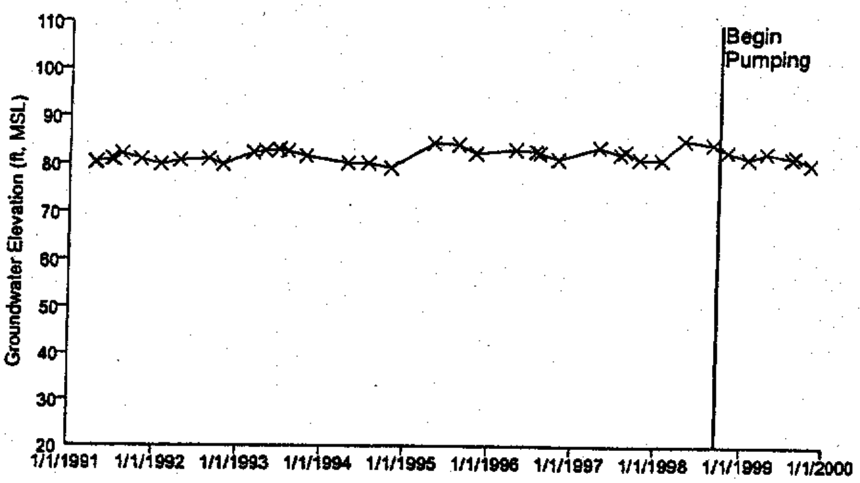


Well 1470

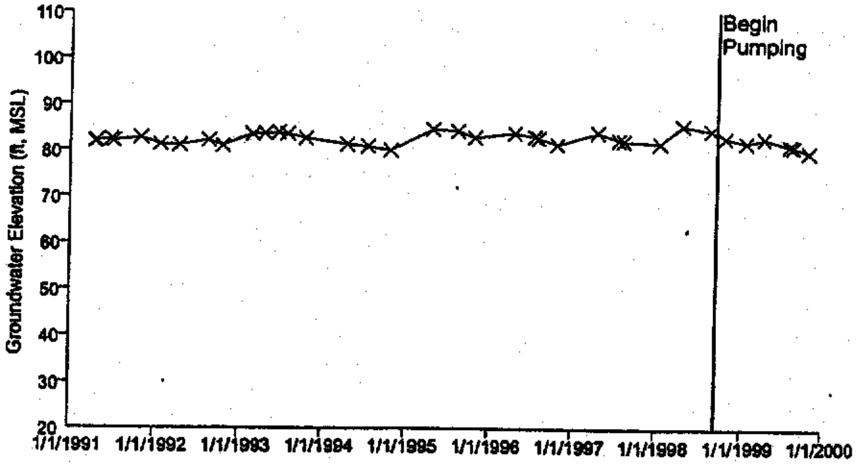


Well 1471

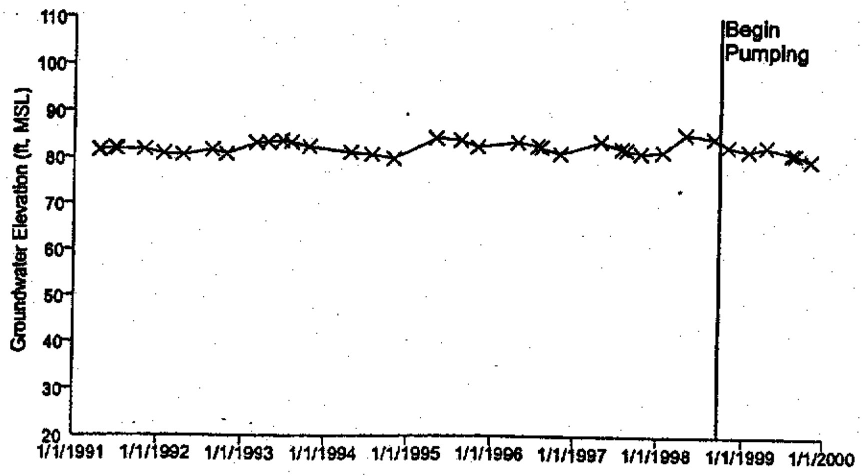
Well 1472

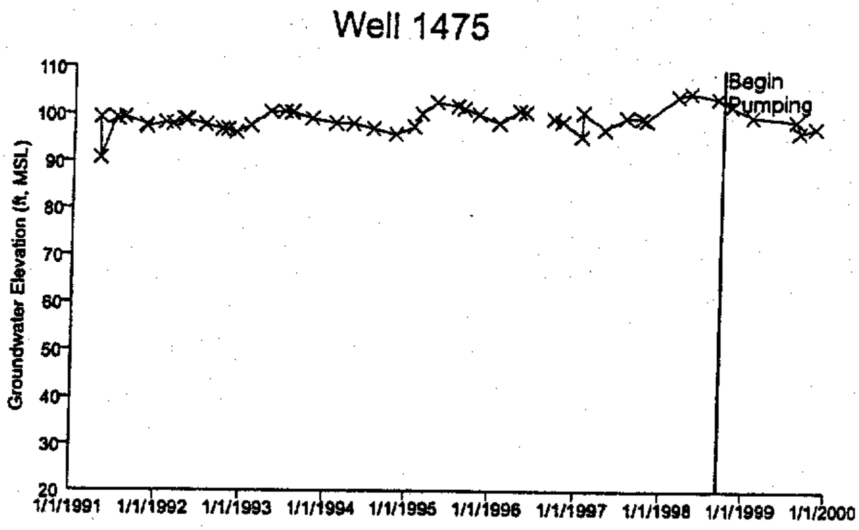


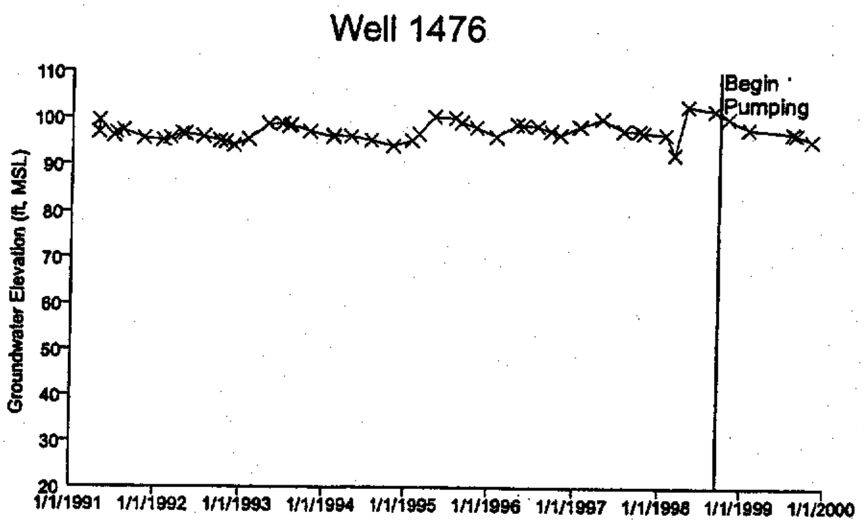
Well 1473

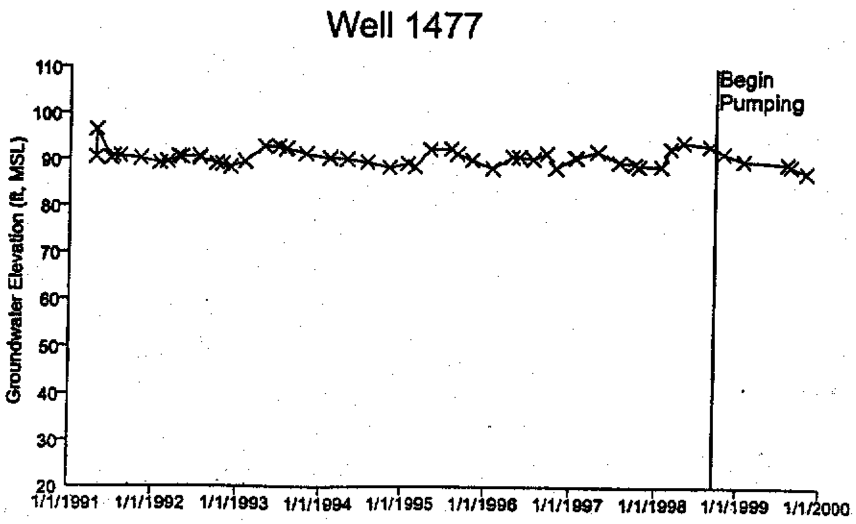


Well 1474

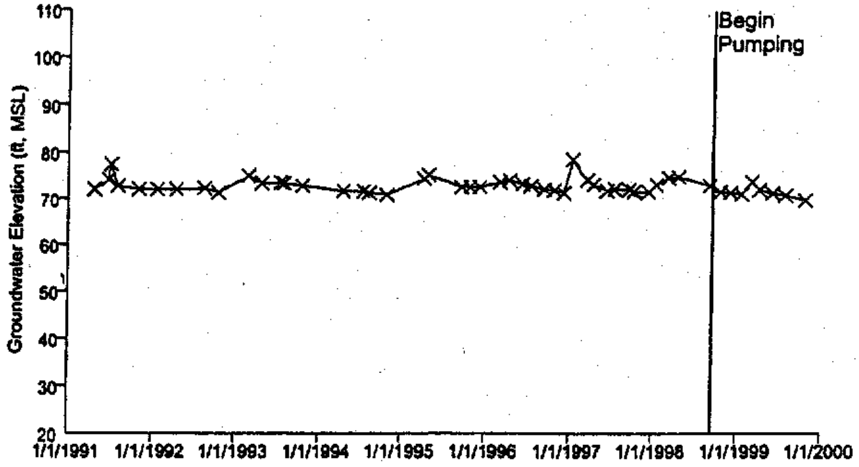



Well 1475


Well 1476


Well 1477

Well 1478



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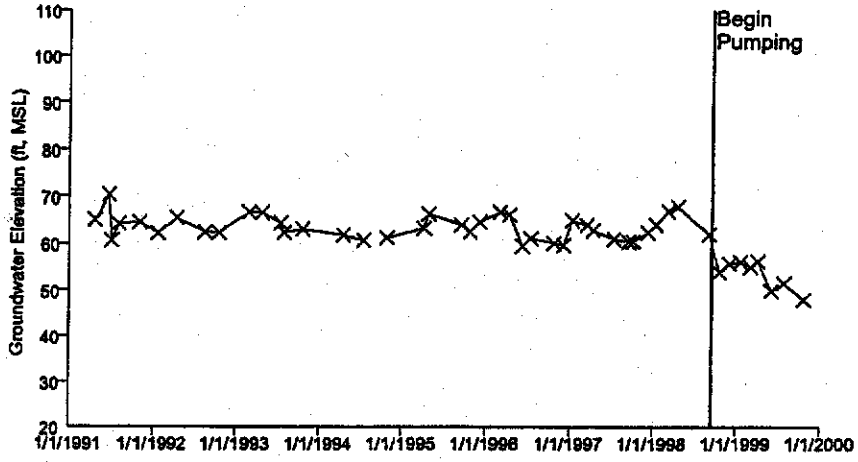
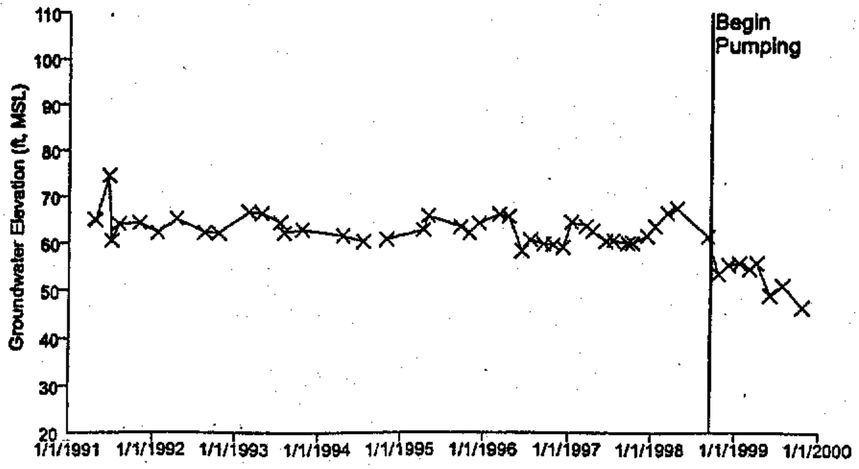
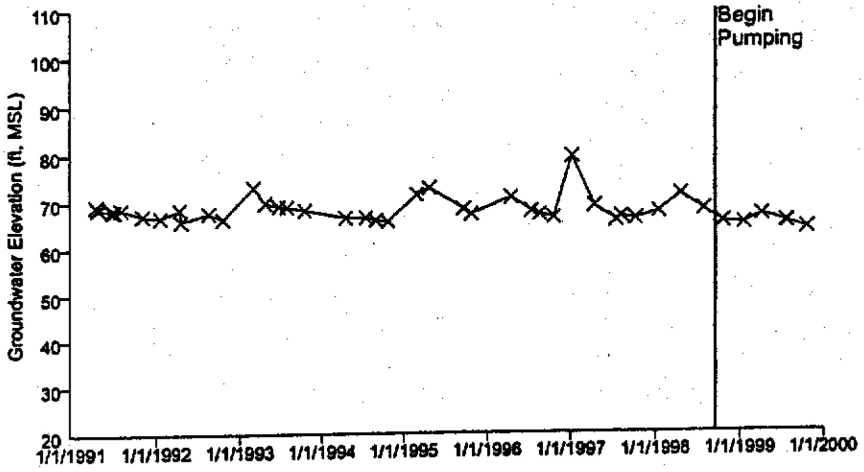


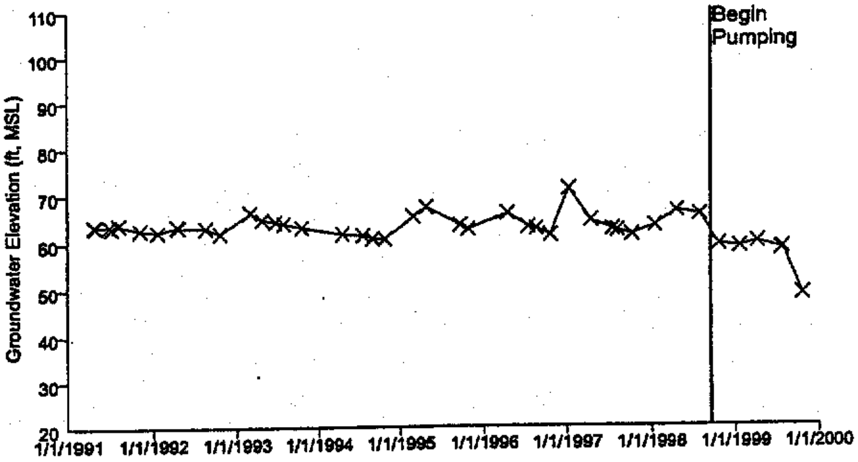
Well 1480



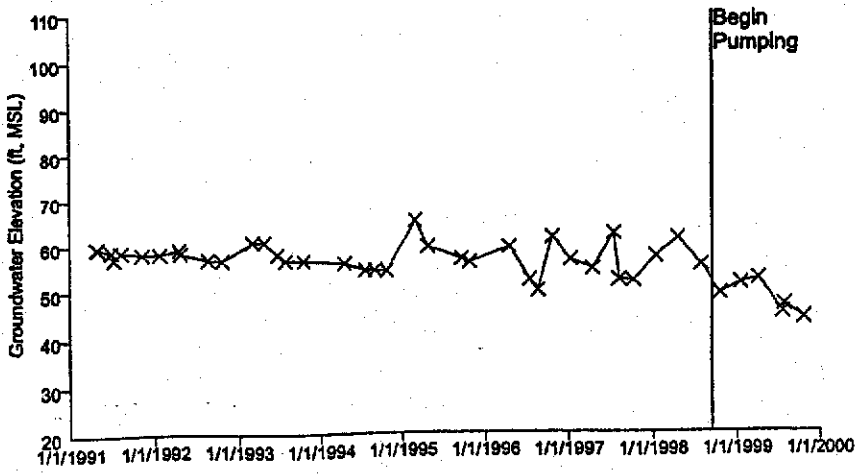
Well 1481



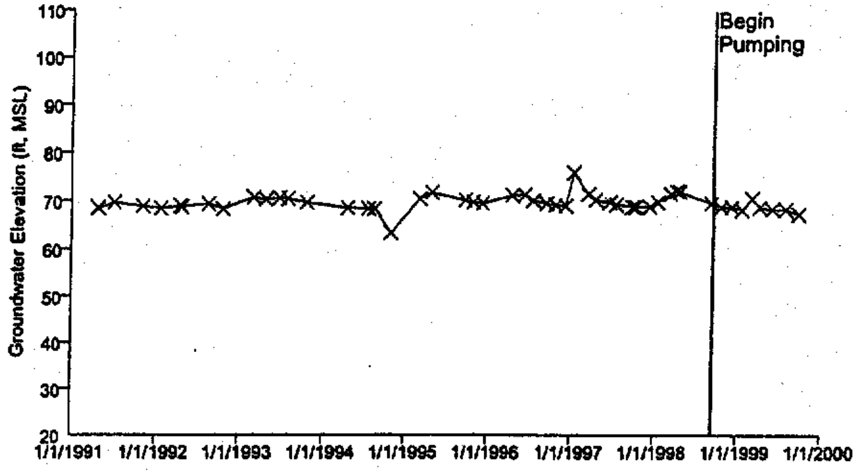
Well 1482



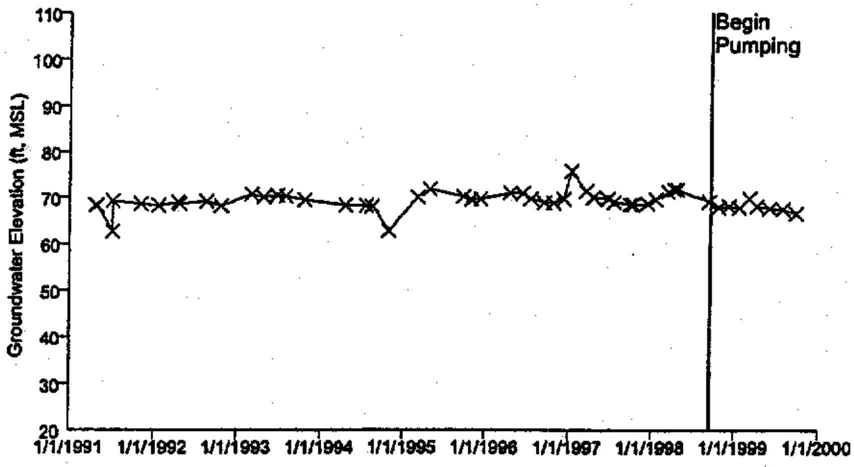
Well 1483



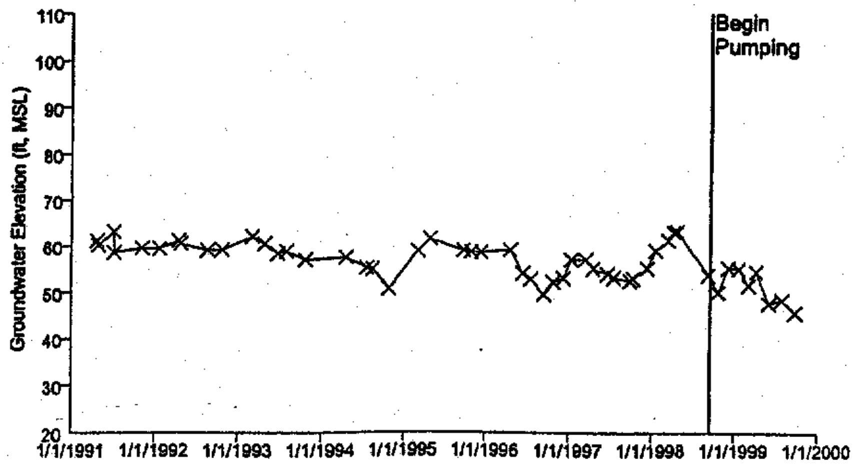
Well 1487



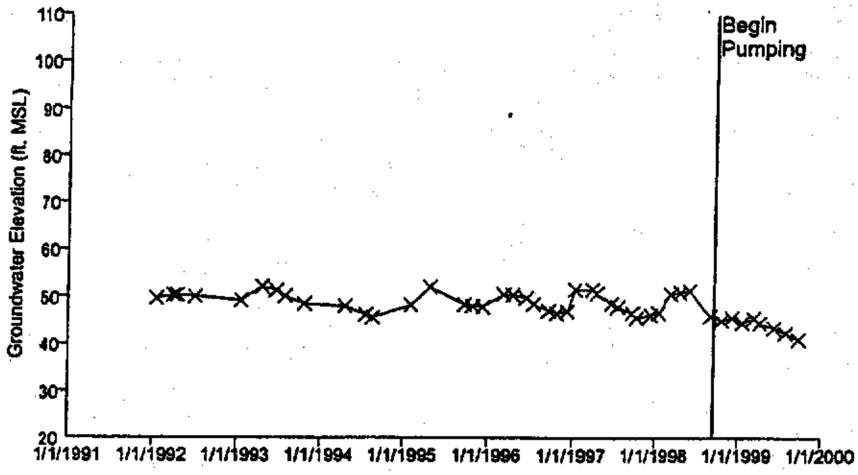
Well 1488



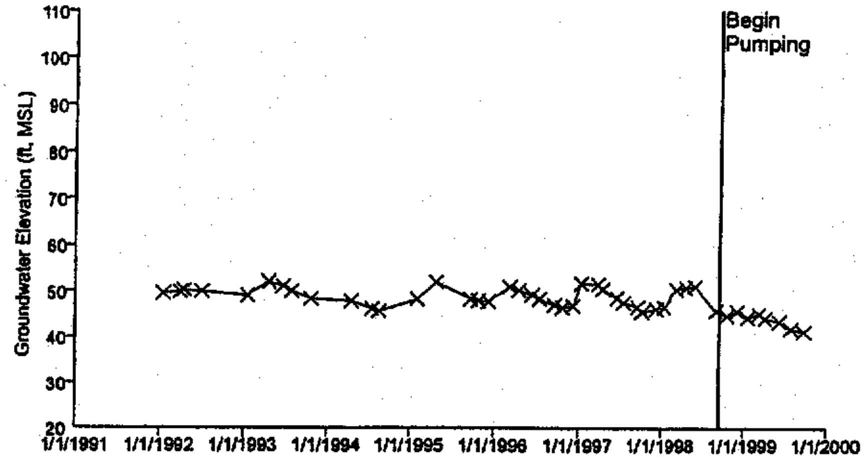
Well 1489



Well 1506



Well 1507



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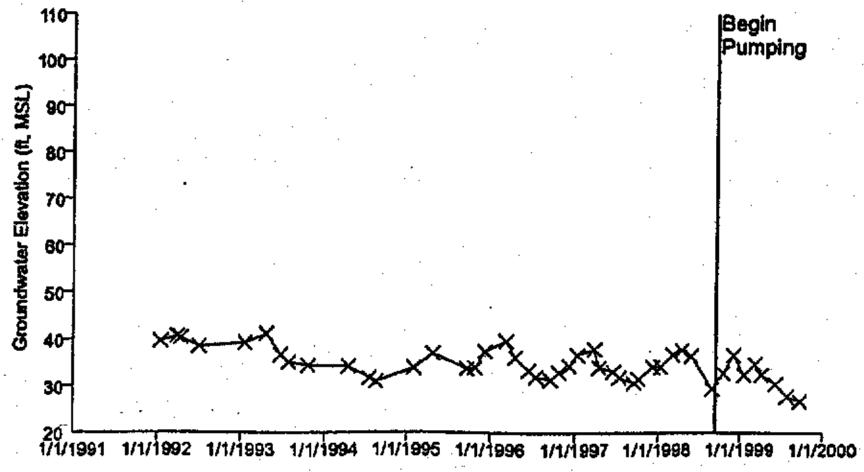
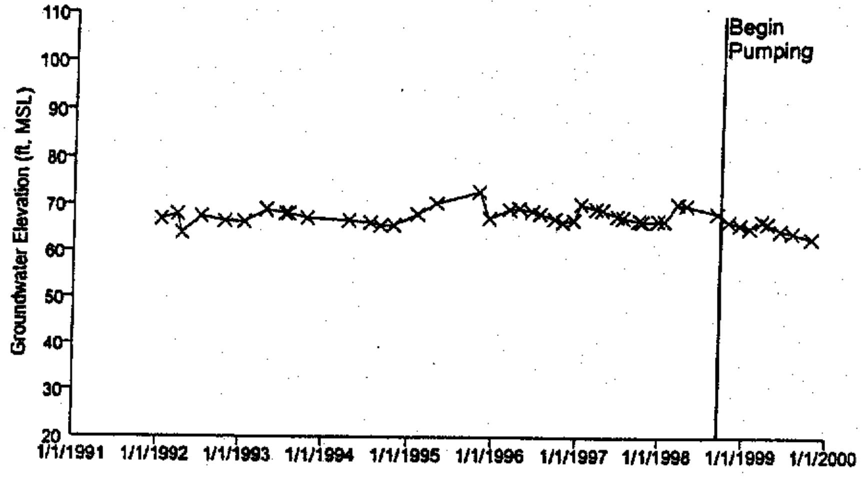


Well 1509



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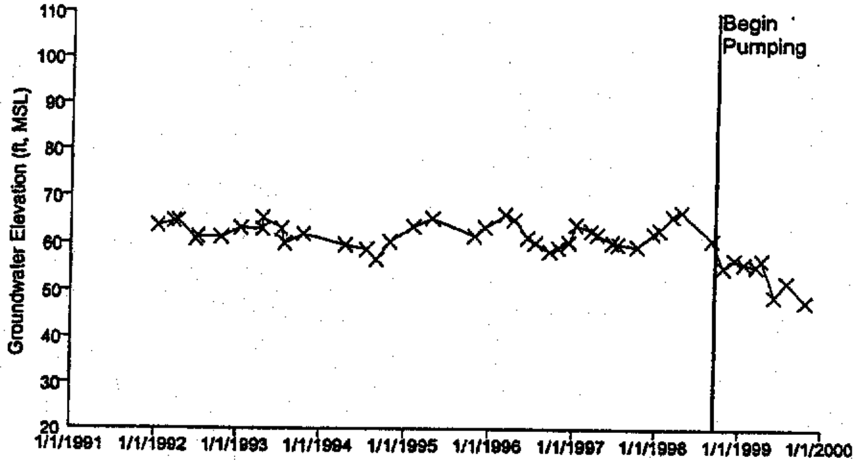

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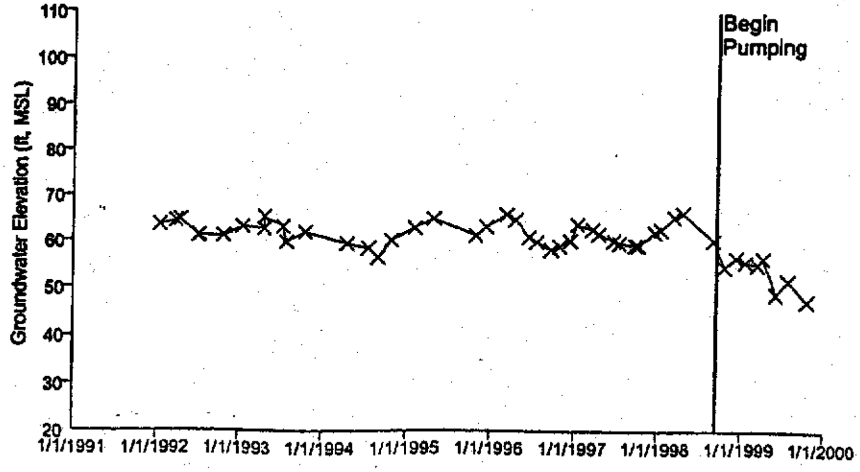

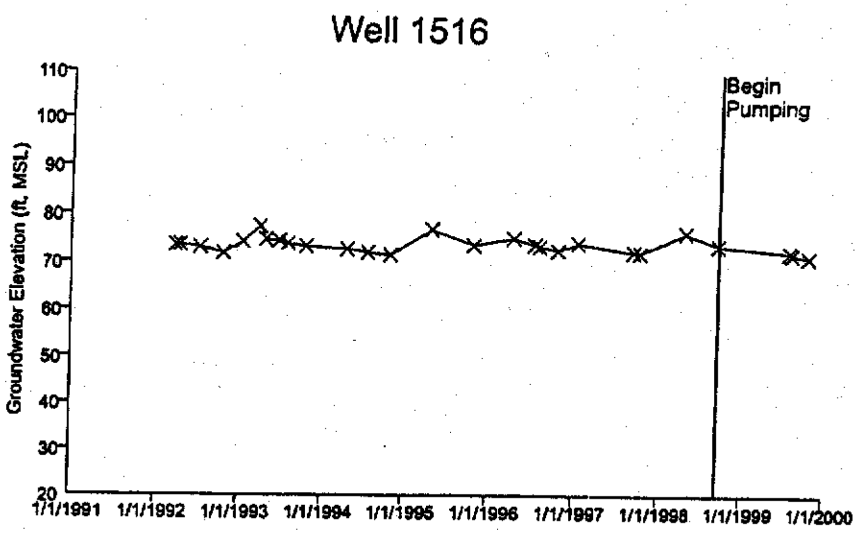
Well 1516
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
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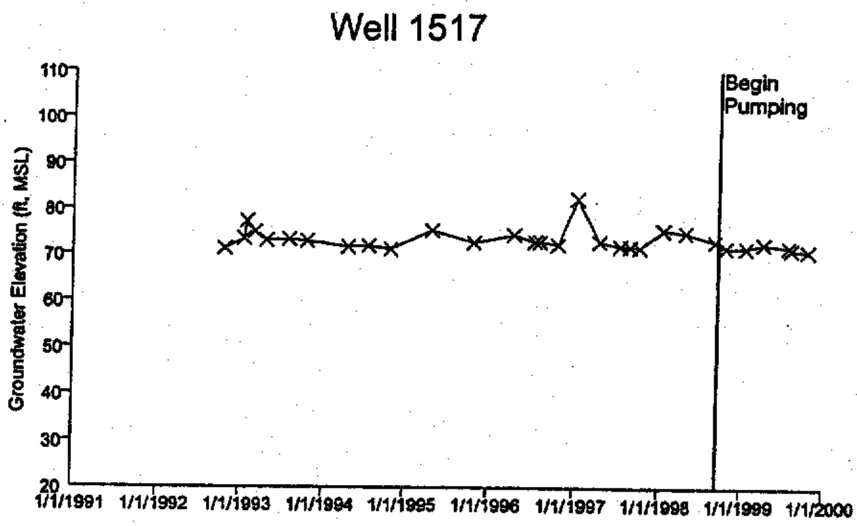
Begin Pumping


Well 1517
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
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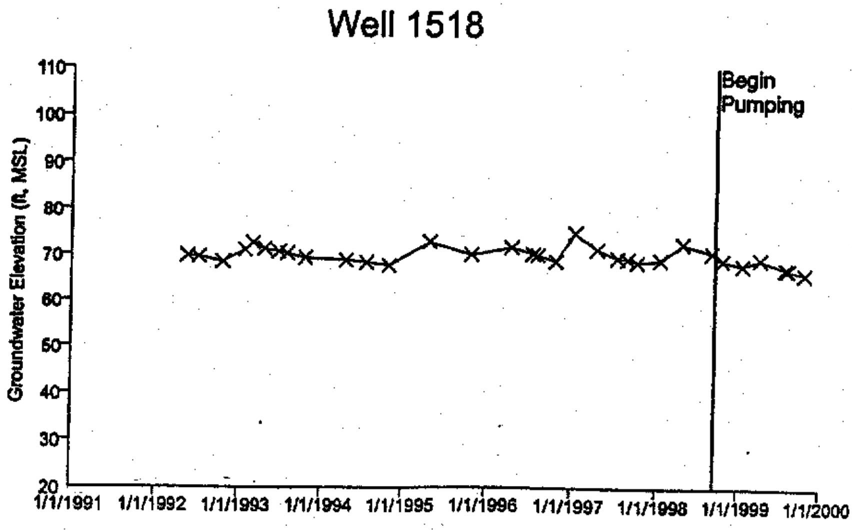
1/1/2000
Begin Pumping


Well 1518
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
1/1/1992
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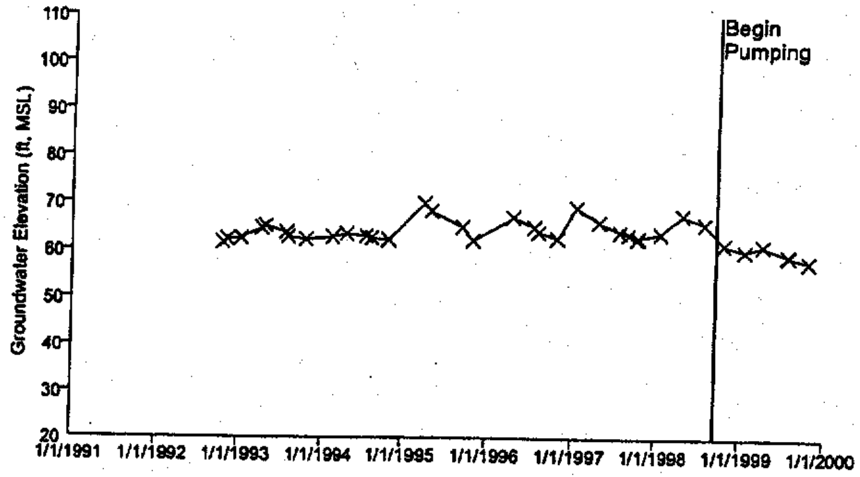
Begin Pumping



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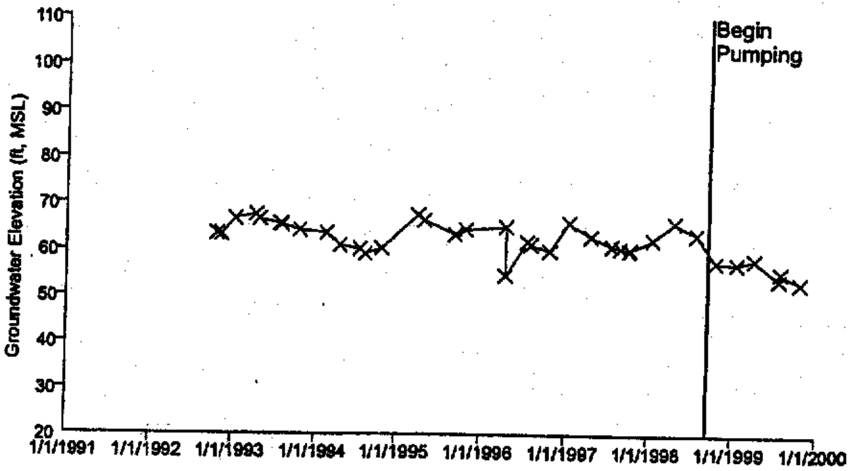

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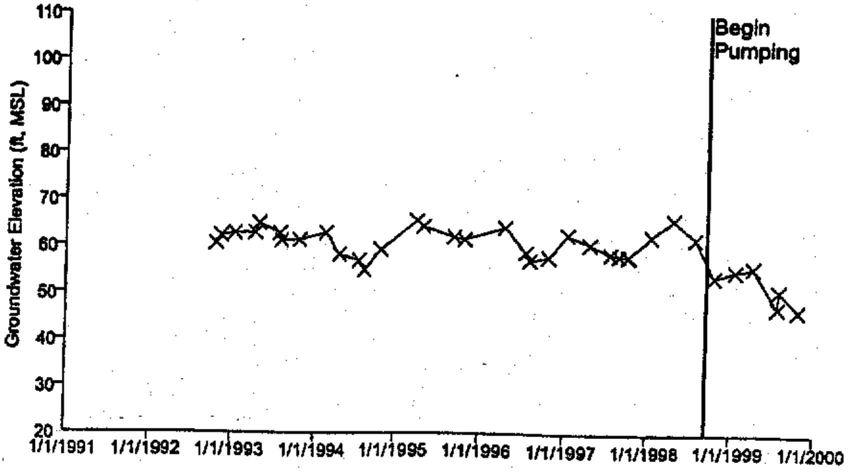
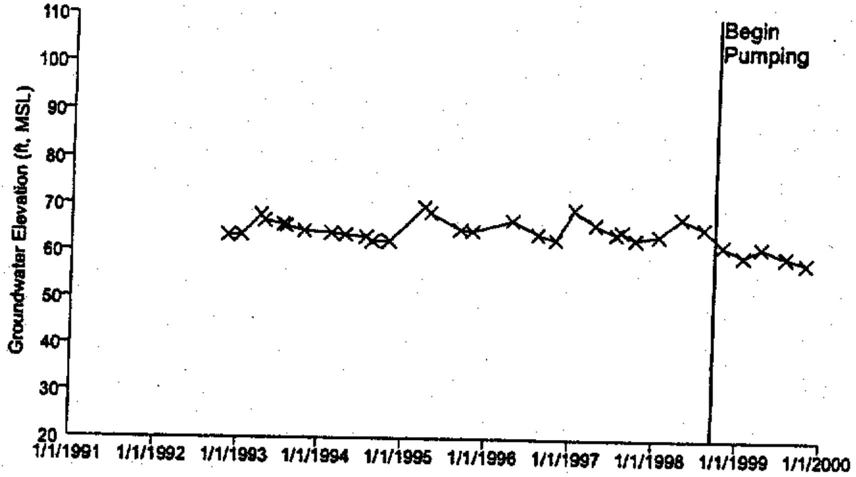
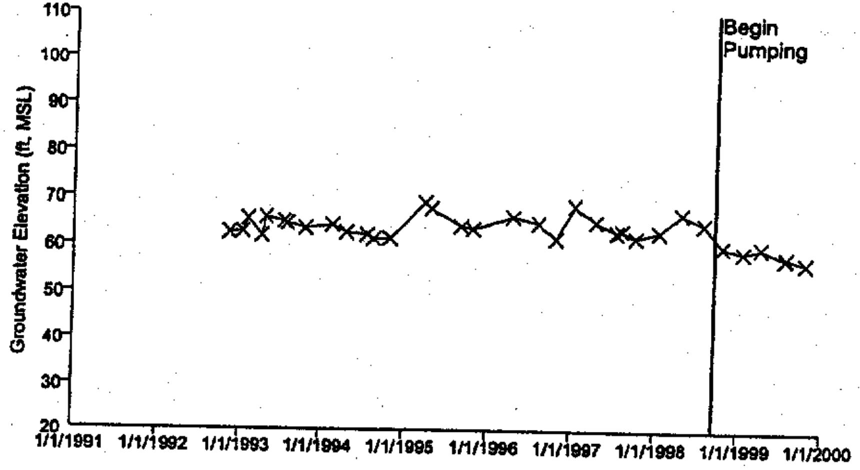


Well 1521

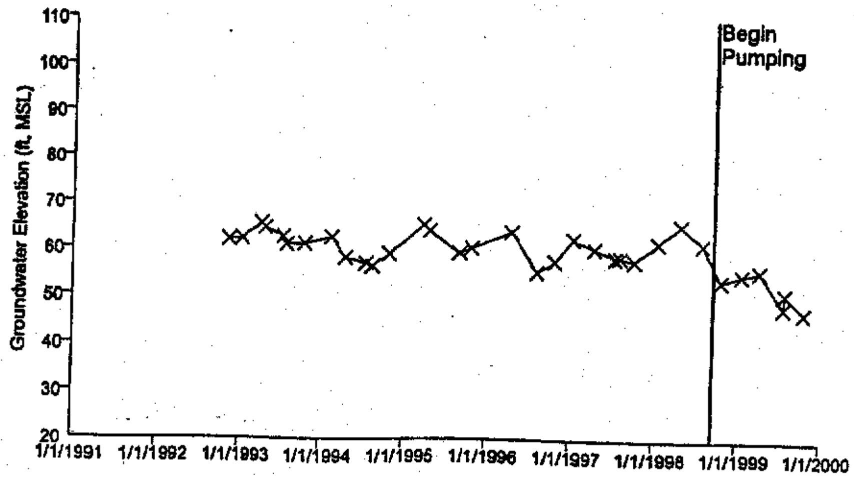
Well 1522



Well 1523

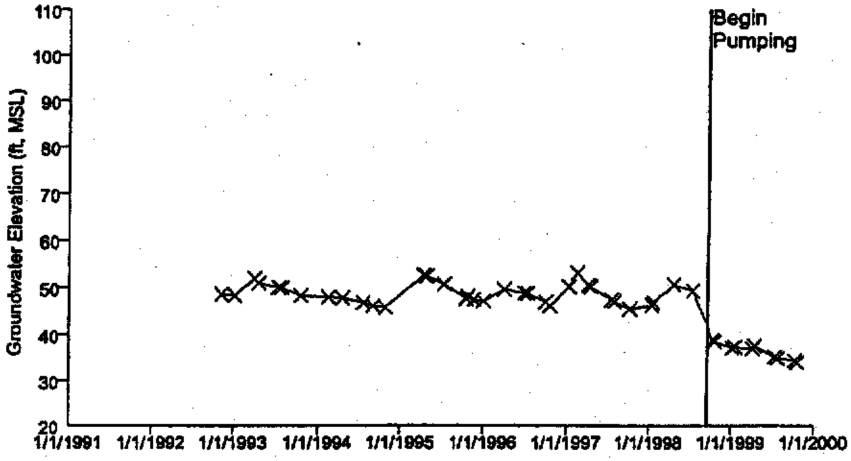


Well 1524



Well 1525

Well 1526



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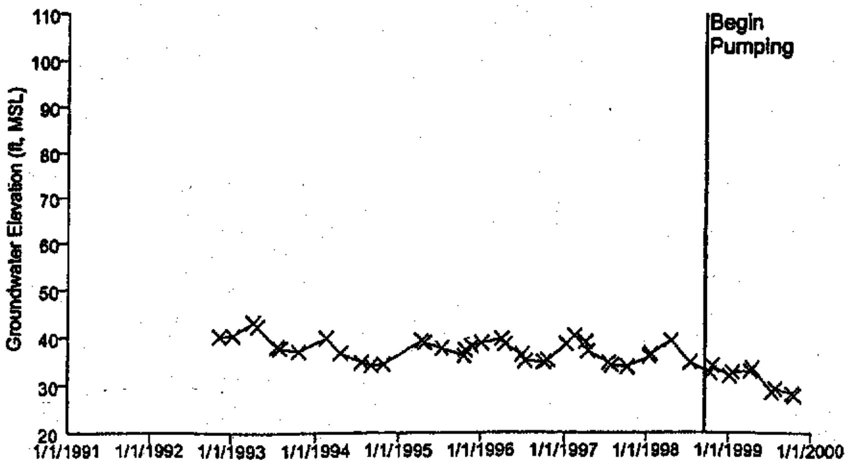
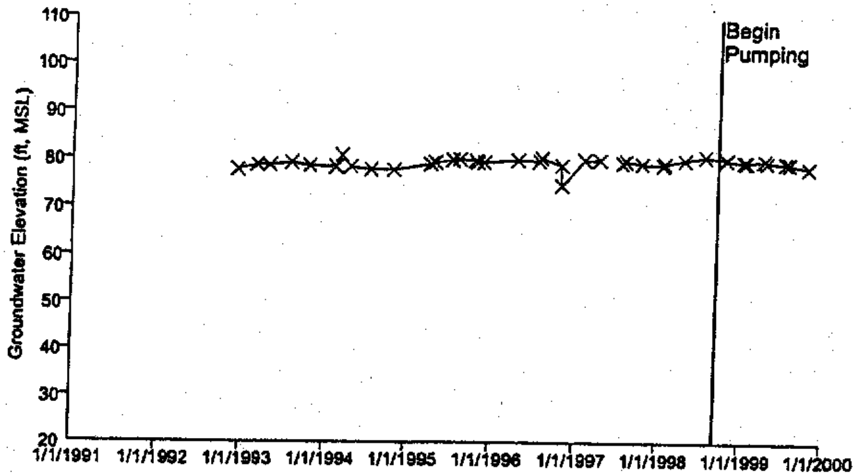
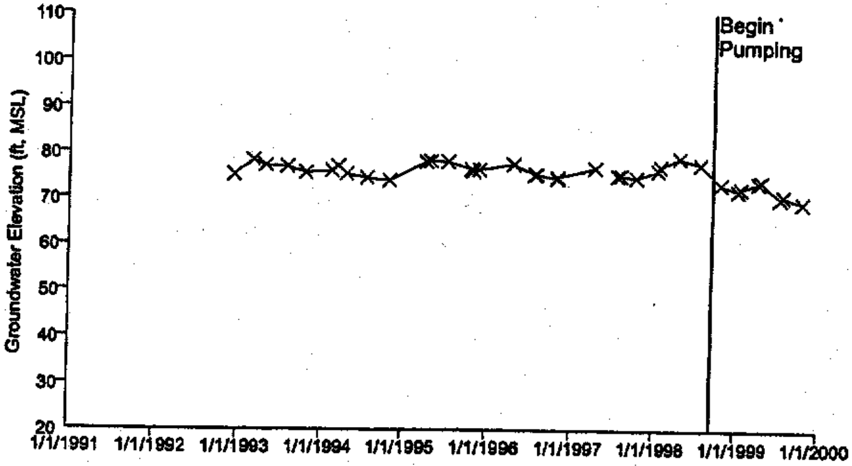


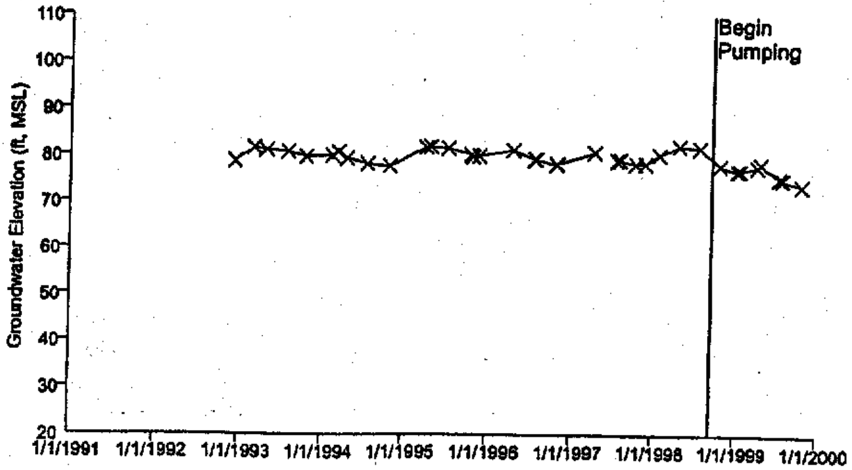
Well 1528



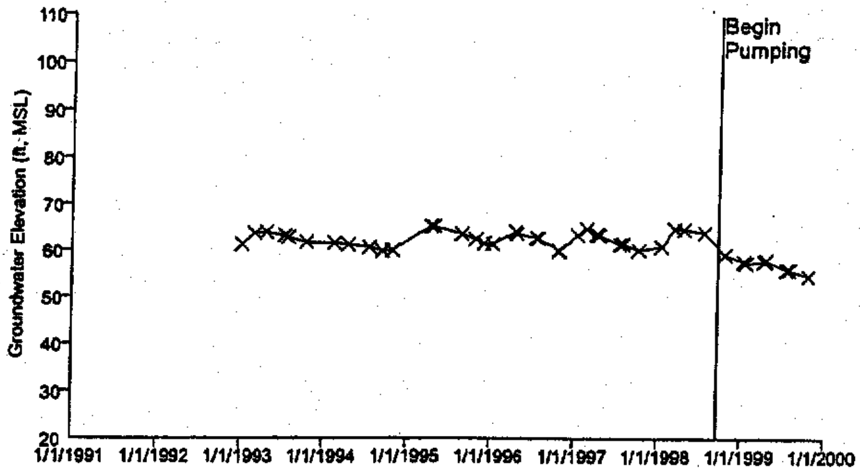
Well 1529



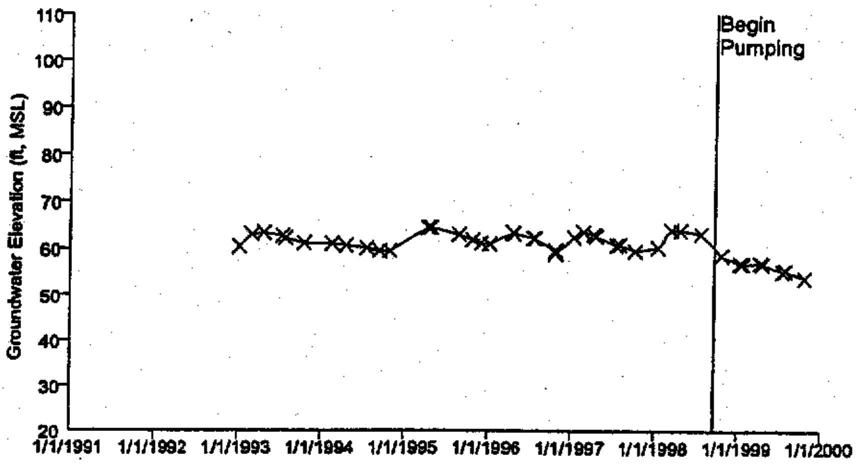
Well 1530



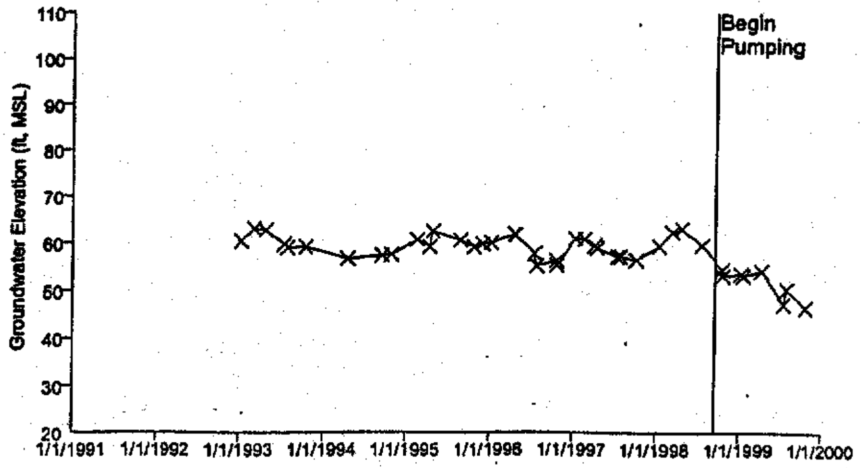
Well 1531



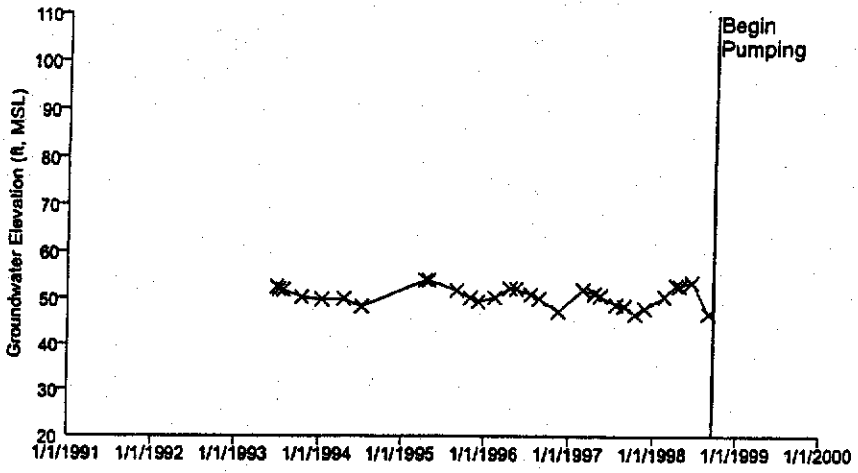
Well 1532



Well 1533



Well 1538



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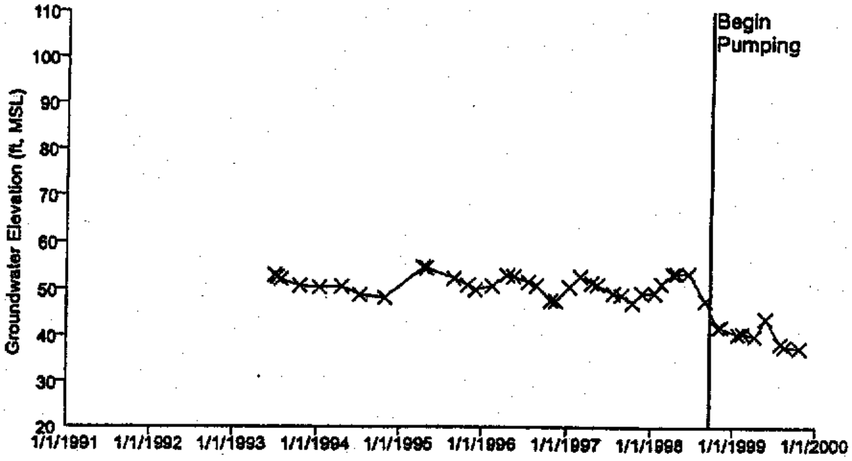
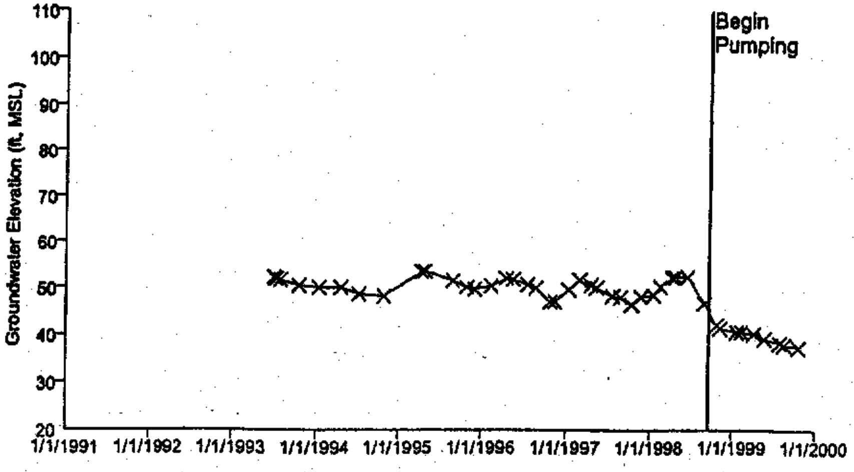
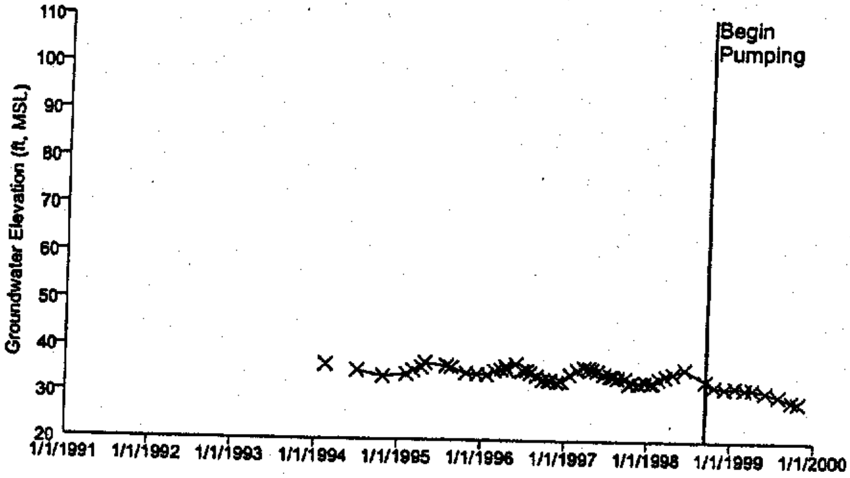


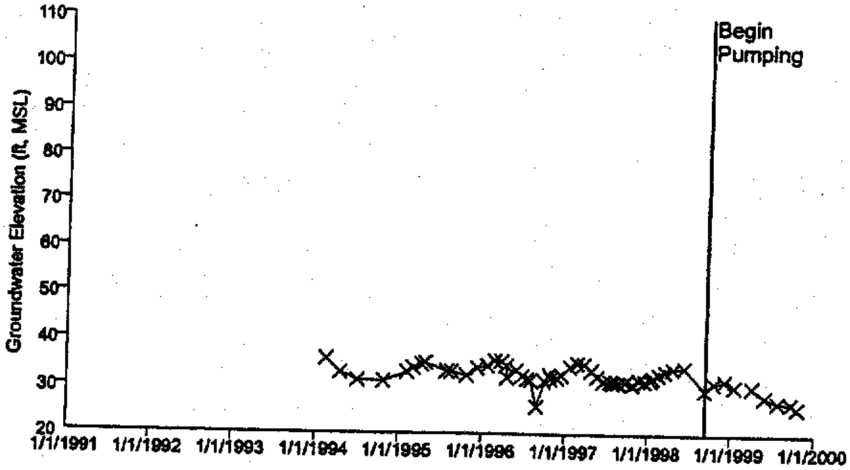
Well 1540



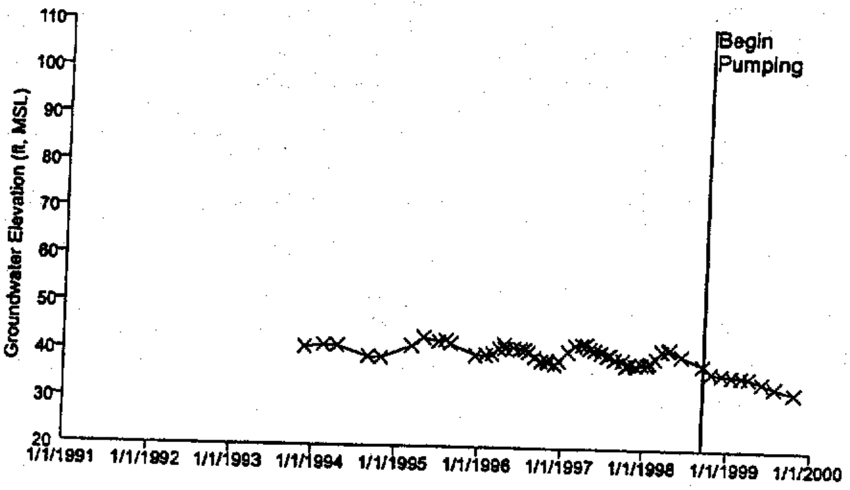
Well 1557



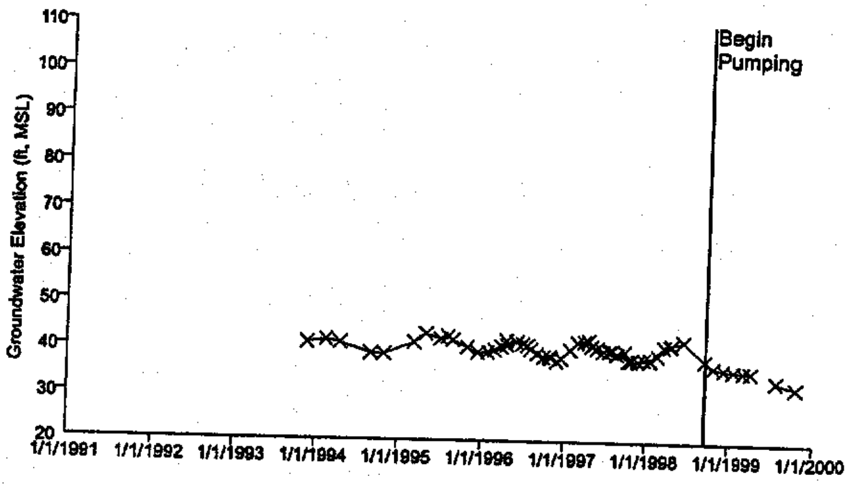
Well 1558



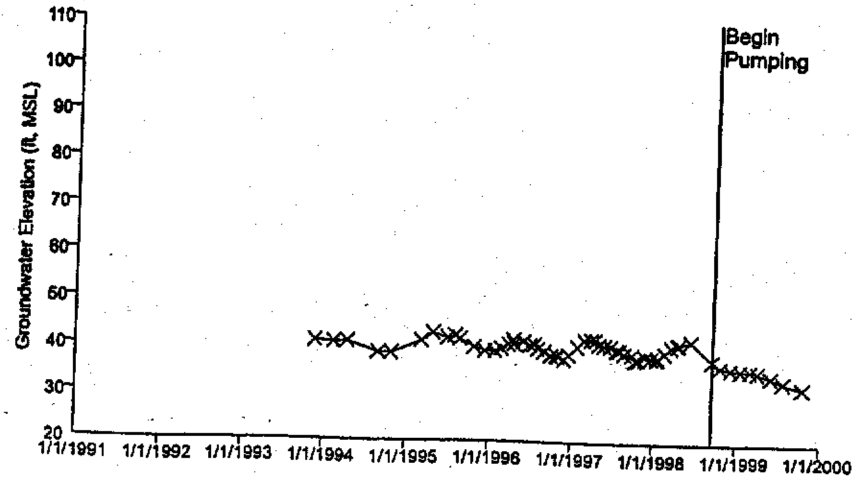
Well 1559



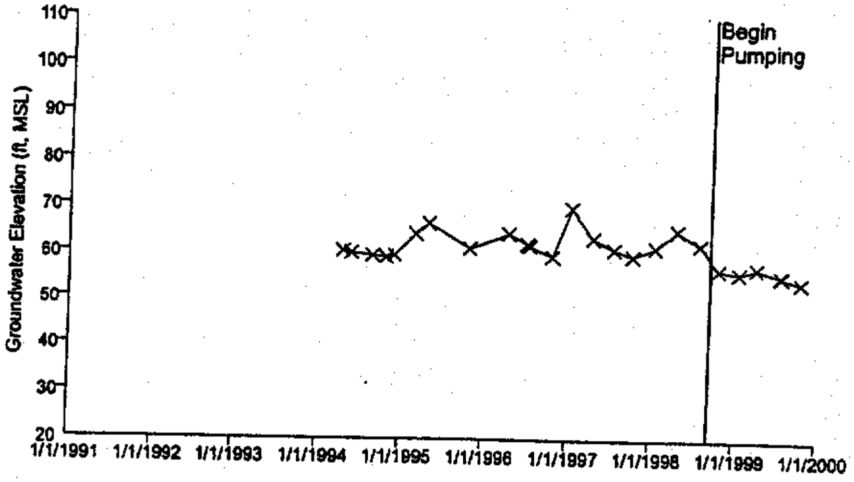
Well 1560



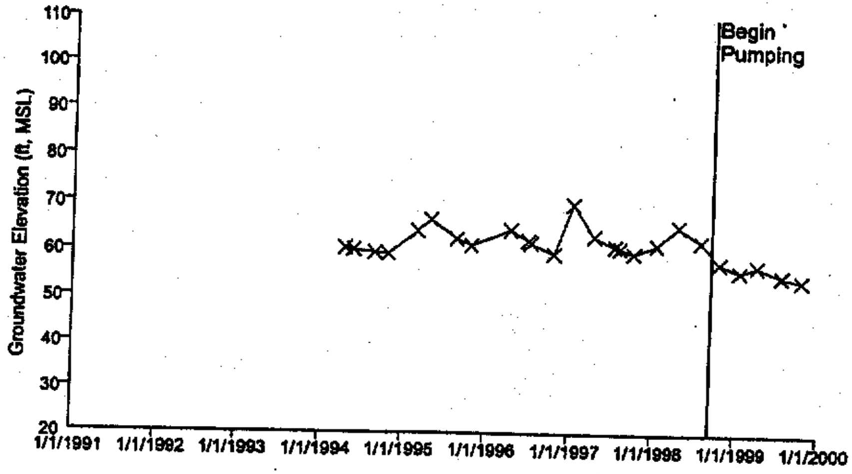
Well 1561

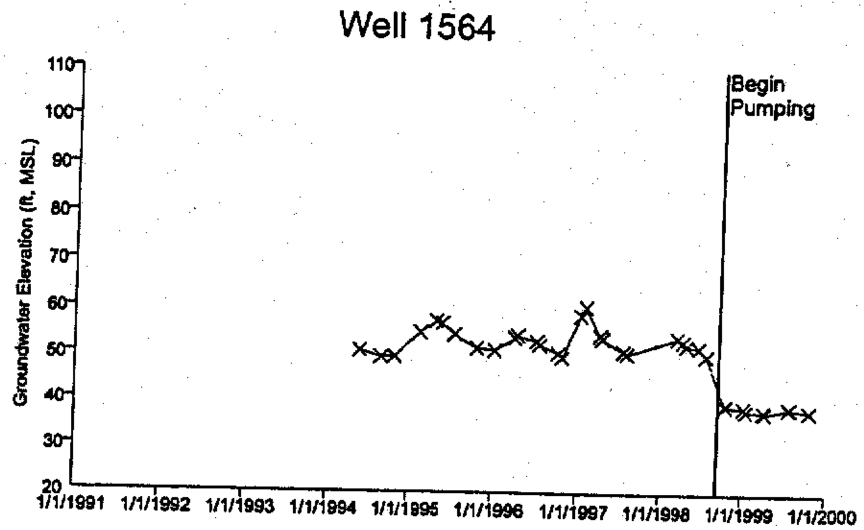


Well 1562



Well 1563




Well 1564
Groundwater Elevation (ft, MSL)
110
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1/1/1991
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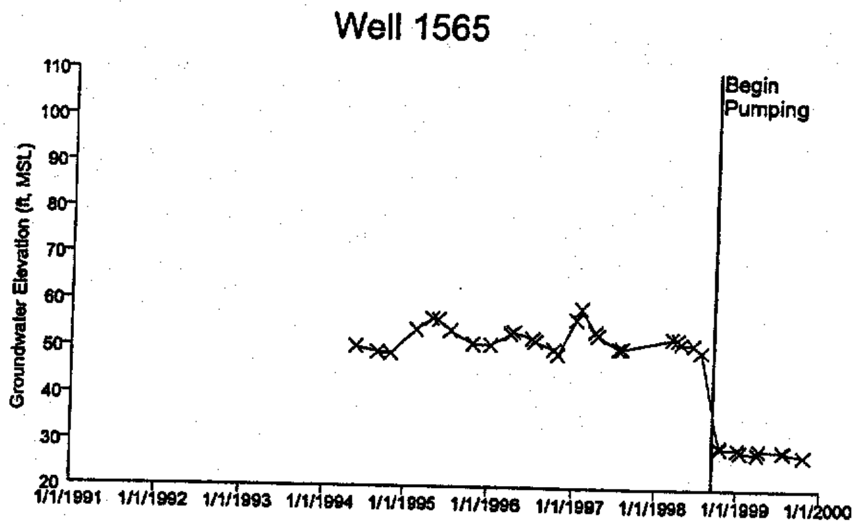
Begin Pumping


Well 1565
Groundwater Elevation (ft, MSL)
110
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1/1/1991
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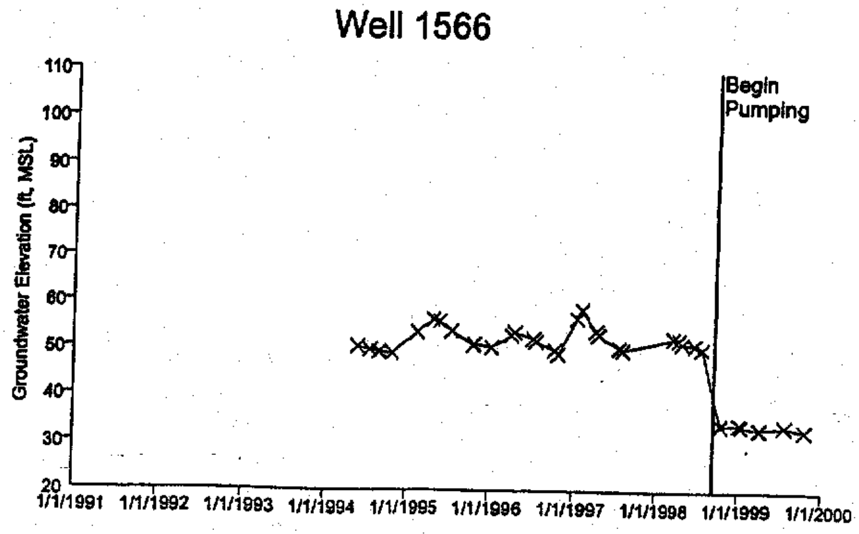
Begin Pumping


Well 1566
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
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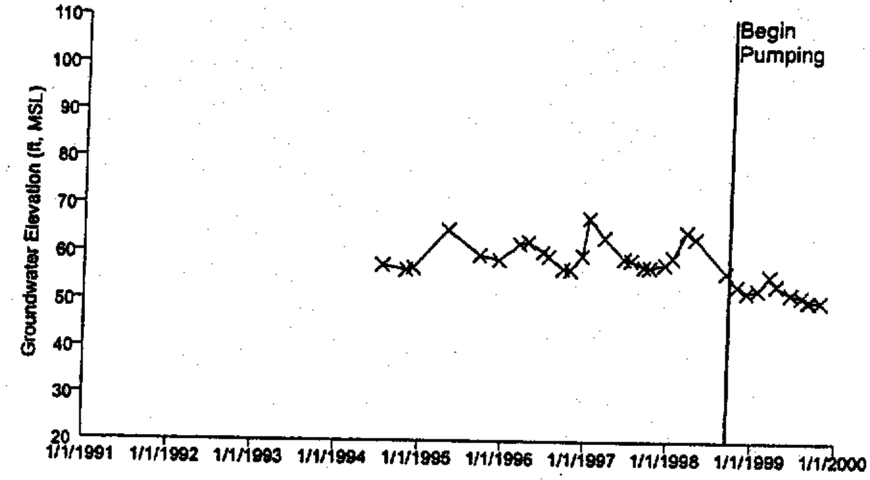
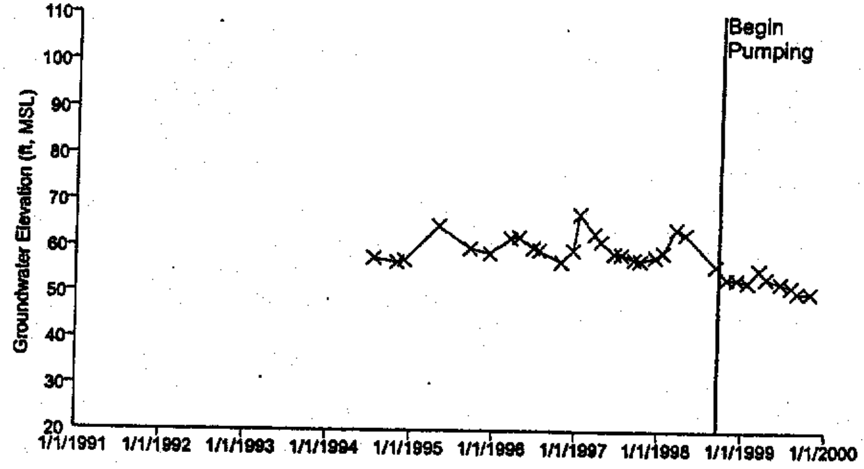
Begin Pumping

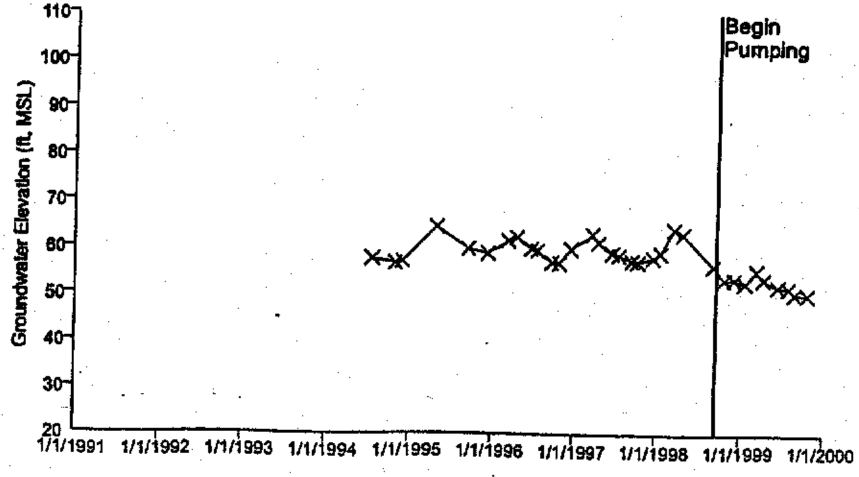
Well 1567



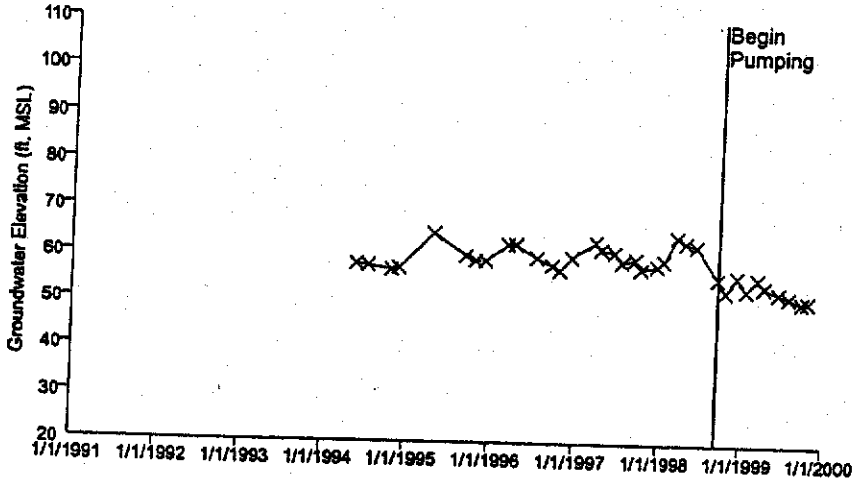
Well 1568



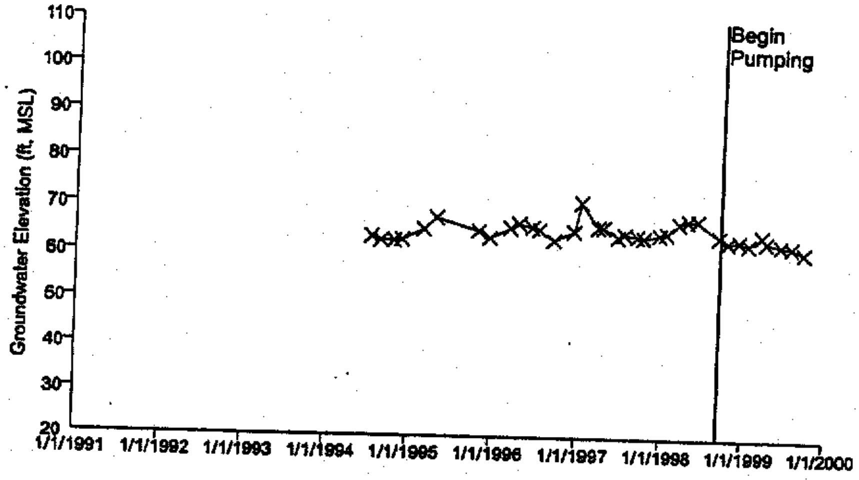
Well 1569



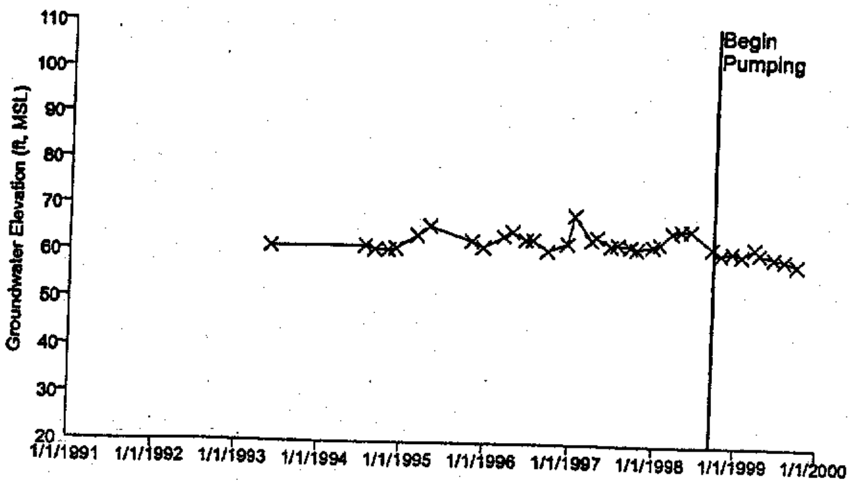
Well 1570



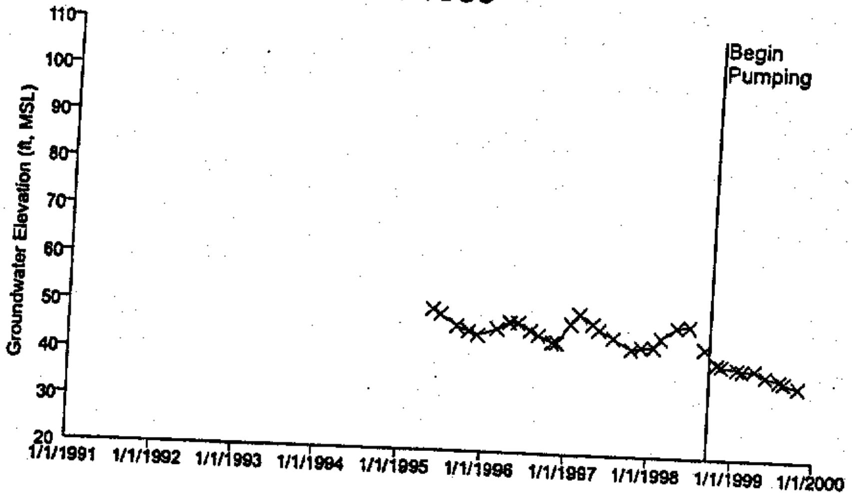
Well 1571



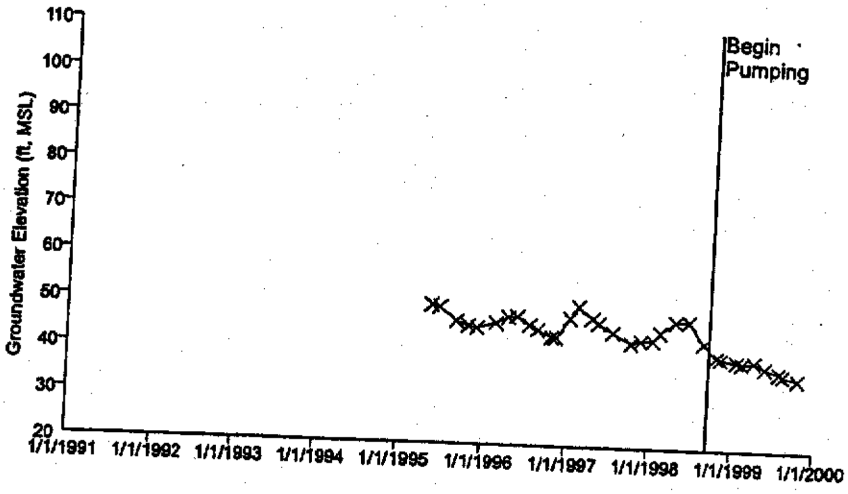
Well 1572



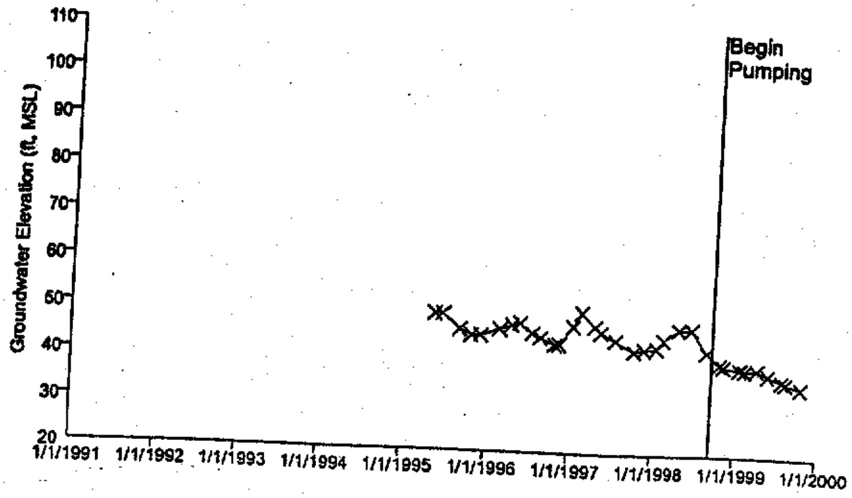
Well 1585



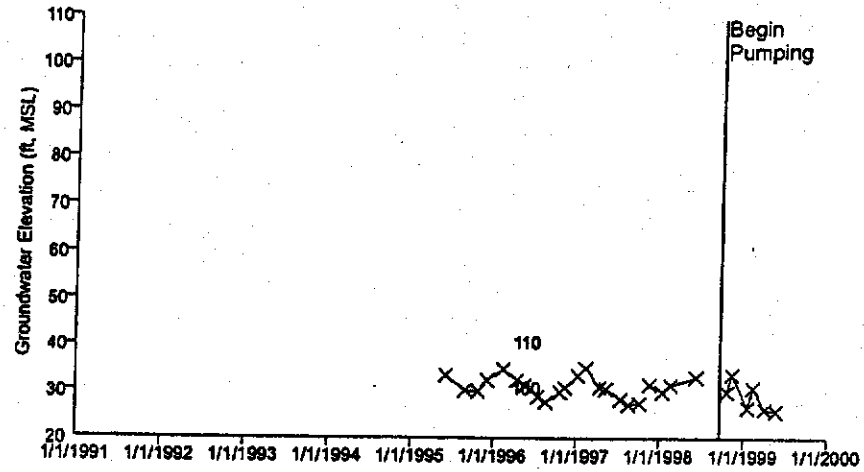
Well 1586



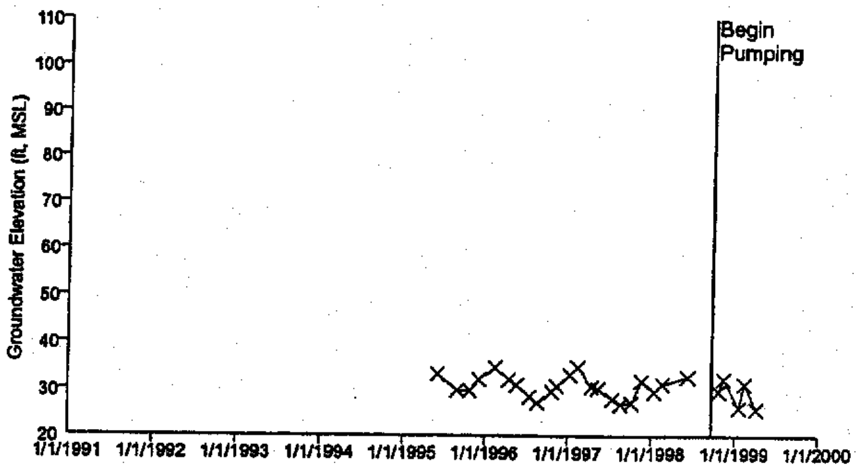
Well 1587



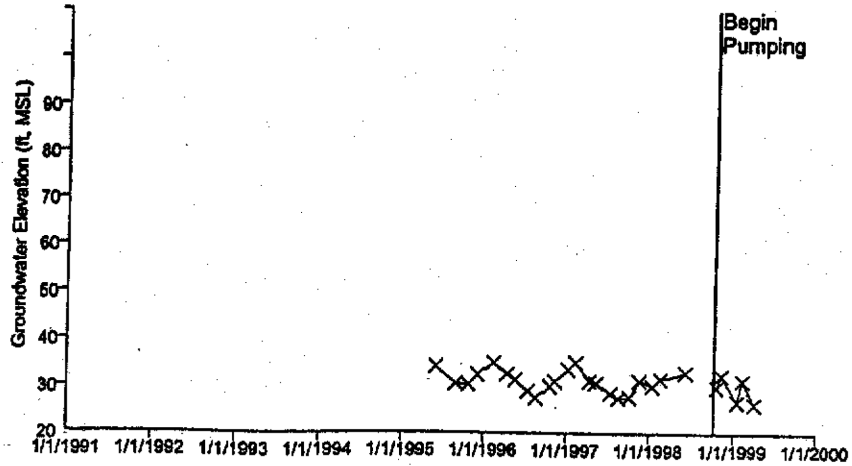
Well 1588



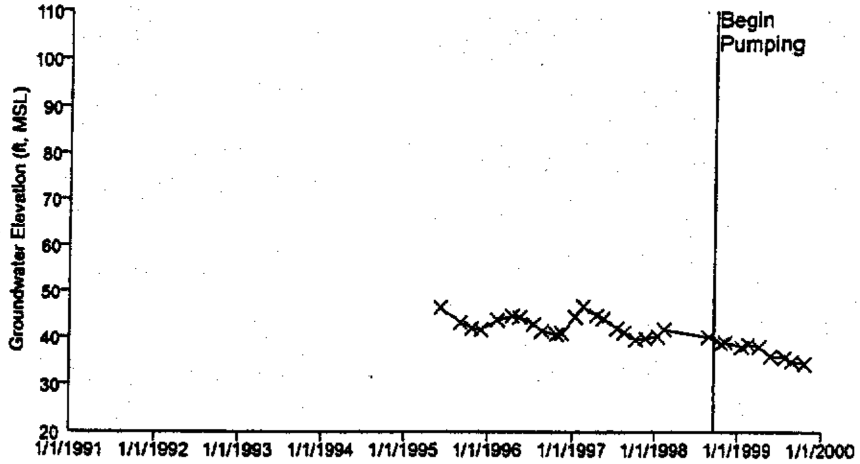
Well 1589



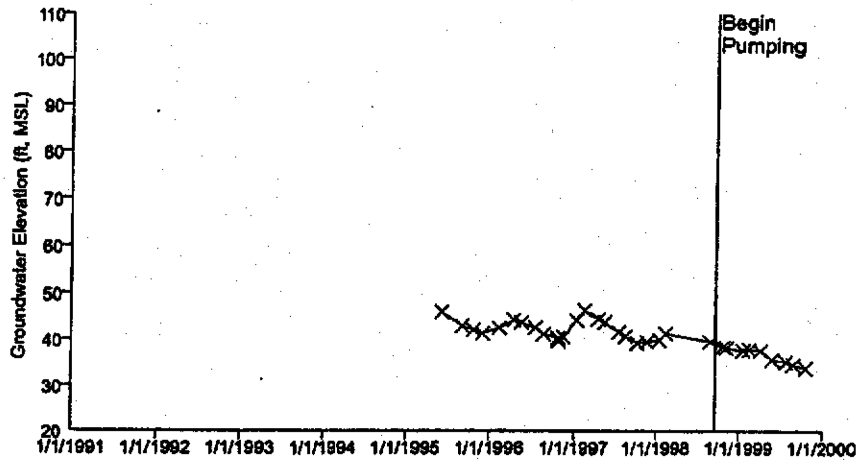
Well 1590



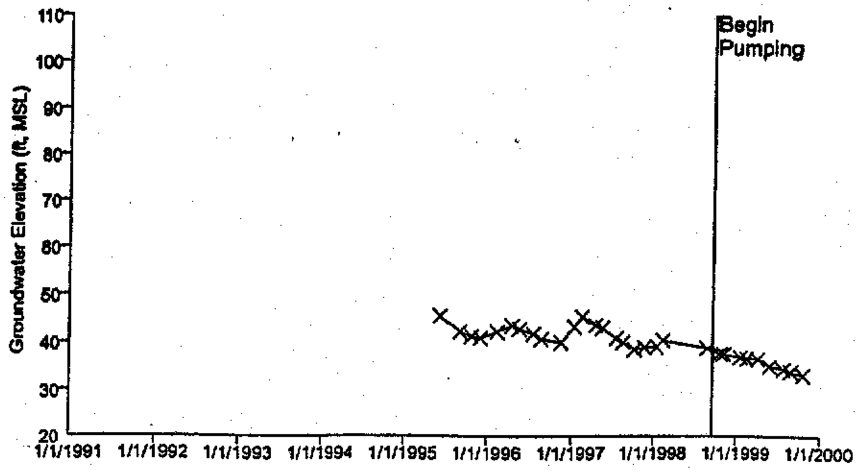
Well 1591

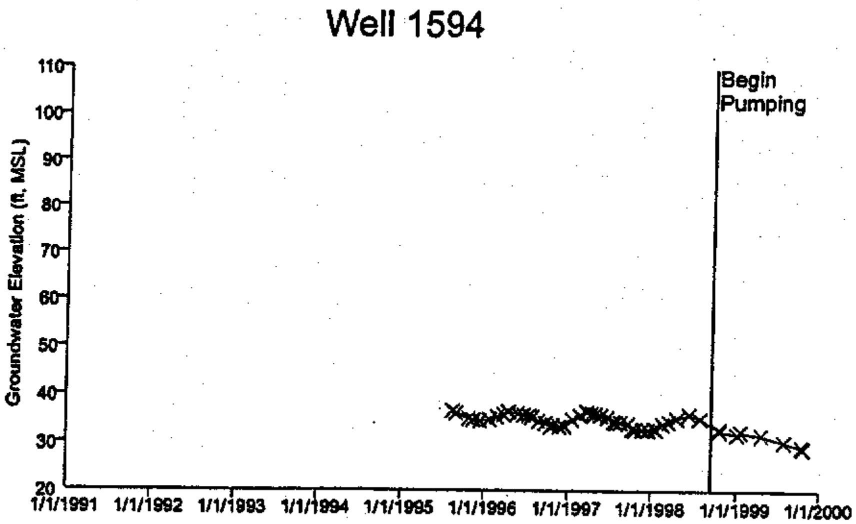


Well 1592



Well 1593




Well 1594
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
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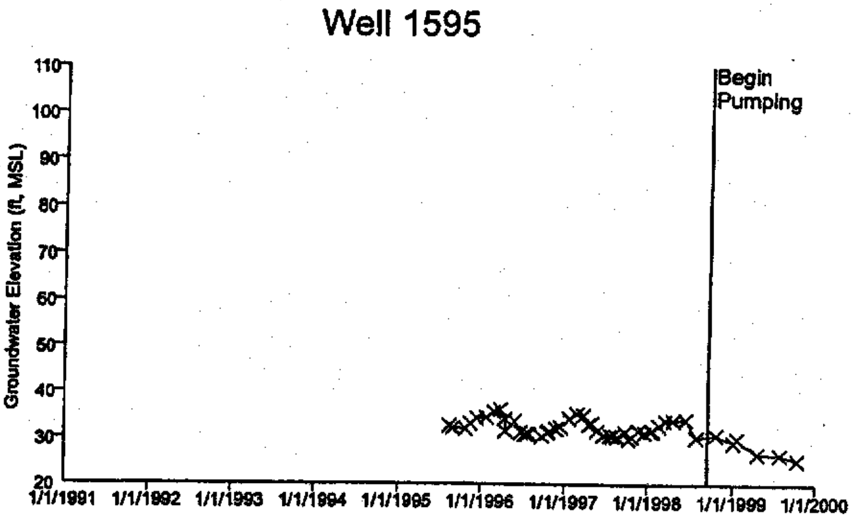
Begin
Pumping


Well 1595
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
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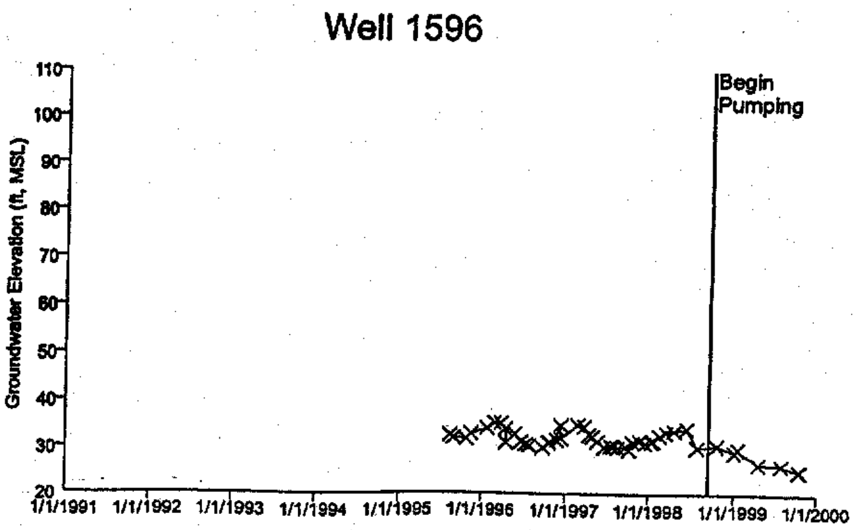
1/1/2000
Begin
Pumping


Well 1596
Groundwater Elevation (ft, MSL)
110
100
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1/1/1991
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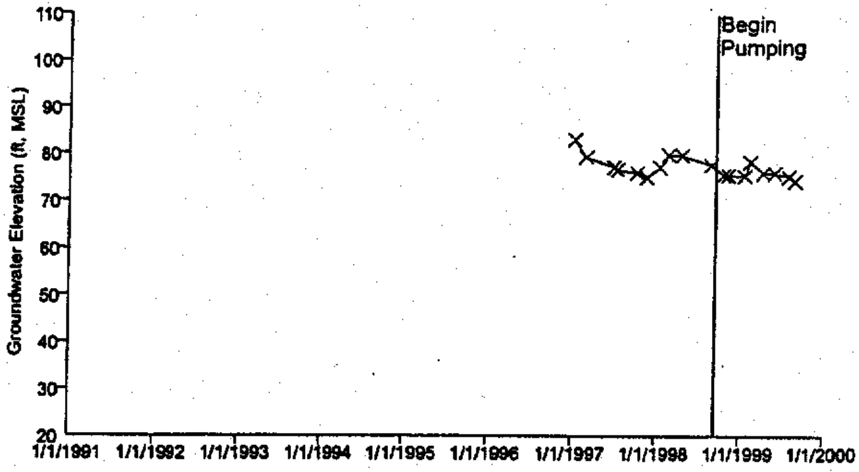
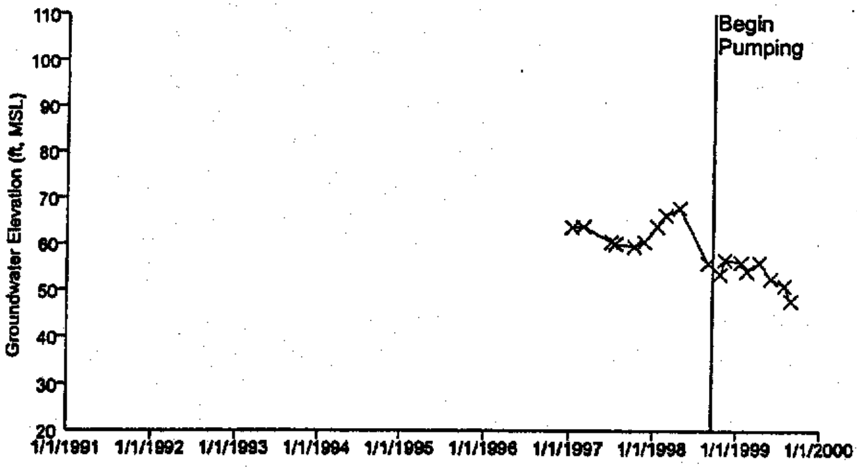
Begin
Pumping

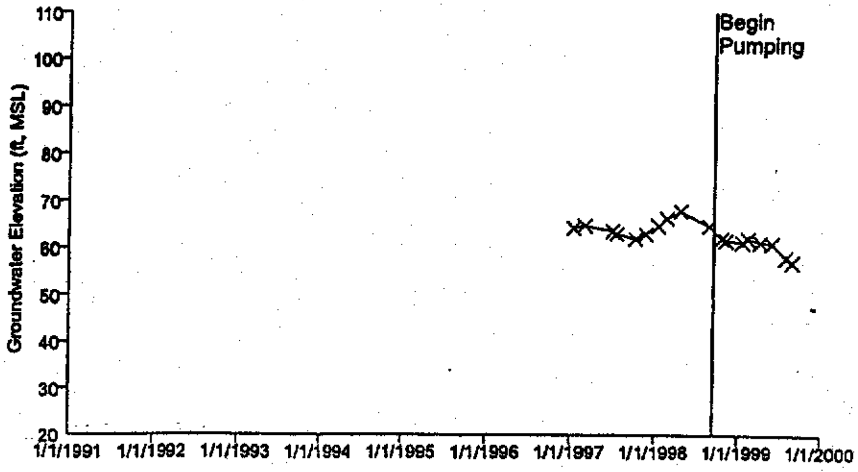
Well 30068



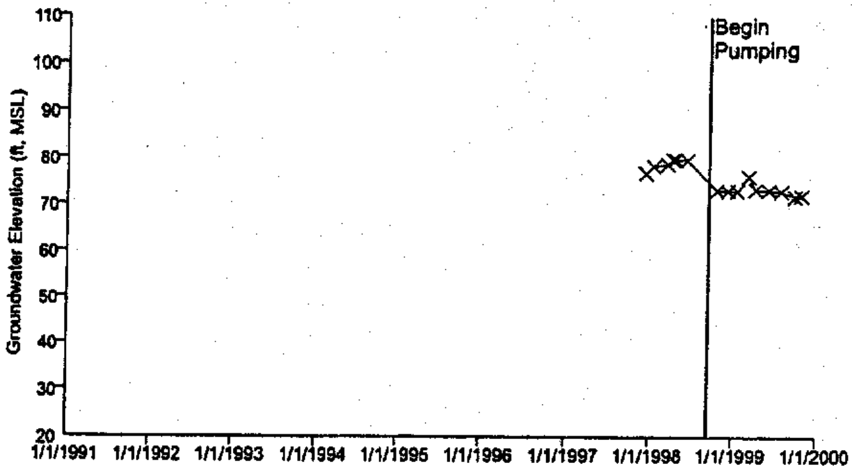
Well 30069



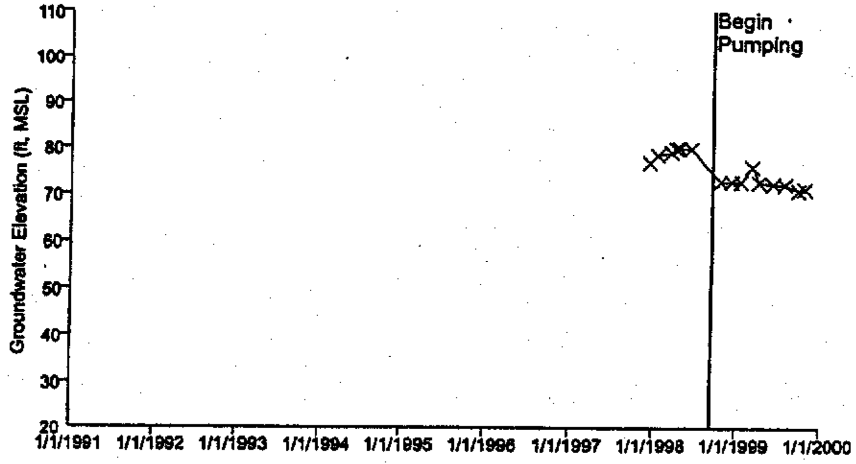
Well 30070



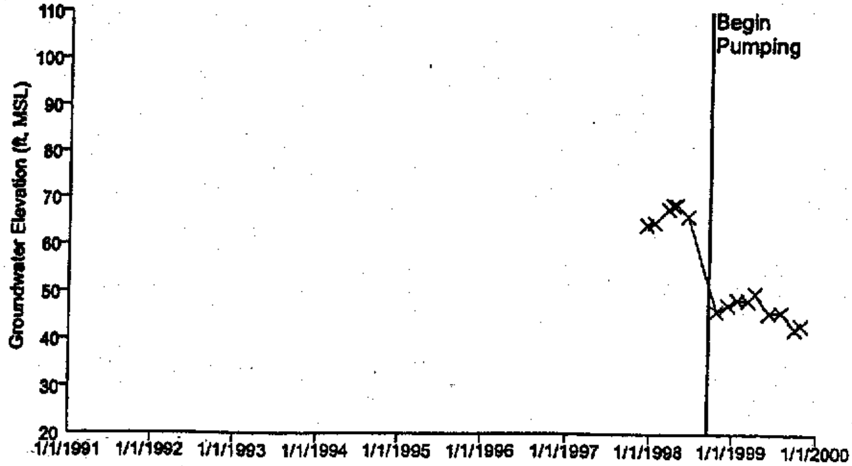
Well 30100



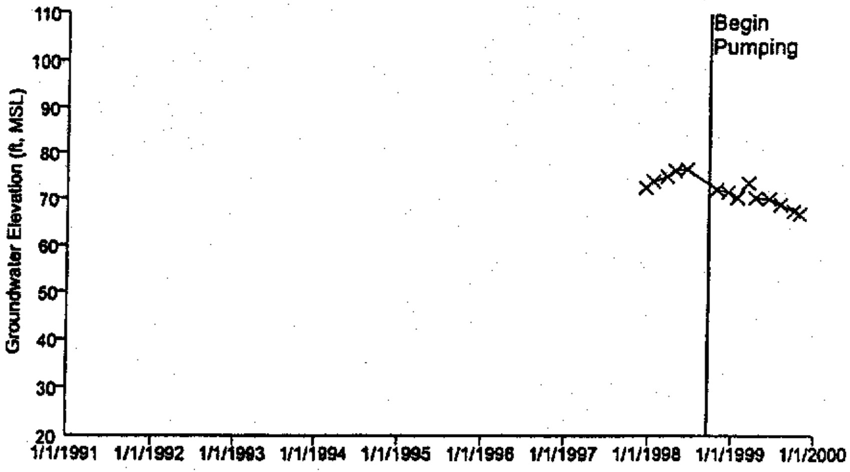
Well 30101



Well 30102

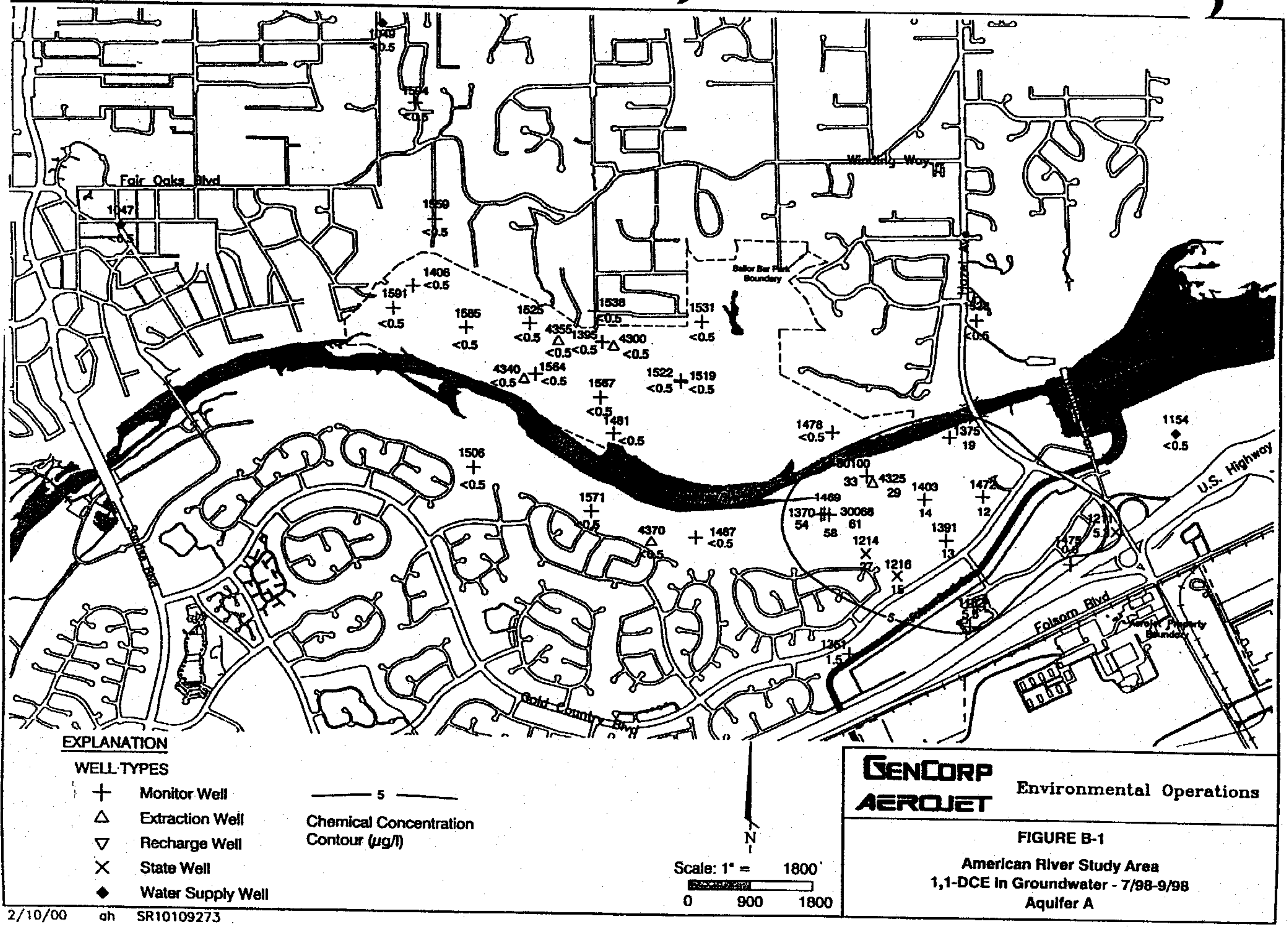


Well 30103


Groundwater Elevation (ft, MSL)
110
100
90
80
70
60
50
40
30
20
1/1/1991
1/1/1992
1/1/1993
1/1/1994
1/1/1995
1/1/1996
1/1/1997
1/1/1998
1/1/1999
1/1/2000
Begin Pumping

APPENDIX B

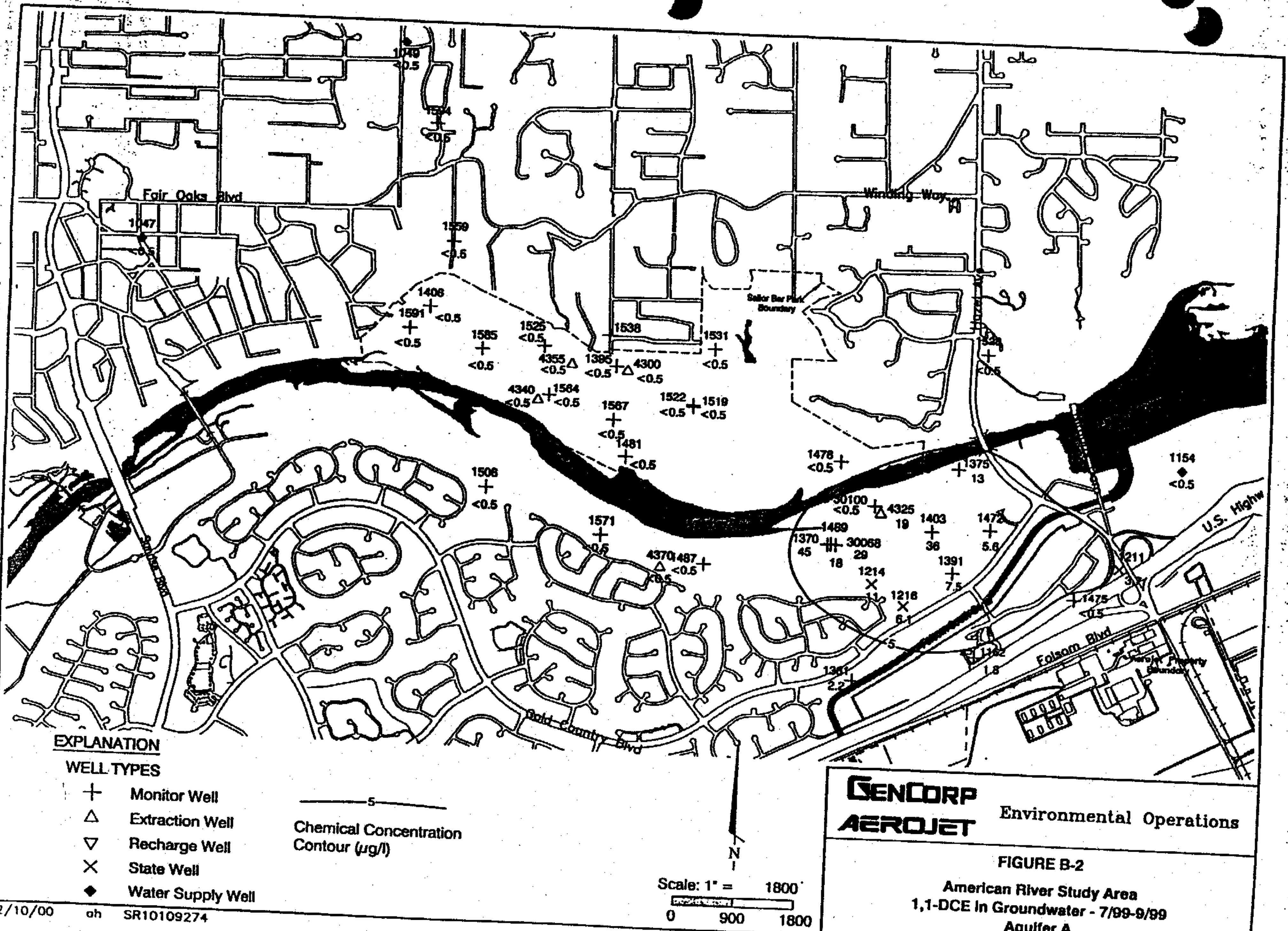
CHEMICAL DISTRIBUTION MAPS



GENCORP AEROJET Environmental Operations

FIGURE B-1

American River Study Area
1,1-DCE in Groundwater - 7/98-9/98
Aquifer A

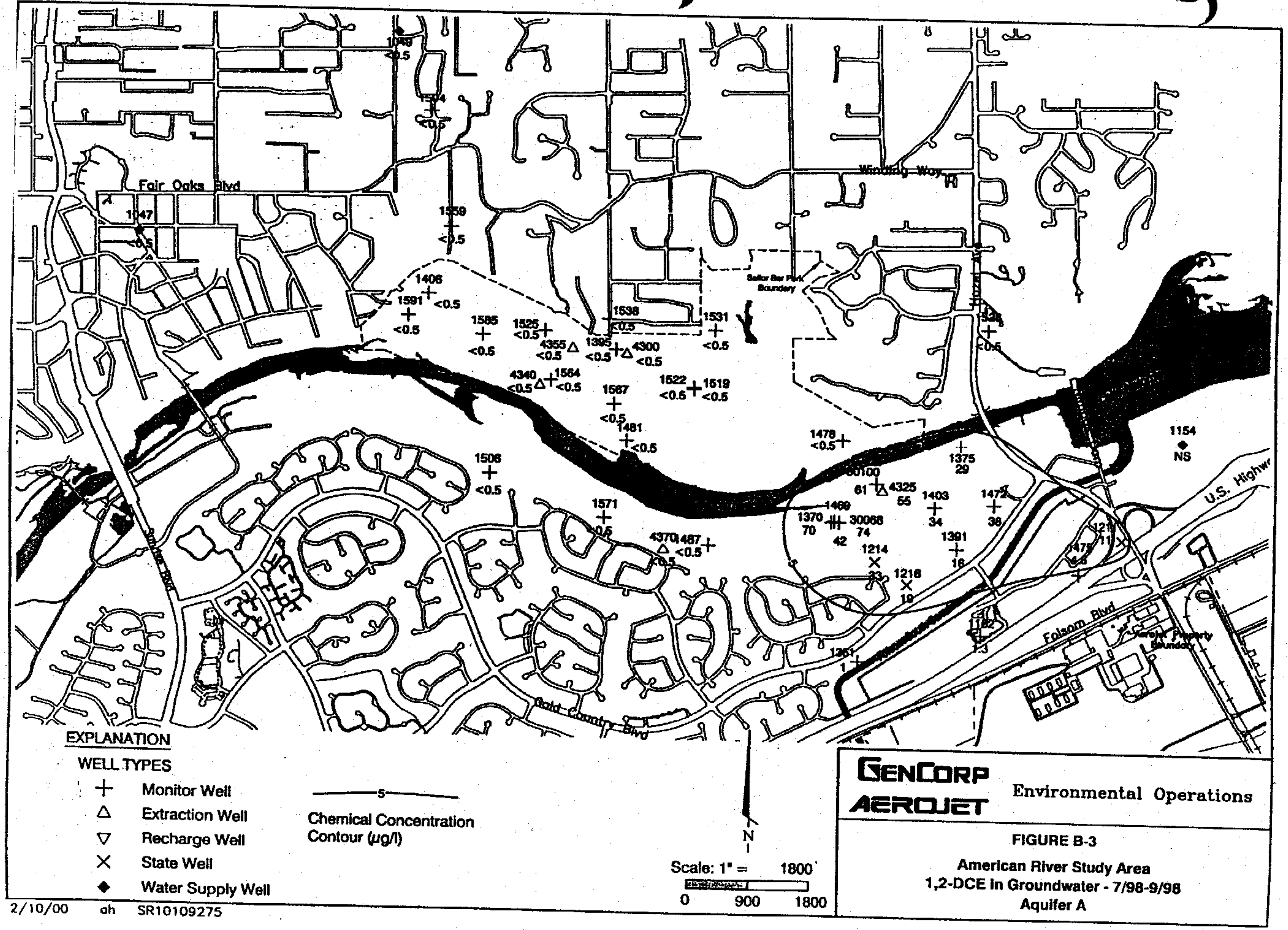


GENCORP
AEROJET
Environmental Operations

FIGURE B-2

American River Study Area
1,1-DCE In Groundwater - 7/99-9/99
Aquifer A

2/10/00 oh SR10109274

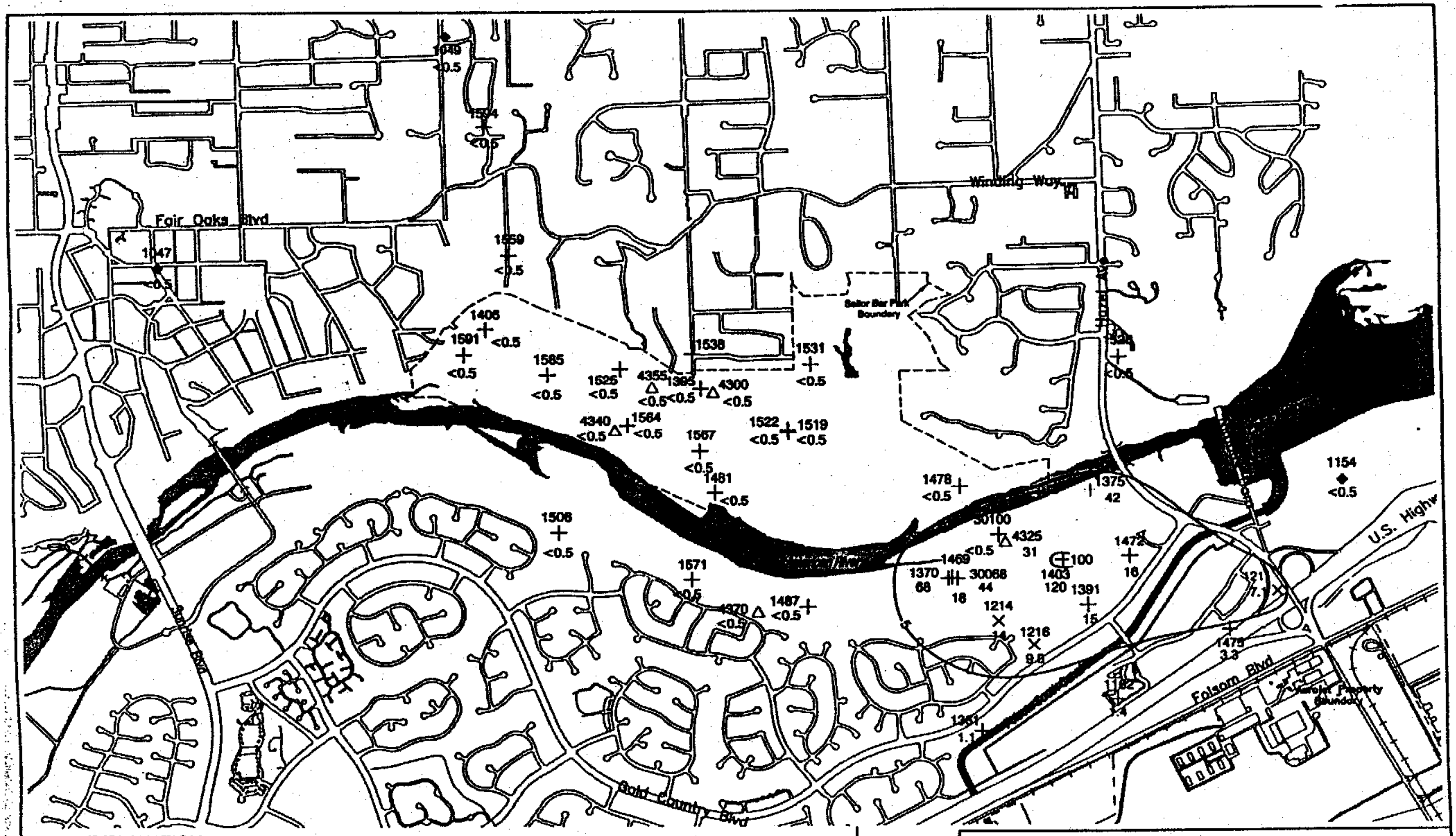


GENCORP
AEROJET
Environmental Operations

FIGURE B-3

American River Study Area
1,2-DCE in Groundwater - 7/98-9/98
Aquifer A

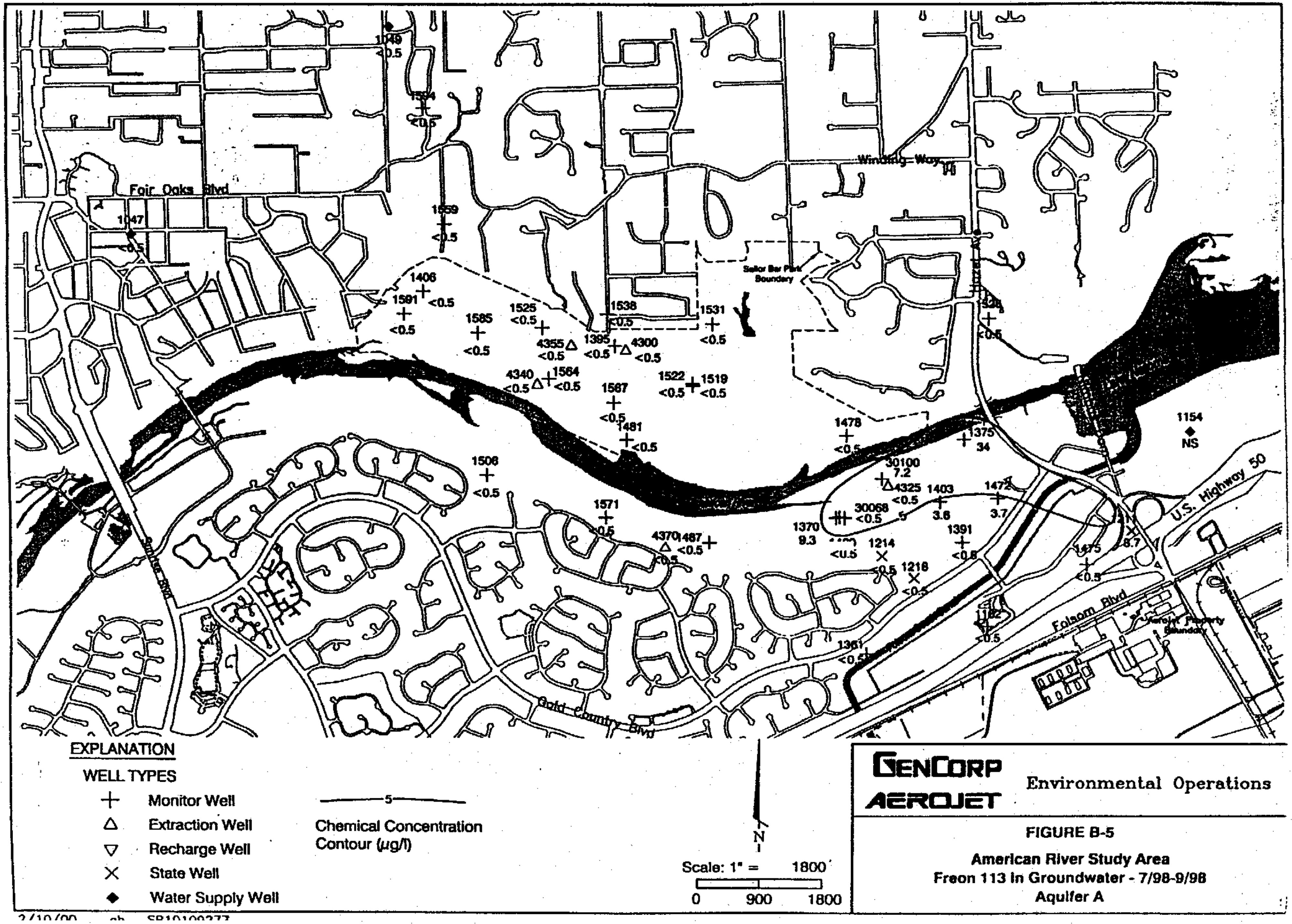
2/10/00 ah SR10109275



GenCorp
Aerojet
Environmental Operations

FIGURE B-4

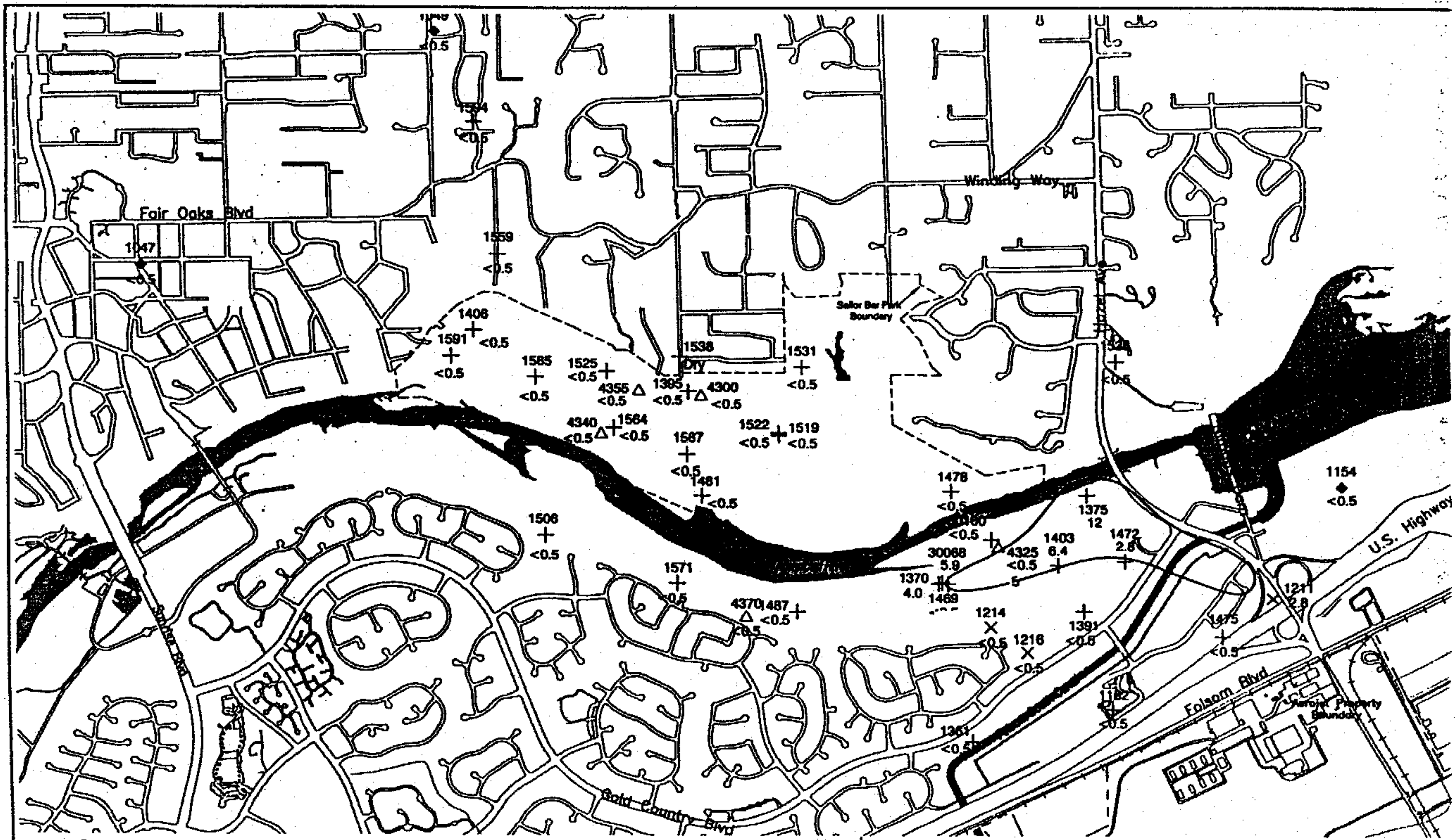
American River Study Area
1,2-DCE In Groundwater - 7/99-9/99
Aquifer A



GENCORP
AEROJET
Environmental Operations

FIGURE B-5

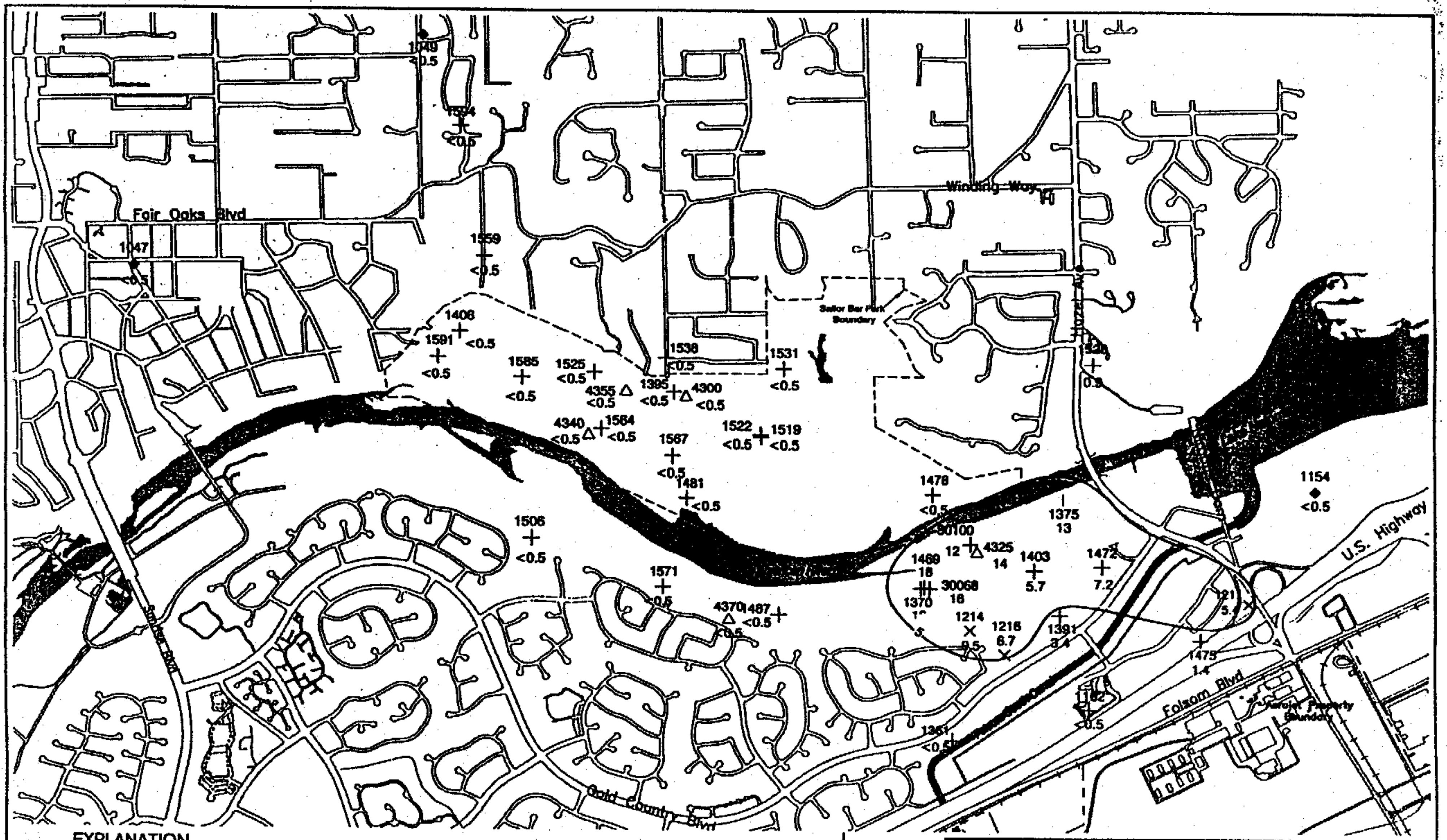
American River Study Area
Freon 113 in Groundwater - 7/98-9/98
Aquifer A



GENCORP
AEROJET
Environmental Operations

FIGURE B-6

American River Study Area
Freon 113 in Groundwater - 7/99-9/99
Aquifer A



EXPLANATION

WELL TYPES

+	Monitor Well
△	Extraction Well
▽	Recharge Well
×	State Well
◆	Water Supply Well

———5——— Chemical Concentration Contour (µg/l)

N

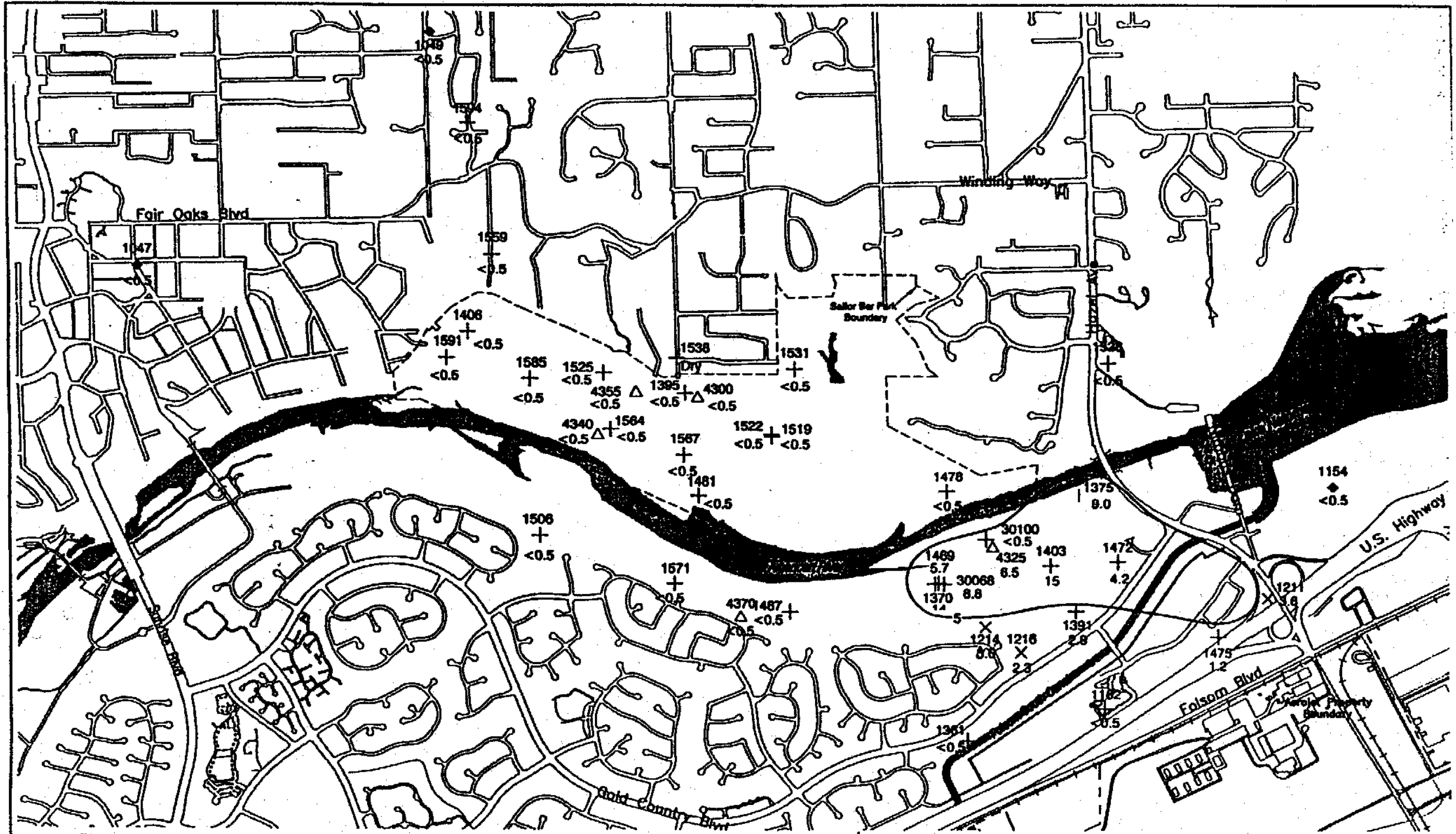
Scale: 1" = 1800'

0 900 1800

GenCorp Aerojet Environmental Operations

FIGURE B-7

American River Study Area
PCE In Groundwater - 7/98-9/98
Aquifer A



EXPLANATION

WELL TYPES

+	Monitor Well
△	Extraction Well
▽	Recharge Well
×	State Well
◆	Water Supply Well
——5——	Chemical Concentration Contour (µg/l)

N

Scale: 1" = 1800

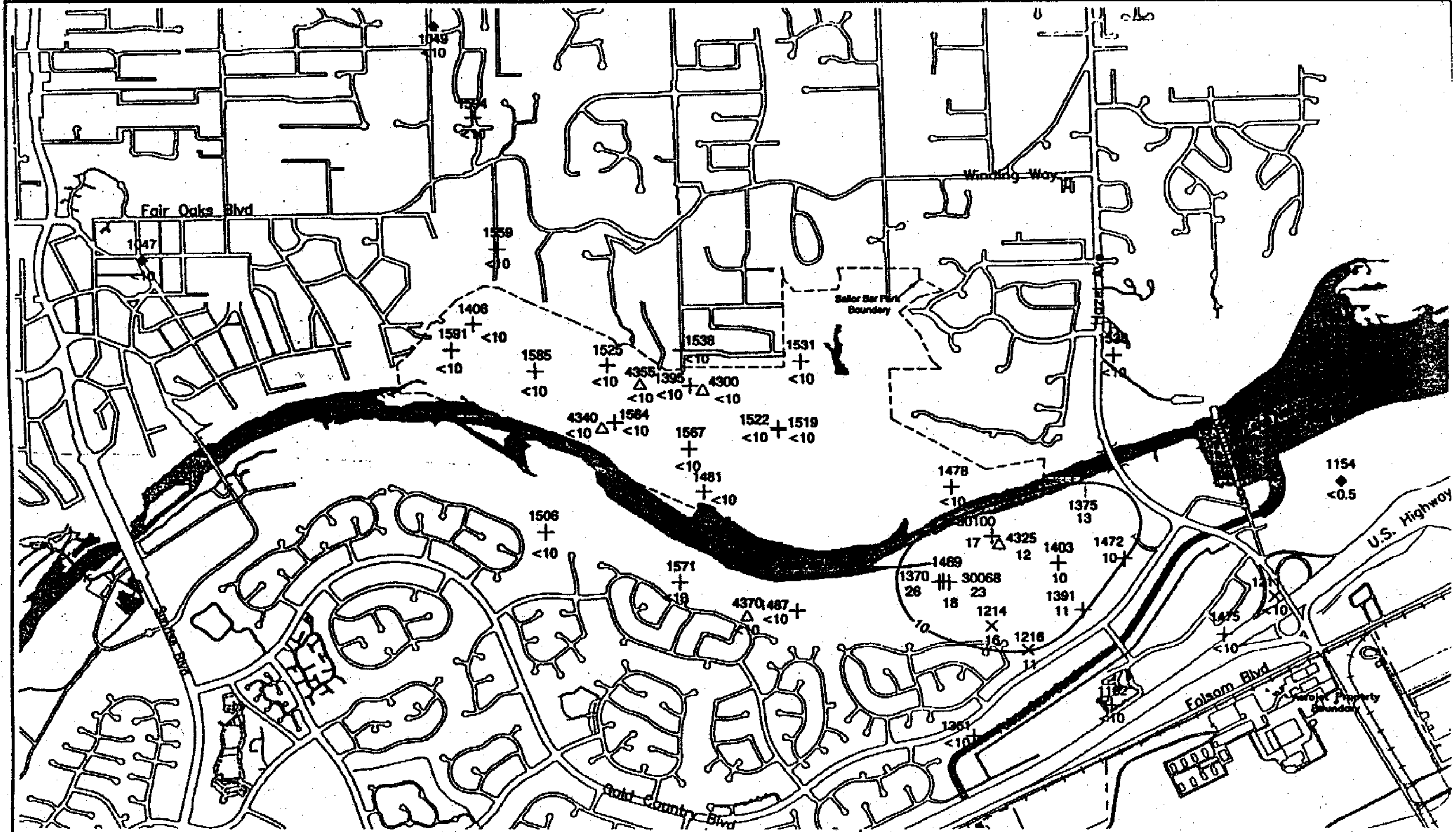
0 900 1800

GENCORP
AEROJET

Environmental Operations

FIGURE B-8

American River Study Area
PCE In Groundwater - 7/99-9/99
Aquifer A



EXPLANATION

WELL TYPES

+	Monitor Well
△	Extraction Well
▽	Recharge Well
×	State Well
◆	Water Supply Well

———5——— Chemical Concentration Contour (µg/l)

N

Scale: 1" = 1800

0 900 1800

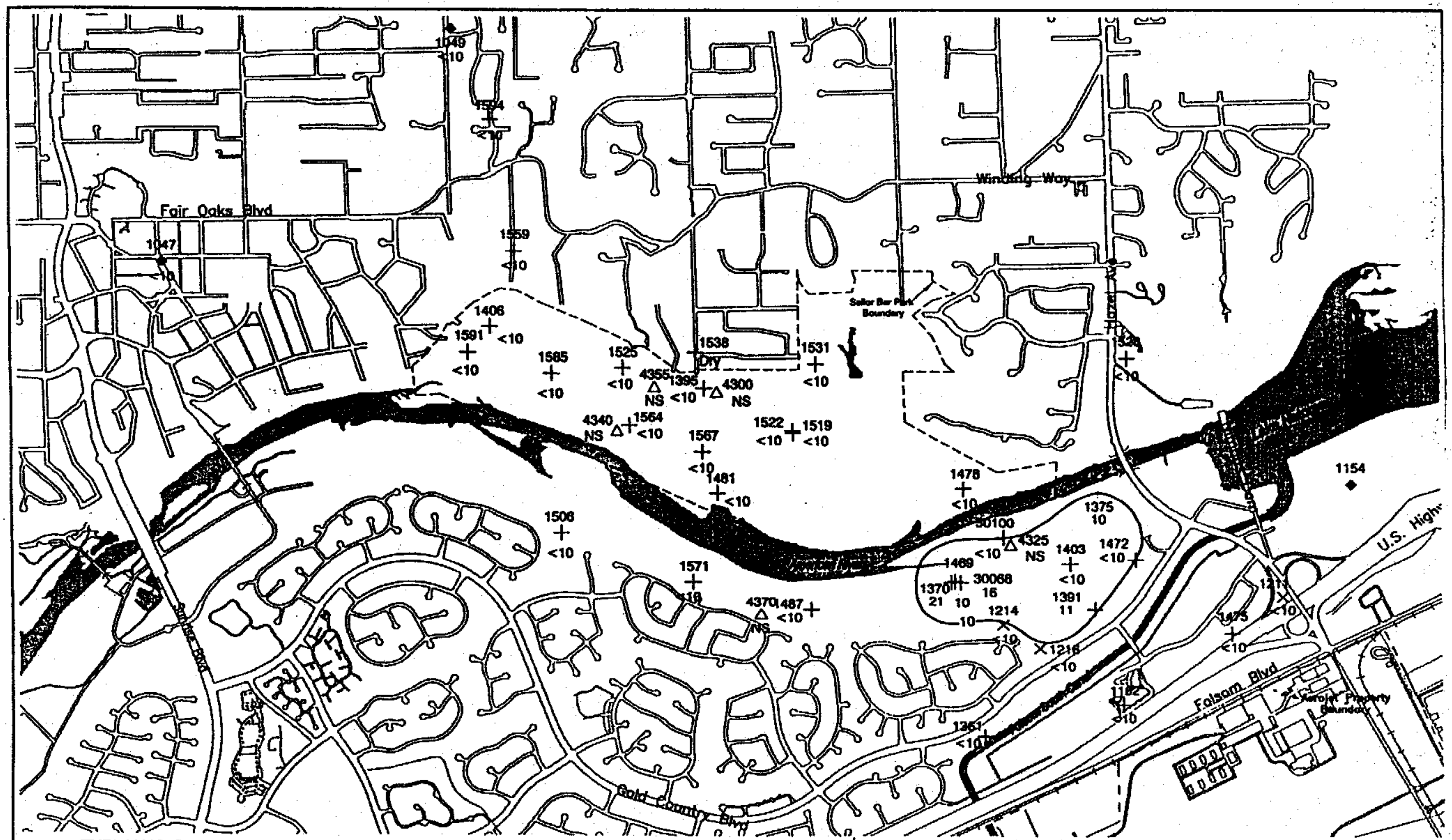
GENCORP

AEROJET

Environmental Operations

FIGURE B-9

American River Study Area
1,4-Dioxane in Groundwater - 7/98-9/98
Aquifer A



EXPLANATION

WELL TYPES

+	Monitor Well
△	Extraction Well
▽	Recharge Well
×	State Well
◆	Water Supply Well

——5—— Chemical Concentration Contour (µg/l)

Scale: 1" = 1800

0 900 1800

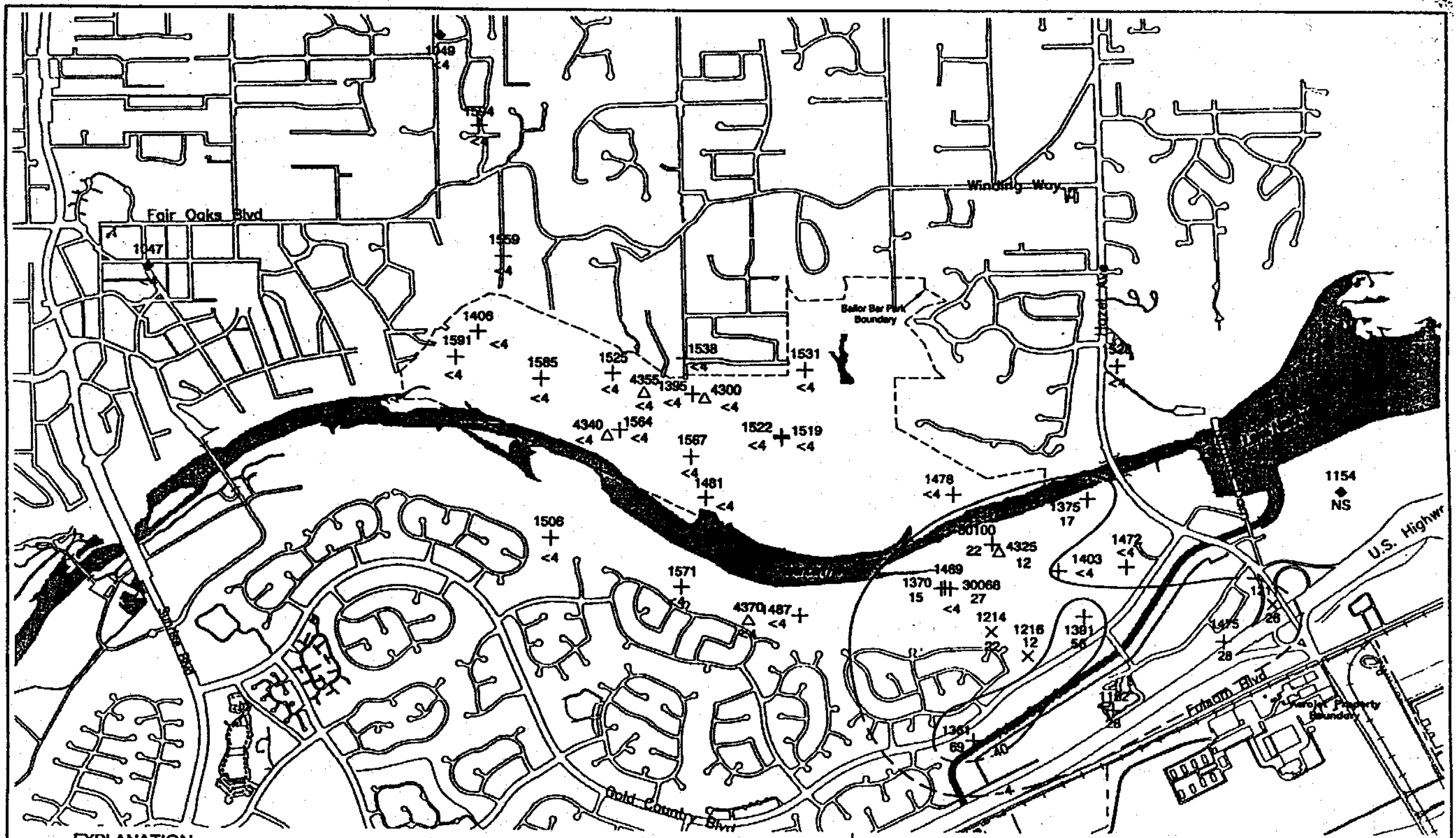
GENCORP
AEROJET

Environmental Operations

FIGURE B-10

American River Study Area
1,4-Dioxane in Groundwater - 7/99-9/99
Aquifer A

2/10/00 ah SR1010982



EXPLANATION

WELL TYPES

- + Monitor Well
- △ Extraction Well
- ▽ Recharge Well
- × State Well
- ◆ Water Supply Well

——5—— Chemical Concentration Contour (µg/l)

N

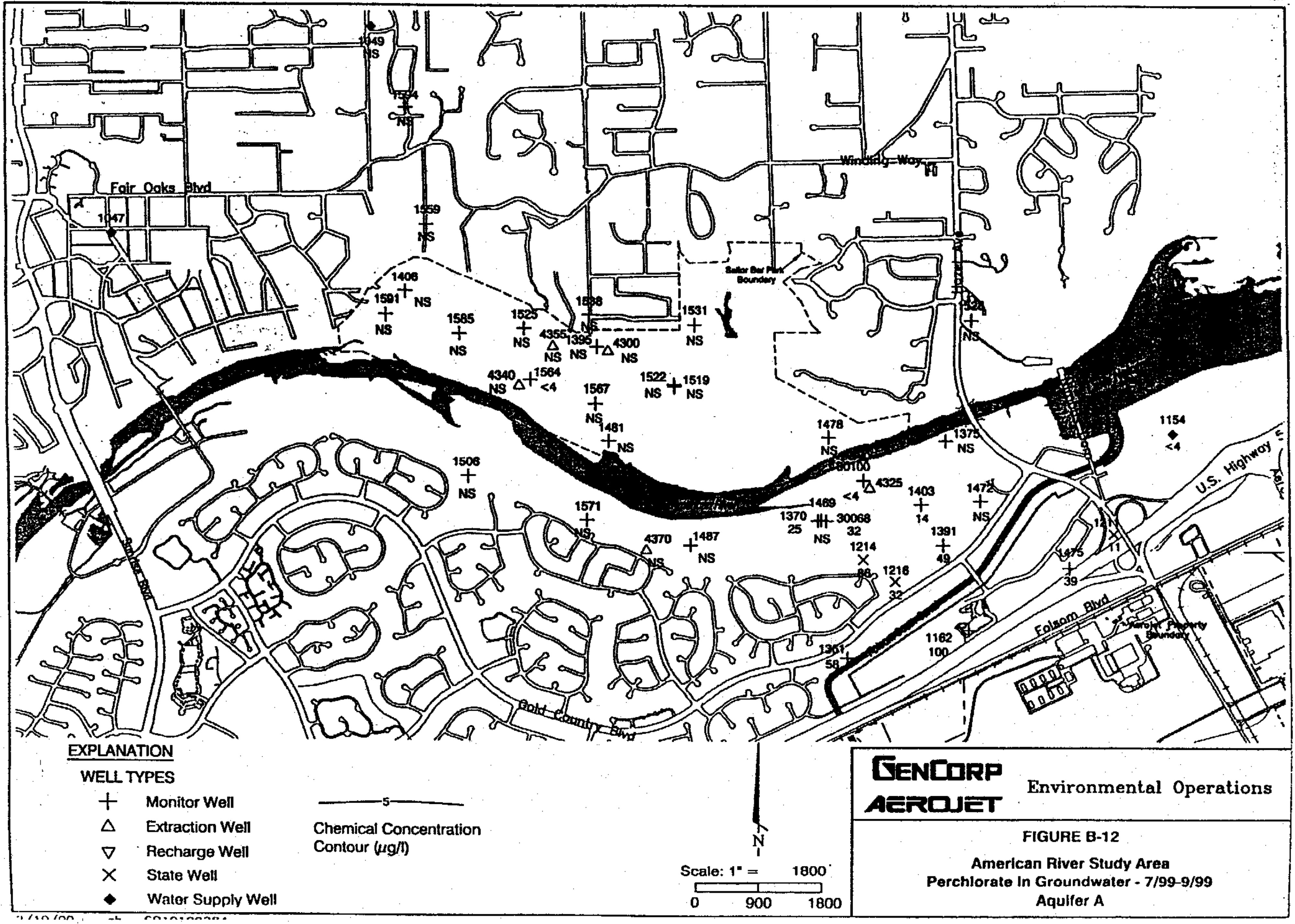
Scale: 1" = 1800'

0 900 1800

GENCORP
AEROJET
Environmental Operations

FIGURE B-11

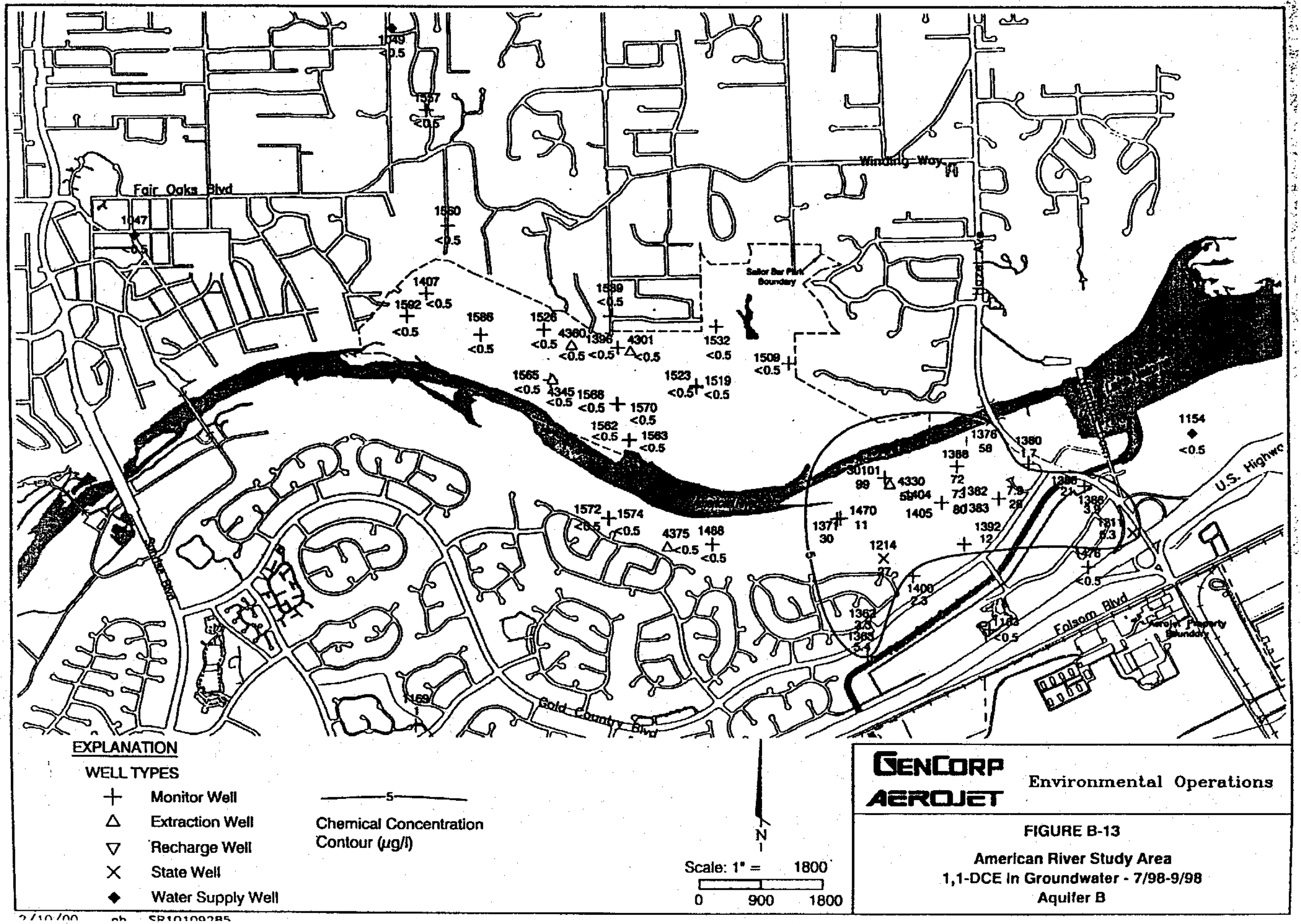
American River Study Area
Perchlorate in Groundwater - 7/98-9/98
Aquifer A



GENCORP
AEROJET
Environmental Operations

FIGURE B-12

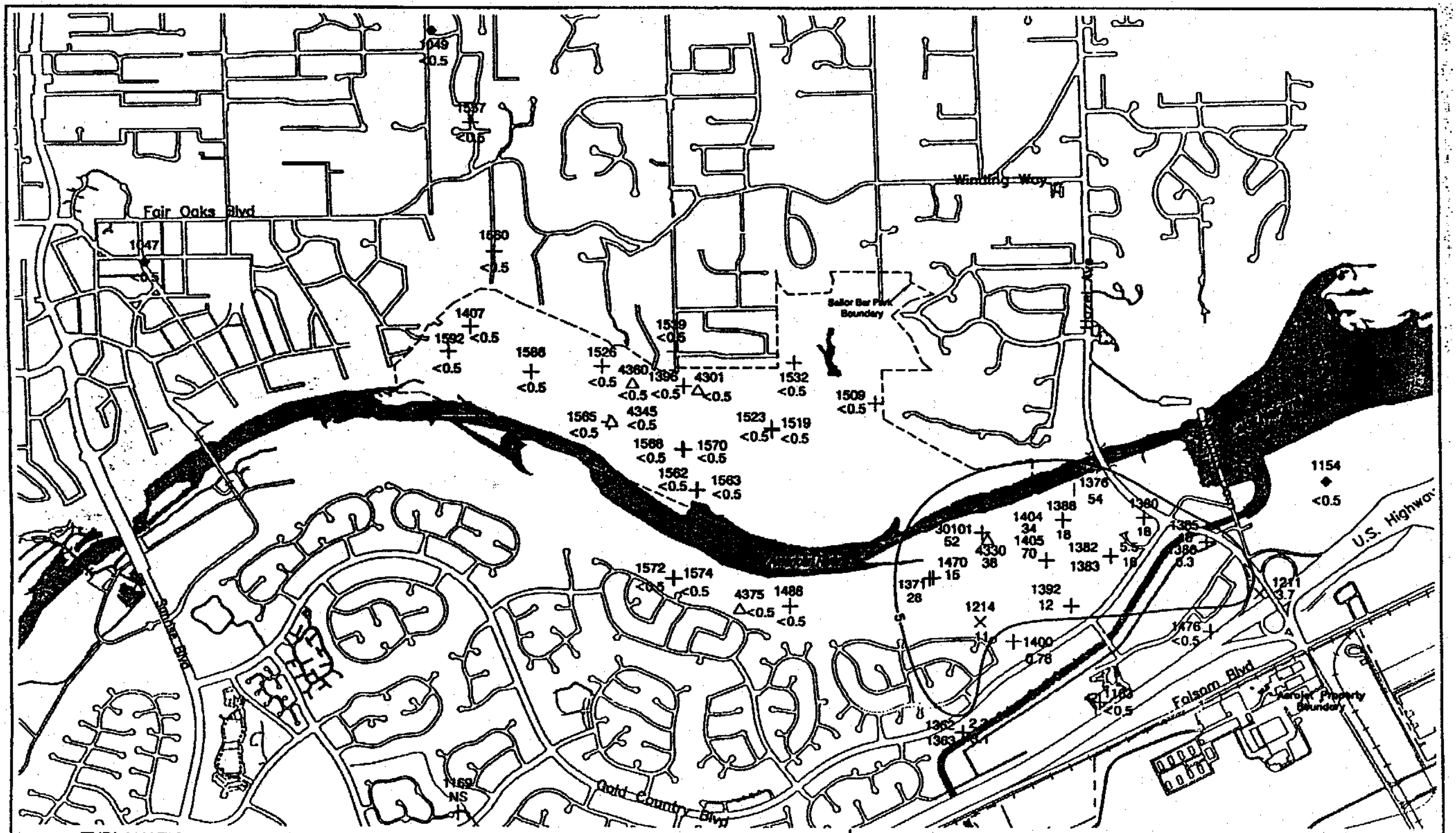
American River Study Area
Perchlorate In Groundwater - 7/99-9/99
Aquifer A



GENCORP
AEROJET
Environmental Operations

FIGURE B-13

American River Study Area
1,1-DCE in Groundwater - 7/98-9/98
Aquifer B



GENCORP
AEROJET

Environmental Operations

FIGURE B-14

American River Study Area
1,1-DCE in Groundwater - 7/99-9/99
Aquifer B

PROOF OF SERVICE

I am a resident of the State of California, over the age of eighteen years, and not a party to the within action. My business address is HATCH AND PARENT, 21 East Carrillo, Santa Barbara, California 93101. On April 29, 2002 , I served the within document:

Information Regarding Aerojet ARGET and GET E/F Facilities

☐ by transmitting via facsimile the document listed above to the fax number set forth below on this date before 5:00 p.m.

☐ by placing the document listed above in a sealed envelope with postage thereon fully prepaid, in the United States mail at Santa Barbara, California, addressed as set forth below.

☒ by causing delivery of the document listed above to the person at the address set forth below by Federal Express.

☐ by personally delivering the document listed above to the person at the address set forth below.

See Attached List

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

☒ *(State)* I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on April 29, 2002, at Santa Barbara, California.

April Robitaille

April Robitaille.

VIA FEDERAL EXPRESS

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Sacramento, CA 95814

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San Diego, CA 92101

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A LAW CORPORATION

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SOUTH LAKE TAHOE
THE SUMMIT
SOUTH LAKE TAHOE, CA 96150
TELEPHONE: (530) 542-7800

OUR FILE # 6774.110
DIRECT DIAL # (805) 882-1453
INTERNET: MFife@HatchParent.com

May 1, 2002

To: American River FAS Hearing Participants

Re: Supplemental Information re Aerojet ARGET and GET E/F Facilities

On April 29, 2002, Southern California Water Company ("SCWC") distributed information then in our possession concerning the quantity and the location of water at issue in the proceedings regarding SCWC's Petition to Revise the Declaration of Fully Appropriated Stream Systems Regarding the American River. Our cover letter also indicated our continued attempt to obtain additional information that would further clarify the source and quantity of the proposed expansion of the Aerojet discharges into the American River.

Our previous distribution identified the facilities known as "GET E/F" as one source of the additional discharges. We have since obtained a tentative revision of Aerojet's NPDES Permit No. CA0083861 which clearly identifies the GET E/F facilities as a source of the additional water and identifies the quantity of such water at 6000 gpm. This tentative revision to Aerojet's permit is included here. We direct your attention particularly to page 5 (paragraphs 15 through 20) for a detailed discussion of the proposed permit modification.

Also included here are more legible copies of the map of the ARGET and GET E/F facility locations.

These documents have been added to our Exhibit list and so are labeled with exhibit covers. As with the previous distribution of information, we hope to avoid the need to copy all of this information a second time, and so do not intend to distribute it again with the remainder of our exhibits.

There is still a third increment of water about which we continue to seek further information. This is the additional 8000 gpm that is anticipated to be produced from the area known as the Western Groundwater Operable Unit ("WGOU"). This area is identified on the large map included here. While we know this is the location and anticipated quantity of water to be produced and discharged as part of this expansion, we hope to be able to provide to the kind of detailed information that we have provided for the ARGET and GET E/F facilities.

If you have any further questions please do not hesitate to contact us.

Sincerely,

Scott S. Slater
Michael T. Fife
for HATCH AND PARENT

MXF:bcm

PROOF OF SERVICE

I am a resident of the State of California, over the age of eighteen years, and not a party to the within action. My business address is HATCH AND PARENT, 21 East Carrillo, Santa Barbara, California 93101. On May 1, 2002 , I served the within document:

Supplemental Information Regarding Aerojet ARGET and GET E/F Facilities

☐ by transmitting via facsimile the document listed above to the fax number set forth below on this date before 5:00 p.m.

☐ by placing the document listed above in a sealed envelope with postage thereon fully prepaid, in the United States mail at Santa Barbara, California, addressed as set forth below.

☒ by causing delivery of the document listed above to the person at the address set forth below by Federal Express.

☐ by personally delivering the document listed above to the person at the address set forth below.

See Attached List

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

☒ *(State)* I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on May 1, 2002, at Santa Barbara, California.

Brenda

Brenda Torres

VIA FEDERAL EXPRESS

Ronald M. Stork
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Jean McCue (5 Binders)
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21 E. Carrillo Street
Santa Barbara, CA 93101
Telephone: (805) 963-7000
Facsimile: (805) 965-4333

Attorneys for Petitioner,
SOUTHERN CALIFORNIA WATER COMPANY

BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In re Petition of Southern California Water Company to Revise the Declaration of Fully Appropriated Stream Systems Regarding the American River, Sacramento County)
)
)
)
)
)
)

SCWC EXHIBIT 25

California Regional Water Quality Control Board

Central Valley Region

Robert Schneider, Chair

nston H. Hickox
Secretary for
Environmental
Protection

Sacramento Main Office
Internet Address: http://www.swrcb.ca.gov/~rwqcb5/home.html
3443 Routier Road, Suite A, Sacramento, California 958[illegible]-3003
Phone (916) 255-3000 • FAX (916) 255-3015

Gray Davis
Governor

12 March 2002

Mr. Scott Goulart
Environmental Management
Aerojet-General Corporation
P.O. Box 13222
Sacramento, CA 95813-6000

TENTATIVE REVISED NPDES PERMIT, AMERICAN RIVER STUDY AREA AND GET E/F, AEROJET-GENERAL CORPORATION, ORDER NO. 98-113 (NPDES NO. CA0083861)

Enclosed is a copy of the subject tentative revision to your NPDES permit. Aerojet requested revisions to allow for the discharge from the GET E/F facility to Buffalo and/or Alder Creek. The discharges are from a groundwater extraction and treatment system designed to remove volatile organic compounds, perchlorate, and n-nitrosodimethlyamine. There are some slight modifications to the draft version of the revised permit you previously received.

Also enclosed with this letter is a copy of a Notice of Public Hearing and Proof of Posting. The notice is required to be posted no later than **26 March 2002.** Posting of the notice in the Rancho Cordova Library by that date will comply with the requirement. The notice is also required to be placed in the Sacramento Bee for one (1) day. It should be attempted to have it place in, or prior to, the **26 March 2002** edition of the paper. If that is not possible, then the earliest edition possible after that date will be sufficient. Submit the completed Proof of Posting to our office by **5 April 2002.**

Please provide comments by the dates in the Notice of Public Hearing. If possible, provide any significant comments by **1 April 2002** so that they can be considered prior to submission of the Board agenda package for reproduction.

If you have any questions regarding this matter, please call me at (91[illegible]) 255-3025.

Alexander

ALEXANDER MACDONALD
Senior Engineer

cc: United States Environmental Protection Agency, San Francisco
U.S. Army Corps of Engineers, Sacramento
United States Fish and Wildlife Service, Sacramento
National Marine Fisheries Service, Santa Rosa
Cathy Lee, Dept. of Health Services, Office of Drinking Water Sacramento
Dept. of Fish and Game, Region II, Rancho Cordova
Dept. of Water Resources, Central District, Sacramento
Catherine George, Office of Chief Counsel, State Water Resources Control Board
Div. of Water Quality, State Water Resources Control Board, Sacramento
Sacramento County Environmental Management, Sacramento
Sacramento County Planning Department, Sacramento
John Coppola, Sacramento County Water Resources Agency, Sacramento
Mr. Jim Carson, Southern California Water Company, Rancho Cordova
Mr. Rob Roscoe, California-American Water Company, Sacramento
Gary Reents, City of Sacramento Department of Utilities, Sacramento

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
3443 Routier Road, Suite A, Sacramento, California 95827

PUBLIC HEARING

concerning
Notice of Application for Modification of Waste Discharge Requirements
(National Pollution Discharge Elimination System Permit
for

AEROJET-GENERAL CORPORATION
SACRAMENTO COUNTY

Aerojet-General Corporation currently discharges treated groundwater from its American River Study Area Groundwater Extraction and Treatment (GET) System to Buffalo Creek, tributary to the American River in eastern Sacramento County in the community of Rancho Cordova. Business activities at the Aerojet facility include development of rocket propulsion systems, engineering, manufacturing and testing, and custom and specialty chemical and pharmaceutical manufacturing and related activities. The proposed modifications allow for the discharge of up to 6000 gallons per day from Aerojet's GET E/F system to Buffalo and/or Alder Creek. The GET E/F treatment system removes the contaminants of concern - volatile organics to below 0.5 parts per billion (ppb), perchlorate to less than 4 ppb, and NDMA o less than 0.002 ppb prior to discharge.

A **formal** public hearing concerning this matter will be held during the Regional Board meeting which is scheduled for:

DATE: 26 April 2002
TIME: 8:30 a.m.
PLACE: Fresno Education Department
Auditorium, 2nd Floor
Tulare & M Streets
Fresno, California

The designated parties for this hearing are as follows:

- Staff of Central Valley Regional Board
- Aerojet-General Corporation

Only designated parties will have these rights: to call and examine witnesses; to introduce exhibits; to cross-examine opposing witnesses; to impeach any wi ness; and to rebut the evidence against him or her. All other persons wishing to testify or provide comments are interested persons and not designated parties. Such interested persons may request status as a designated party for purposes of this hearing by submitting such request in writing to the Board no later than **12 April 2002**. The request must explain the basis for status as a designated party and in particular how the person is directly affected by the discharge.

Persons wishing to comment on this noticed hearing item must submit testimony, evidence, and/or comments in writing to the Regional Board no later than **12 April 2002**. Written testimony, evidence, or comments submitted after **22 April 2002** will not be accepted and will not be incorporated into the administrative record if doing so would prejudice any party.

All interested persons may speak at the Board meeting, and are expected to orally summarize their written submittals. Oral testimony will be limited in time by the Board Chair

Anyone having questions on the proposed permit modification should contact Alexander MacDonald. The proposed item and related documents may be inspected and copied at the Regional Board's office at 3443 Routier Road, Suite A, Sacramento, California, weekdays between 8:00 a.m. and 5:00 p.m. by appointment.

The procedures governing Regional Water Board meetings may be found at Title 23, California Code of Regulations, Section 647 et seq. and is available upon request. Hearings before the Regional Water Board are not conducted pursuant to Government Code section 11500 et seq. The procedures may be obtained by accessing http://www.swrcb.ca.gov/water_laws/index.html. Information on meeting and hearing procedures is also available on the Regional Board's website at http://www.swrcb.ca.gov/rwqcb5/board_meetings/mtgprocd.html or by contacting any one of the Board's offices. Questions regarding such procedures should be directed to Ms. Janice Tanaka at (916) 255-3039

The hearing facilities will be accessible to persons with disabilities. Individuals requiring special accommodations are requested to contact Ms. Janice Tanaka at (916) 255-3039 at least 5 working days prior to the meeting. TTY users may contact the California Relay Service at 1-800-735-2929 or voice line at 1-800-735-2922.

Please bring the above information to the attention of anyone you know who would be interested in this matter.

Thomas R Pinkos

THOMAS R. PINKOS, Assistant Executive Officer

03/12/02

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

TENTATIVE

ORDER NO.

NPDES NO. CA0083861

WASTE DISCHARGE REQUIREMENTS
FOR
AEROJET-GENERAL CORPORATION
INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
AMERICAN RIVER STUDY AREA AND GET E/F
SACRAMENTO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. Aerojet-General Corporation (hereafter Discharger) submitted a Report of Waste Discharge, dated 27 September 2001 and supplemental information dated 20 November 2001, and applied for a revision of its authorization to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the American River Study Area (ARSA) Groundwater Extraction and Treatment System. The application requested authorization to add the discharge from the Groundwater Extraction and Treatment (GET) E/F facility to that from the existing ARSA facility.

2 The Discharger operates a rocket-testing and chemical manufacturing facility in eastern Sacramento County near Rancho Cordova and Folsom. Past discharge practices have caused the release of contaminants into the vadose zone and groundwater at the facility.

3 Concentrations of contaminants in the groundwater northwest of the Discharger's property in the vicinity of Sailor Bar Park and the Nimbus Fish Hatchery, north and south of the American River and west of Hazel Avenue (American River Study Area), respectively, include up to 4000 micrograms per liter (µg/l) trichloroethylene (MCL of 5 µg/l), 220 µg/l cis-1,2-dichloroethylene (MCL of 6.0 µg/l), 110 µg/l 1,1-dichloroethylene (MCL of 5.0 µg/l), and 36 µg/l tetrachloroethylene (MCL of 5 µg/l). Concentrations of trichloroethylene in the plume of contaminated groundwater have been detected north of Sailor Bar Park exceeding 100 µg/l. This plume of contaminated groundwater is extracted and treated by the ARSA facility. The Discharger has been extracting and treating groundwater at ARSA, and discharging the treated groundwater pursuant to an NPDES permit, since 1996.

AMERICAN RIVER STUDY AREA

4. The current plume of contaminated groundwater off the Discharger's property and to the north of the American River creates or threatens to create a condition of pollution or nuisance. In response, the Executive Officer issued Cleanup and Abatement Order No. 95 715 requiring the Discharger to submit a plan designed to minimize the flux of contaminated groundwater past the northern boundary of Sailor Bar Park while an evaluation and construction of a system for containment, extraction, and treatment of the entire plume in the American River Study Area was being made.

To comply with the Cleanup and Abatement Order, the Discharg r submitted a plan proposing to initially extract approximately 500 gpm of groundwater from thr e existing groundwater extraction wells, treat the water using granular activated carbon (GAC), and discharge the treated groundwater under a permit into the Sacramento Regional County Sanitation I istrict's collection system. However, the costs for discharge to the sewer were significant pr mpting the Discharger to request to discharge the treated groundwater under an NPDES permit to an xisting pond in Sailor Bar Park. The pond was being fed by storm and urban runoff from a small pstream watershed and by a groundwater supply well near the pond. The Board adopted an N PDES permit, Order No. 96-066, for the discharge from the interim treatment plant to the pond in ailor Bar Park. Water quality of the discharge was no worse, and was generally better due to treat nent, than the other discharges into the pond. Overflow from the pond is to an unnamed tributary to he American River. Given the very coarse soils in the drainage channel, and the numerous road rossings blocking flow, and ponding areas, a direct discharge from the pond does not reach th e American River. See Attachment A, a part of this Order.

5. The interim groundwater treatment system consisted of twenty-f ur GAC absorber vessels each containing 2000 pounds of carbon and operated in twelve sets of wo vessels in series. The plant was designed to treat 500 gpm of extracted ground water to conc ntrations below that which can be detected. Prior to entering the GAC vessels, the water will passe l through bag filters to remove suspended particles larger than 5 microns. The discharge was in substantial compliance with the effluent and receiving water limitations found in Order No. 96-0 6 during its period of operation, which ceased in October 1997 to allow construction of the curre t system. The new system is to treat extracted groundwater from all the extraction wells in the A nerican River Study Area (discussed further below). This Order revises the requirements c f Order No. 96-066 to reflect the changes due to the proposed discharges.

6. The Board modified Order No. 95-715 with the adoption of Clea nup and Abatement Order No. 96-230 on 20 September 1996. Order No. 96-230 directs the Di charger to complete design, construction, and operation of a groundwater extraction system i the American River Study Area to contain and cleanup the plume of contaminated groundwater. Tl e Discharger complied with that Order by completing construction of a treatment facility on the I ischarger's property capable of treating 3500 gpm. Flow from nine extraction wells in Sailor B r Park is pumped under the American River, combined with flows from six extraction wells on the south side of the river, and piped back to the treatment facility. The new facility came on-li e in April 1998 and discharged pursuant to the NPDES permit contained in Order No. 98-113.

The treatment plant utilizes ultraviolet/peroxide oxidation and a r stripping to remove the volatile organic contaminants (VOCs), as described in Finding No. 3, ab ve.

7. Sacramento County Department of Parks and Recreation has req ested the Discharger to continue the discharge of groundwater to Sailor Bar Park pond (in Sectio 17, R6E, T9N, MDB&M). It was

found that the continuous discharge of freshwater to the pond from the interim system, enhanced the quality of the pond. If the current park well was utilized to provide the flow for the pond, a treatment system would be required for the well since samples of water from the well have found up to 85 µg/l trichloroethylene (TCE). A treatment system consisting of activated carbon canisters has been provided for removal of the TCE prior to discharge to the pond. The treatment system has shown to be effective in removing the TCE to non-detectable levels during its entire operational period. Monitoring of the water supply well treatment system is required by this permit. The 250 gpm flow from the water supply well will be intermittent, and will have a maximum flow of 0.18 million gallons per day (mgd).

8. The current discharge from the ARSA system consists of the main flow from the groundwater treatment plant to Buffalo Creek on the Discharger's property and the flow to the pond as described in Finding No. 7, above. Buffalo Creek discharges to the American River just upstream of the Sunrise Bridge crossing in Section 13, R6E, T9N, MDB&M. See Attachment A.

9. The Report of Waste Discharge for the ARSA facility, including data from sampling of the Sailor Bar park system and nearby groundwater wells, describes the discharge as follows:

Monthly Average Flow:	5.0 mgd
Daily Peak Flow:	5.0 mgd
Design Flow:	5.0 mgd
Average Temperature:	70°F summer; 59°F winter
pH	7.2 - 8.5

Constituent	mg/l
COD	< 3
Total Suspended Solids	< 6
Chlorides	40
Sulfate	12
Manganese	0.07
Aluminum	< 0.16
Zinc	0.034
Arsenic	< 0.002
Lead	< 0.005
Hardness (as $CaCO_3$)	110
Barium	0.07
Copper	< 0.0015
Chromium	< 0.002
Nickel	< 0.005
All Volatile Organic Contaminants	< 0.0005
Perchlorate	0.008

10. Sampling for perchlorate in groundwater monitor wells in the American River Study Area was recently conducted. Concentrations ranged from non-detect (<0.004 mg/l) to 0.150 mg/l. The average concentration was 0.007 mg/l with a median of non-detect (<0.004 mg/l). None of the groundwater extraction wells were found to contain perchlorate at detectable concentrations. The highest concentrations of perchlorate are found in the monitor wells closest to Aerojet and all wells with detections, except one, were found on the south side of the American River. Using values from monitor wells closest to the extraction wells, it is calculated that the influent to the treatment system is estimated to be around 0.007 mg/l. This is near the current Department of Health Services Action Level for drinking water of 0.004 mg/l (January 2002). Sampling of the effluent from the ARSA facility since 1998 has shown that the concentration of perchlorate is in the range of 0.005-0.008 mg/l.. It should be noted that there will be a *minimum* [illegible]0-fold dilution in the American River (flow at 250 cubic feet per second) at the maximum discharge rate of 3450 gpm, resulting in no detectable concentrations of perchlorate in the American River.

11. One other contaminant of concern, other than those discussed above, which was deemed necessary for evaluation is 1,4-dioxane. This contaminant is found in some of the groundwater monitor wells south of the American River in the American River Study Area, with a maximum concentration of 0.029 mg/l. Estimated worst-case effluent concentrations for 1,4-dioxane are 0.006 mg/l. The UV/peroxide treatment system provides effective treatment for the reduction of 1,4-dioxane. For 1,4-dioxane, the California State Action Level is 0.003 mg/l and the Proposition 65 value is 0.015 mg/l. The effluent limitation is set at Action Level.

12. Another contaminant of concern is N-Nitrosodimethylamine (NDMA) which has been found in groundwater on the eastern side of Aerojet and a few wells on the western edge of Aerojet. There are no known source areas for NDMA in the vicinity or upgradient of the American River Study Area. In addition, NDMA has not been detected in monitor wells in the American River Study Area. This permit requires monitoring for NDMA in the treatment facility and in the American River upstream and downstream of the confluence with Buffalo Creek.

13. The Discharger submitted a Final Revised Engineering Evaluation and Cost Analysis for the American River Study Area dated 13 September 1996, a draft Quality Assurance Project Plan dated 31 January 1998, a draft revised Sampling and Analysis Plan dated 31 January 1998, and a draft Groundwater Extraction and Treatment System Effectiveness Evaluation Work Plan dated 31 January 1998. These documents were utilized in formulating the initial Order(s).

14. The Final Revised Engineering Evaluation and Cost Analysis (EE/CA) of the American River Study Area evaluated several discharge options for the treated groundwater, including providing the water for municipal and industrial use. The method of discharge covered in this permit as an interim solution, and options considered in the EE/CA may be utilized by the Discharger in the future. This permit would be modified as necessary.

PERMIT MODIFICATIONS – GET E/F

15. The Discharger has been operating the GET E and F treatment facilities since 1984, and according to the requirements of the Partial Consent Decree since its entry by Federal Court in December 1989. GET E and GET F were combined in 2000 with all of the water being treated at a modified GET E/F facility. The GET E/F extraction system is designed to intercept groundwater contaminant plumes prior to them leaving the western portion of the Discharger's property. Currently, the facility operates at approximately 3800 gpm, and is being expanded to achieve a treatment capacity of 6000 gpm. Previously, discharge of the treated groundwater was by injection back into the aquifer. However, the remedy for the Western Groundwater Operable contained in the Record of Decision issued by USEPA in July 2000, which includes the GET E/F facility, does not call for injection, but for discharge to surface water in order to allow for reuse of the treated groundwater to provide replacement water supplies for those lost due to contamination in the Rancho Cordova and surrounding areas. In addition, infiltration capacity in the vicinity is limited as demonstrated by the current ponding of water from the GET E/F discharge of 3600 gpm to land for recharge. Increasing application to land at a rate of 6000 gpm is not feasible.

16. The groundwater contaminant plumes intercepted by the GET E/F extraction field include VOCs (primarily TCE), perchlorate, and NDMA.

17. The GET E/F facility uses biological reduction to remove perchlorate, ultraviolet light to remove NDMA, and air stripping to remove VOCs. The GET E/F facility has been in operating in its current configuration since 1999. The treatment process has been shown to be effective in removing VOCs to below detection levels (0.5 µg/l), perchlorate to below 4 µg/l, and NDMA to below detection (0.002 –0.075 µg/l). Testing of the influent and effluent to the treatment facility for full-scan analysis, including tentatively identified compound analysis, did not indicate additional contaminants of concern. A schematic of the treatment facility is included in this Order as Attachment B.

18. The Report of Waste Discharge for the GET E/F, describes the discharge as follows:

Monthly Average Flow:	8.64 mgd
Daily Peak Flow:	8.64 mgd
Design Flow:	8.64 mgd
Average Temperature:	64°F summer; 60°F winter
pH	7.2 - 7.5

Constituent	mg/l
COD	<3
Total Suspended Solids	<5

Constituent	mg/l
Nitrate	<0.05
Chlorides	6.6
Sulfate	15
Manganese	0.07
Aluminum	<0.05
Zinc	<0.10
Arsenic	<0.002
Lead	<0.10
Hardness (as $CaCO_3$)	110
Barium	0.1
Copper	<0.01
Chromium	<0.01
Nickel	<0.04
All Volatile Organic Contaminants	<0.0005

19. Initial discharge of the treated groundwater will be to Buffalo Creek. Later, the effluent from the GET E/F facility may also be discharged to Alder Creek, tributary to Lake Natoma (American River), on the Discharger's property. These two discharge locations are shown on Attachment A. A pipeline to convey the treated water from the GET E/F facility will need to be constructed prior to the discharge to Alder Creek. The Discharger is currently evaluating pipeline alternatives that would allow discharge to Alder Creek. The interim discharge to Buffalo Creek will co-mingle with the discharge from the ARSA facility, prior to leaving the Discharger's property.

20. In the process of removing perchlorate, alcohol is added to the water to provide sufficient food source for biological growth. Excess alcohol is minimized, however, the low concentrations of excess alcohol react with the peroxide used in the NDMA destruction process and low concentrations of acetaldehyde and formaldehyde are formed. Concentrations of those two chemicals have been detected in the effluent from the air-stripper at concentrations up to 2 µg/l for acetaldehyde and 20 µg/l formaldehyde. Those concentrations are below the lowest adverse risk levels found of 380 µg/l (IRIS) and 100 µg/l (State of California Action Level). Effluent limitations are set at 5 for acetaldehyde and 30 µg/l for formaldehyde. In addition, it is also believed that those chemicals will be further reduced biologically in the upper stretches of Buffalo Creek. Further sampling will be conducted to verify this hypothesis.

Other

21. USEPA adopted the *National Toxics Rule* on 5 February 1993 and the *California Toxics Rule* on 18 May 2000. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State

Implementation Plan), which contains guidance on implementation of the *National Toxics Rule* and the *California Toxics Rule.*

22. The Board adopted the *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

23. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric water quality standard. Based on information submitted as part of the application and from past monitoring, the Board finds that the proposed discharge has a reasonable potential to exceed standards and objectives for the constituents discussed in the Information Sheet for the following constituents:

    a. VOCs: cis-1,2-dichloroethene, cis-1,2-dichloroethane, 1,1-dichloroethylene, chloroform, trichloroethene, and trans-1,2-dichloroethene; and effluent limitations for the constituents have been included in this Order. The two treatment systems have been designed, constructed, and operated to meet the to meet the effluent limitations.

    b. Non-VOCs:1,4-dioxane, formaldehyde, acetaldehyde, perchlorate, and n-nitrosodimethylamine; and effluent limitations for the constituents have been included in this Order.

    c. This Order and the Basin Plan prohibit the discharge of toxic constituents in toxic amounts. Based on information submitted as part of the application and monitoring reports, VOCs: 1,2-dichloroethane, chloroform, cis-1,2-dichloroethene, trichloroethene, and trans-1,2-dichloroethene in the discharge, have a reasonable potential to cause or contribute to a violation of the Basin Plan narrative prohibition of the discharge of toxic substances in toxic concentrations. The Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule) is promulgated in the Federal Register, 40CFR Part 131, Part III. Effluent limitations for VOCs: 1,2-dichloroethane, chloroform, cis-1,2-dichloroethene, trichloroethene, and trans-1,2-dichloroethene, based on the California Toxics Rule and Best Available Technology (as described above), are included in this Order.

24. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality objective. This Order contains provisions that:

    a. require the Discharger to provide information as to whether the levels of priority pollutants, including CTR and NTR constituents, and constituents for which drinking water maximum contaminant levels (MCL) are prescribed in the California Code of Regulations, and temperature in the discharge cause or contribute to an in-stream excursion above a water quality objective;

b. if the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality objective, require the Discharger to submit information necessary to calculate effluent limitations for those constituents; and

c. allow the Board to reopen this Order and include effluent limitations for those constituents.

24. The U.S. Environmental Protection Agency (EPA) and the Board have classified this discharge as a minor discharge.

25. The beneficial uses of the American River downstream of the discharge are municipal and domestic, industrial, and agricultural supply; water contact and noncontact recreation; groundwater recharge, fresh water replenishment; and preservation and enhancement of fish, wildlife and other aquatic resources.

26. The beneficial uses of the underlying groundwater are municipal and domestic, industrial, and agricultural supply.

27. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. The impact on water quality will be insignificant.

28. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301, 302, 304, and 307 of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

29. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), in accordance with Section 13389 of the California Water Code.

30. The Department of Toxic Substances Control has certified a final Negative Declaration and Initial Study for the American Rivers Study Area project in accordance with the CEQA (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines. The Board has reviewed the Negative Declaration and these waste discharge requirements will mitigate or avoid any significant impacts on water quality.

31. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

32. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

33. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. 98-113 is rescinded and Aerojet-General Corporation, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of treated wastewater at a location or in a manner different from that described in Finding No. 8 is prohibited.

2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by the attached Standard Provisions and Reporting Requirements A. 3.

B. Effluent Limitations:

1. Effluent from the ARSA facility shall not exceed the following limits:

Constituents	Units	Daily Maximum	Monthly Average
Total Copper	µg/l	17	11
Total Lead	µg/l	15	2.5
Total Zinc	µg/l	110	100
Volatile Organics[1]	µg/l	0.5[1]	
1,2-Dichloroethane	µg/l	0.5	0.38
Perchlorate	µg/l	18	18
1,4-dioxane	µg/l	10	3

[1] All volatile organic constituents listed in EPA Methods 8010 and 8020. The concentration of each constituent shall not exceed 0.5 µg/l.

2. Effluent from the GET E/F facility shall not exceed the following limits:

Constituents	Units	Daily Maximum	Monthly Average
Total Copper	µg/l	17	11
Total Lead	µg/l	15	2.5

Constituents	Units	Daily Maximum	Monthly Average
Total Zinc	µg/l	110	100
Volatile Organics[1]	µg/l	0.5[1]	
1,2-Dichloroethane	µg/l	0.5	0.38
Perchlorate	µg/l	8	4
1,4-dioxane	µg/l	10	3
N-nitrosodimethylamine	µg/l	0.005	0.002
Acetaldehyde	µg/l	5	
Formaldehyde	µg/l	30	

[1] Volatile organic constituents listed in EPA Method 8010 and 8020. The concentration of each constituent shall not exceed 0.5 µg/l.

3. The discharges shall not have a pH less than 6.5 nor greater than 8.5.

4. The 30-day average daily discharge flow shall not exceed 5.04 mgd for the ARSA facility and 8.64 mgd for the GET E/F facility.

5. Survival of aquatic organism in 96-hour bioassays of undiluted waste shall be no less than:
   Minimum for any one bioassay - - - - - - - - - 70%
   Median for any three or more consecutive bioassays - - - - 90%

C. **Sludge Disposal:**

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner that is consistent with Chapter 15, Division 3 Title 23, of the CCR and approved by the Executive Officer.

2. Any proposed change in sludge use or disposal practice shall be reported to the Executive Officer and EPA Regional Administrator at least **90 days** in advance of the change.

D. ***Receiving Water Limitations:***

Receiving Water Limitations are site-specific interpretations of water quality objectives from applicable water quality control plans. As such they are a required part of this permit. However, a receiving water condition not in conformance with the limitation is not necessarily a violation of this Order. The Board may require an investigation to determine the cause and culpability prior to asserting that a violation has occurred.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/l.

2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.

3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

4. Aesthetically undesirable discoloration.

5. Fungi, slimes, or other objectionable growths.

6. Turbidity to increase more than 20 percent over background levels.

7. The normal ambient pH to fall below 6.5, exceed 8.5.

8. Deposition of material that causes nuisance or adversely affects beneficial uses.

9. The normal ambient temperature to be increased more than 5°F.

10. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

11. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

12. Aquatic communities and populations, including vertebrate invertebrate, and plant species, to be degraded.

13. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

14. Violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.

E. Provisions:

1. The Effluent Limitations for metals found in Effluent Limitation B.1 were conservatively developed, but with only a minimal amount of data. The Discharger shall be collecting additional information during required monitoring that will be used to evaluate the limits. If necessary, this permit may be reopened and the effluent limitations for metals revised based on the new data.

2. The Discharger shall comply with the Operation, Maintenance, and Monitoring Plan, Ground Water Extraction and Treatment System, American River Study Area dated **31 January 1998**. The Discharger shall submit an Operation, Maintenance, and Monitoring Plan for the GET E/F facility no later than **31 May 2002** for Executive Officer approval. The Discharger shall comply with the approved version of the plan.

3. Prior to discharge to Alder Creek, Aerojet shall complete and submit an assessment of the thermal impacts to Alder Creek from the discharge and receive approval for the discharge from the Executive Officer.

4. The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharge shall submit a work plan to conduct a Toxicity Reduction Evaluation (TRE) and upon approval conduct the TRE, and this Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if a chronic toxicity water quality objective is adopted by the State Water Resources Control Board, this Order may be reopened and a limitation based on that objective included.

5. The Discharger shall use the best practicable cost-effective control technique currently available to limit mineralization to no more than a reasonable increment.

6. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provision(s)."

7. The Discharger shall comply with the attached Monitoring and Reporting Program No. XX-XXX which is part of this Order, and any revisions thereto, as ordered by the Executive Officer.

8. Under Monitoring and Reporting Program No. XX-XXX, the Discharger shall report trace concentrations of constituents found during the analysis of samples. Trace values are estimates of concentrations detected between the detection level and the practical quantitation level. Trace values are not always reliable as there is a potential for interferences below the practical

quantitation level. As effluent limitations specified in this permit are at or above the practical quantitation level, reporting trace values shall not be a violation of an effluent limitation. Trace values are to be used to help operate the treatment facility and to provide information to minimize violations of effluent limits."

9. Section 13267(b) of the California Water Code provides that: "In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of discharging, or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of discharging, or who proposes to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports." The monitoring and reporting progam and technical reports required by this Order and the attached "Monitoring and Reporting Program, Order No. R5-XXXX-XXXX" are necessary to assure compliance with these waste discharge requirements. The Discharger operates the facility that discharges the waste subject to this Order.

10. This Order expires on XX XXXXXXX XXXX and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 80 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

11. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of or clearance from the State Water Resources Control Board (Division of Water Rights).

12. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

    To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name, address, and telephone number of the persons responsible for contact with the Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, GARY M. CARLTON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on .

GARY M. CARLTON, Executive Officer

02/07/02:AMM

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM

NPDES NO. CA0083861

ORDER NO. XX-XXXX

FOR
AEROJET-GENERAL CORPORATION
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
AMERICAN RIVER STUDY AREA AND GET E/F
SACRAMENTO COUNTY

Specific sample station locations have been established under direction of the Board's staff, and a description of the stations is attached to this Order.

GROUNDWATER TREATMENT SYSTEM MONITORING

Samples shall be collected from the inlet and outlet to the treatment system and analyzed. If the discharge is intermittent rather than continuous, then the samples shall be collected on the first day of the intermittent discharge. The time of collection of samples shall be recorded. The treatment system monitoring shall include at least the following:

American River Study Area Treatment Facility

Constituents	Units	Type of Sample	Sampling Frequency
Dissolved Oxygen	mg/l	Grab	Monthly
Flow[1]	mgd	Grab	Monthly
Total Dissolved Solids	mg/l	Grab	Monthly
Acute Toxicity[2,3]		Grab	Monthly
Volatile Organics[4]	µg/l	Grab	Monthly
Semi-Volatile Organics[5]	µg/l	Grab	Monthly
1,4-dioxane[6]	µg/l	Grab	Monthly
pH[1]	Number	Grab	Monthly
Turbidity	NTU	Grab	Monthly
Temperature[1]	°F (°C)	Grab	Weekly
Electrical Conductivity@25°C	µmhos/cm	Grab	Monthly
Total Copper	mg/l	Grab	Quarterly
Total Lead	mg/l	Grab	Quarterly
Total Zinc	mg/l	Grab	Quarterly

Constituents	Units	Type of Sampl	Sampling Frequency
Perchlorate[2]	µg/l	Grab	Monthly
N-Nitrosodimethylamine[8]	µg/l	Grab	Monthly
Hardness as (as $CaCO_3$)	mg/l	Grab	Monthly

Footnotes as provided below

GET E/F

Constituents	Units	Type of Sample	Sampling Frequency
Dissolved Oxygen	mg/l	Grab	Monthly
Electrical Conductivity@25°C[1]	µmhos/cm	Meter	Continuous
Flow[1]	mgd	Grab	Monthly
Total Dissolved Solids	mg/l	Grab	Monthly
Acute Toxicity[2,3]		Grab	Monthly
Volatile Organics[4]	µg/l	Grab	Monthly
Semi-Volatile Organics[5]	µg/l	Grab	Monthly
1,4-dioxane[6]	µg/l	Grab	Monthly
pH[1]	Number	Grab	Monthly
Turbidity	NTU	Grab	Monthly
Temperature[1]	°F (°C)	Grab	Weekly
Total Copper	mg/l	Grab	Quarterly
Total Lead	mg/l	Grab	Quarterly
Total Zinc	mg/l	Grab	Quarterly
Perchlorate[2]	µg/l	Grab	Monthly
N-Nitrosodimethylamine[8]	µg/l	Grab	Monthly
Hardness as (as $CaCO_3$)	mg/l	Grab	Monthly
PROWL[9]	µg/l	Grab	Twice per year
Formaldehyde[10]	µg/l	Grab	Monthly
Acetaldehyde[11]	µg/l	Grab	Monthly

Constituents	**Units**	**Type of Sample**	**Sampling Frequency**
Gloxyl[12]	µg/l	Grab	Monthly
Methanol[13]	µg/l	Grab	Monthly
Iron, Total and Dissolved	µg/l	Grab	Monthly

[1] Field Measurements.

[2] The analyses shall be performed in accordance with EPA/600/4-90/027, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.*

[3] Sampling of Effluent only.

[4] Test method to be by EPA Methods 601 and 602, or 8010 and 8020, or 82 50, or 500 series with a practical quanitation level no greater than 0.5 µg/l. All concentrations between the detection level and practical quanitation level shall be reported as trace.

[5] Test method to be EPA Method 8270 or equivalent. All peaks shall be reported and tentatively identified. All concentrations between the detection limit and the practical quantiation limit shall be reported as trace values.

[6] A practical quanitation level of 10 µg/l. All concentrations between the detection level and quantiation level shall be reported as trace.

[7] A practical quantiation level of 4 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[8] NDMA analysis with a practical quantiatation level no greater than 0.005 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[9] PROWL analysis with a practical quantiatation level no greater than 10 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[10] Formaldehyde analysis with a practical quantiatation level no greater than 5 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[11] Acetaldehyde analysis with a practical quantiatation level no greater than [illegible] µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[12] Glyoxal analysis with a practical quantiatation level no greater than 5 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[13] Methanol analysis with a practical quantiatation level no greater than 934 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

Note: All metals analyses shall be by atomic adsorption methods or a method with an equivalent practical quantitation limit. In addition, chronic toxicity monitoring for the treatment system is also required, and detailed below.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. Receiving water monitoring shall include at least the following:

Station	Description
R-1	At least 100 feet upstream on the American River from the confluence with Buffalo Creek.
R-2	Downstream on the American River at the pedestrian bridge crossing just downstream of the Sunrise Bridge overcrossing.

Station	Description
R-3	If discharge is occurring to Alder Creek, the sample shall be collected at least 100 feet upstream in lake Natoma from the confluence with Alder Creek.
R-4	If discharge to Alder Creek is occurring, then the sample shall be collected 100 feet downstream in Lake Natoma from the confluence with Alder Creek.

Constituents	Units	Station	Sampling Frequency
Dissolved Oxygen	mg/l	R-1, R-2, R-3, R-4	Monthly
Electrical Conductivity@25°C	µmhos/cm	R-1, R-2, R-3, R-4	Continuous
Total Dissolved Solids	mg/l	R-1, R-2, R-3, R-4	Monthly
Volatile Organics[1]	µg/l	R-1, R-2, R-3, R-4	Monthly
Semi-Volatile Organics[2]	µg/l	R-1, R-2, R-3, R-4	Monthly
pH	Number	R-1, R-2, R-3, R-4	Monthly
Turbidity	NTU	R-1, R-2, R-3, R-4	Monthly
Temperature	°F (°C)	R-1, R-2, R-3, R-4	Weekly
Total Copper	mg/l	R-1, R-2, R-3, R-4	Quarterly
Total Lead	mg/l	R-1, R-2, R-3, R-4	Quarterly
Total Zinc	mg/l	R-1, R-2, R-3, R-4	Quarterly
Perchlorate[3]	µg/l	R-1, R-2, R-3, R-4	Monthly
N-Nitrosodimethylamine[4]	µg/l	R-1, R-2, R-3, R-4	Monthly
Hardness as (as $CaCO_3$)	mg/l	R-1, R-2, R-3, R-4	Monthly
Methanol[5]	µg/l	R-1, R-2, R-3, R-4	Monthly
Iron, Total and Dissolved	µg/l	R-1, R-2, R-3, R-4	Monthly

[1] Test method to be by EPA Methods 601 and 602, or 8010 and 8020, or 8260, or 500 series with a practical quanitation level no greater than 0.5 µg/l. All concentrations between the detection level and practical quanitation level shall be reported as trace.

[2] Test method to be EPA Method 8270 or equivalent. All peaks shall be reported and tentatively identified. All concentrations between the detection limit and the practical quantiation limit shall be reported as trace values.

[3] A practical quantiation level of 4 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[4] NDMA analysis with a practical quantiatation level no greater than 0.00 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

[5] Methanol analysis with a practical quantiatation level no greater than 93 µg/l. All concentrations between the detection level and quanitation level shall be reported as trace.

Note: All metals analyses shall be by atomic adsorption methods.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions in the American River. Attention shall be given to the presence or absence of:

a. Floating or suspended matter
b. Discoloration
c. Bottom deposits
d. Aquatic life
e. Visible films, sheens or coatings
f. Fungi, slimes, or objectionable growths
g. Potential nuisance conditions

Notes on receiving water conditions shall be summarized in the monitoring report.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing to toxicity in the American River. The testing shall be conducted as specified in EPA 600/4-89-001. Chronic toxicity samples shall be collected at the discharge of the Ground Water Treatment Plant prior to entering Buffalo Creek. One additional test shall be performed on samples collected from Buffalo Creek just prior to leaving the Discharger's property Samples collected from the outlet of the treatment unit shall be representative of the volume and quality of the discharge The time of collection for samples shall be recorded. Chronic toxicity monitoring shall include the following:

Species:	*Pimephales promelas, Ceriodaphnia dubia, Selenastrum capriocornutum*
Frequency:	Once per quarter for first year, annually thereafter
Dilution Series:	100 percent effluent

MONITORING OF DISCHARGE TO SAILOR BAR PARK

The Discharger shall sample the discharge to pond in Sailor Bar Park for volatile organic constituents and N-Nitrosodimethylamine as listed above in the table for the groundwater treatment system monitoring. The sample shall be collected and analyzed on a monthly basis from the discharge prior to it entering the pond.

REPORTING

Monitoring results shall be submitted to the Regional Board by the **25th day of the month** following sample collection. Quarterly and annual monitoring results shall be submitted by the **25th day of the month** following each calendar quarter and year, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **30 January of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

a. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.

b. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6).

The Discharger may also be requested to submit an annual report to the Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by:______________________________
GARY M. CARLTON, Executive Officer

____
(Date)

AMM

Aerojet-General Corporation (Aerojet) operates a rocket-testing and chemical manufacturing facility in eastern Sacramento County near Rancho Cordova and Folsom. Past discharges and disposal practices have caused the release of volatile and semi-volatile organic contaminants to groundwater and the vadose zone. One of the contaminated groundwater plumes extends northwest from Aerojet's property underneath the American River, Sailor Bar Park, and beneath the community of Fair Oaks. This area is referred to as the American River Study Area (ARSA). Aerojet has been discharging extracted groundwater from ARSA under an NPDES permit since 1996. Aerojet requested to add an additional discharge from another groundwater extraction and treatment systems, GET E/F, which captures contaminated groundwater in the western portion of the Aerojet facility. The permit for the ARSA discharge is being revised to include the discharge from GET E/F.

American River Study Area

The concentrations of volatile organic contaminants (VOCs) in the groundwater in the American River Study Area include up to 4000 micrograms per liter (gg/1) trichloroethylene (MCL of 5 µg/1), 220 µg/1 cis-1,2-dichloroethylene (MCL of 6.0 µg/1), 110 µg/l 1,1-dichloroethylene (MCL of 5.0 µg/1), and 36 µg/1 tetrachloroethylene (MCL of 5.0 µg/1). Other maximum concentrations of non-volatile contaminants of concern detected in the groundwater are 1,4 dioxane at 29 µg/1and perchlorate at up to 150 µg/1. More discussion on these contaminants is found below.

The Board adopted Cleanup and Abatement Order No.95-715 requiring Aerojet to provide interim measures to minimize the flux of groundwater contaminants in the plumes described above while assessing the appropriate means of remediating the plume of contaminated groundwater in the American River Study Area. That interim measure consisted of extracting groundwater from three groundwater extraction wells at the toe of the plume, treating the extracted groundwater using activated carbon in a temporary treatment facility, and discharging the treated water to a pond in Sailor Bar Park. This park is located on the north side of the American River. The discharge was regulated by an NPDES permit, Order No. 96-066. The operation of the plant during its 1.5 years of operation was in substantial compliance with the requirements found in Order No. 96-066.

The Board modified Order No. 95-715 with the adoption of Order No. 96-[illegible]30, directing Aerojet to complete the design, construction, and operation of a groundwater extraction and treatment system in the American River Study Area to contain and cleanup the plume of contaminated groundwater. Aerojet is complying with that Order by completing construction of a treatment system on Aerojet's property capable of treating a flow of 3500 gpm. Aerojet completed the extraction wells and treatment system and commenced discharge from the treatment system to Buffalo Creek in 1998. Extracted groundwater comes from nine wells in Sailor Bar Park and six wells on the south side of the American River. Additional extraction wells are being constructed to enhance plume containment. The treated effluent is discharged to Buffalo Creek, a tributary of the American River just east of the Sunrise Bridge overcrossing. In addition, the Sacramento County Department of Parks and Recreation requested Aerojet continue the discharge to the pond in Sailor Bar Park that was discontinued with the shutdown of the temporary facility. The water supply well that has been utilized in the past by County Parks for the purpose of maintaining the water level in the pond contains up to 5[illegible] µg/1 trichloroethylene and would require treatment before discharge to the pond. Instead of treating the water supply well, Aerojet uses an extraction well near the pond that has not been found to contain any contaminants. That extraction well takes water from the shallow water bearing zone, which is different from the County Park well.

GET E/F

The Discharger has been operating the groundwater extraction systems, GET E and F, since 1984, and according to the requirements of the Partial Consent Decree since its entry by Federal Court in December 1989. Effluent from the GET E and F facilities was either discharged to land or recharged to groundwater via injection wells. GET E and GET F were combined in 2000 with all of the water being treated at a modified GET E/F facility. The GET E/F extraction system is designed to intercept groundwater contaminant plumes prior to them leaving the western portion of the Discharger's property. Currently, the facility operates at approximately 3600 gpm, and is being expanded to achieve a treatment capacity of 6000 gpm. The GET E/F facilities are part of the remedy for the Western Groundwater Operable Unit (WGOU) section of Aerojet. The Record of Decision for the WGOU issued by USEPA in July 2000 does not call for injection, but for discharge of the treated groundwater to surface water in order to allow for the greatest potential for reuse of the treated groundwater to provide replacement water supplies for those lost due to contamination in the Rancho Cordova and surrounding areas. In addition, infiltration capacity in the vicinity is limited as demonstrated by the current ponding of water from the GET E/F discharge of 3600 gpm to land for recharge. Increasing application to land at a rate of 6000 gpm is not feasible.

The groundwater contaminant plumes intercepted by the GET E/F extraction field include VOCs (primarily TCE), perchlorate, and NDMA. The GET E/F facility uses biological reduction to remove perchlorate, ultraviolet light to remove NDMA, and air stripping to remove VOCs. The GET E/F facility has been in operating in its current configuration since 1999. The treatment process has been shown to be effective in removing VOCs to below detection levels (0.5 µg/l), perchlorate to below 4 µg/l, and NDMA to below detection (0.002 –0.075 µg/l). Testing of the influent and effluent to the treatment facility for full-scan analysis, including tentatively identified compound analysis, did not indicate additional contaminants of concern.

Initial discharge of the treated groundwater will be to Buffalo Creek. Later, the effluent from the GET E/F facility may also be discharged to Alder Creek, tributary to Lake Natoma (American River), on Aerojet's property. A pipeline to convey the treated water from the GET E/F facility will need to be constructed prior to the discharge to Alder Creek. Aerojet is currently evaluating pipeline alternatives that would allow discharge to Alder Creek. The interim discharge to Buffalo Creek will co-mingle with the discharge from the ARSA facility, prior to leaving the Discharger's property.

Reasonable Potential and Anti-degradation Analyses

A reasonable potential analyses for priority pollutants, utilizing guidance covered by the Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), adopted in March 2000 by the State Board, was conducted based upon data submitted by the Discharger regarding effluent concentrations of volatile organic compounds.

The numeric water quality criteria for priority pollutants were promulgated by U.S. EPA with the adoption of the *National Toxics Rule* on 5 February 1993 and the *California Toxics Rule* on
18 May 2000. The reasonable potential analysis for Trichloroethene, 1,2-Dichloroethane, Chloroform, cis-1, 2-Dichloroethene, revealed that these constituents may exceed numeric water quality criteria, and require limits. Limits were not included for those detected constituents where there is no reasonable potential to exceed a standard.

Additionally, federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have a reasonable potential to cause, or contribute to an in-stream excursion above numerical or narrative water quality standard. The Discharger is required to provide information as to whether the levels of priority pollutants, including CTR and NTR constituents, and constituents for which drinking water maximum contaminant levels prescribed in the California Code of Regulations, in the discharge cause or contribute to an in stream excursion above a water quality objective. If the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a water quality objective, the Discharger is required to submit information to calculate effluent limitations for those constituents.

Effluent Limits

The following water quality limits have been selected to implement all applicable water quality objectives for the protection of Board-designated beneficial uses of surface water in Ingram Slough downstream from the Titan I-A Missile Site:

Volatile Organic Compounds

Both the ARSA and GET E/F treatment facilities utilize air stripping and ultraviolet/peroxide oxidation to remove the volatile organics from the extracted groundwater to concentrations less than the quantitation limit of 0.5 µg/l (the effluent limitation for these constituents). The 0.5 µg/l value for the volatile organic constituents are below the respective maximum contaminant levels (Primary and Secondary Drinking Water Standards) for the individual volatile organic contaminants. One chemical of concern, 1,2-Dichloroethane has a CTR value less than 0.5 µg/l and so its monthly average is set at that concentration. The effluent limits are based on Best Available Technology utilizing either air stripping or carbon adsorption which have been demonstrated to readily reduce volatile organics to below 0.5 µg/1.

1,4-Dioxane Limitation

The treatment systems at ARSA and GET E/F utilize ultraviolet light/peroxide which has been demonstrated to effectively remove 1,4-dioxane. The calculated concentrations or 1,4-dioxane entering and exiting the ARSA treatment plant are 6 µg/1 and 3 µg/1, respectively. These are below the practical quantitation level of 10 µg/1 and the Proposition 65 value of 15 µg/l. Sampling of the effluent from the facility has not shown detectable concentrations of 1,4-dioxane. The effluent limitations have been set at the practical quantitation level for the monthly average value and the Proposition 65 value for the daily maximum. It should also be noted that there will be a minimum 30-fold dilution in the American River (flow at 250 cubic feet per second) at the maximum discharge rate of 3450 gpm.

Only very low concentrations (3 to 5 µg/l) of 1,4-dioxane have been detected in the influent to the GET E/F facility. The facility has been shown to effectively remove these low concentrations to below 3 µg/l.

Perchlorate Limitation

The current Action Level (January 2002) set by the Department of Health Services -Office of Drinking Water as its recommended value not to be exceeded in a drinking water supply, is 4 µg/l. For the ARSA facility, the calculated value that could eventually be found in the influent to the treatment plant is 8 µg/l (the current influent concentrations range between 5 and 7 µg/l). The previous version of this permit established the effluent limitation for perchlorate at 18 µg/l, the Action Level for perchlorate at the time of adoption of the permit. Given the minimum 30-fold dilution in the American River, the low influent perchlorate concentration, and the additional mixing with the GET E/F effluent, this permit does not establish a revised effluent limitation for perchlorate. At 8 µg/l perchlorate in the effluent and a flow of 2000 gpm, the GET E/F discharge will reduced the perchlorate concentration in the combined effluent to a calculated value of approximately 1.8 µg/l.

The GET E/F influent concentration of perchlorate is approximately 3000 µg/l. The GET E/F treatment facility has been shown to be capable of reducing the perchlorate concentration to less than the practical quantitation level of 4 µg/l. The effluent limitation is established at 4 µg/l based on the ability to reduce the concentration to at or below the Action Level.

NDMA Limitation

N-Nitrosodimethylamine (NDMA), a contaminant not suspected in the American River Study Area, but found in the groundwater at the eastern end of Aerojet and in March 1998 in wells at the western end of Aerojet, is required to be sampled and analyzed for in the permitted discharges and receiving water. To date, no NDMA has been found within the extraction area for ARSA. There are no known source areas for NDMA in the vicinity or upgradient of the American River Study Area. Additional sampling of groundwater monitor wells in the American River Study Area for NDMA will occur on a periodic basis.

The GET E/F facility was designed to remove NDMA to concentration no greater than 0.002 µg/l, the estimated excess one-in-a-million cancer risk value established by the Office of Environmental Health Hazard Assessment. The effluent limitation is established at 0.002 µg/l.

Other

Analysis for metals in samples collected from the groundwater monitoring system and extraction wells and influent to the treatment system were used to assess which metals may be of concern. This analysis found only three metals of concern that were detected, or are currently of potential concern in the American River. Those metals are copper, lead, and zinc. The effluent limitations for those metals were established based on protection of aquatic life, with no dilution. The values utilize a hardness of 100 mg/l and Ambient Water Quality Criteria, which is based on data collected from the groundwater and treatment systems. The detected values in the groundwater for those three metals are below the effluent limitations established in this permit.

The following tables provide the rationale for the effluent limits.

Table 1: Monthly Average Limit

Constituent	**Monthly Average Limit**	**Units**	***Reference***
Trichloroethene[1]	0.5	µg/l	Non-detect, Best Practicable Treatment
1,2-Dichloroethane[1]	0.38	µg/l	California Toxics Rule
Chloroform[1]	0.5	µg/l	Non-detect, Best Practicable Treatment
cis-1, 2-Dichloroethene[1]	0.5	µg/l	Non-detect, Best Practicable Treatment
Dichloromethane[1]	0.5	µg/l	Non-detect, Best Practicable Treatment
trans-1, 2-Dichloroethene[1]	0.5	µg/l	Non-detect, Best Practicable Treatment
1,4-Dioxane	3	µg/l	DHS Action Level
Perchlorate	4	µg/l	DHS Action Level, Best Practicable Treatment
N-nitrosodimethlyamine	0.002	µg/l	Non-detect, Best Practicable Treatment

[1] – EPA Method 8260B or equivalent.

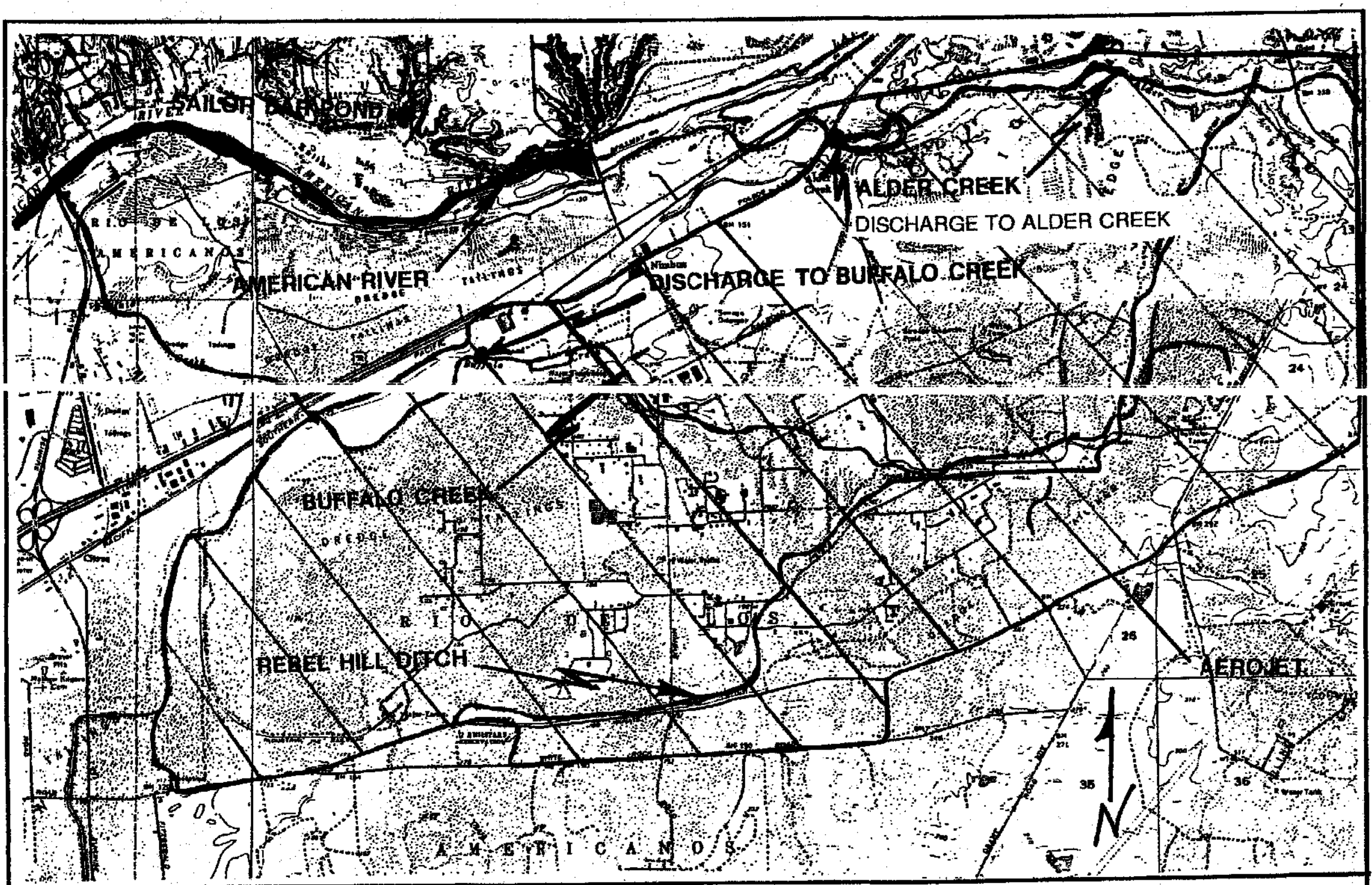
Discharge limits are primarily based on the *Fourth Edition of the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board - Central Valley Region, Sacramento River and San Joaquin River Basins,* and Best Available Technology for removal of VOCs, NDMA, and perchlorate.

Receiving Water Limitations

Receiving Water Limitations D.1 through D.13 are found in the Basin Plan and deal with general receiving water parameters. Given that this is not a discharge of elevated temperature wastewaters, limitations for temperature found in the *Water Quality Control Plan for Control of Temperatures in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* are not included.

Chronic toxicity and acute toxicity testing of the effluent is required.

AMM (2/21/02)



ATTACHMENT A
AEROJET-GENERAL CORPORATION
SACRAMENTO COUNTY

T9N, R7E
BUFFALO CREEK, FOLSOM, CITRUS HEIGHTS
AND CARMICHAEL USGS 7.5' QUADS
SCALE 1" = 4000'

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Attorneys for Petitioner,
SOUTHERN CALIFORNIA WATER COMPANY

BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In re Petition of Southern California Water Company to Revise the Declaration of Fully Appropriated Stream Systems Regarding the American River, Sacramento County)

SCWC EXHIBIT 26

SCWC EXHIBIT

26

MAPS:

- Figure 3-1, American River Study Area Well location map
- Aerojet Vacinity wells