Appendix **E**

Characterization of Subsurface Conditions by R. L. Stollar & Associates, Inc., dated September 16, 1988 (on CD)

V. 1

CHARACTERIZATION OF SUBSURFACE CONDITIONS

WATKINS-JOHNSON COMPANY
Scotts Valley, California

Submitted to

WATKINS-JOHNSON COMPANY
Palo Alto, California

September 16, 1988

WJ007659

CHARACTERIZATION OF SUBSURFACE CONDITIONS

Watkins-Johnson Company
Scotts Valley, California

September 16, 1988

Submitted to:

U.S. Environmental Protection Agency
Region IX
Superfund Programs Branch
San Francisco, California 94105

Prepared for:

Watkins-Johnson Company
Palo Alto, California

Prepared by:

R. L. Stollar & Associates, Inc.
3611 South Harbor Blvd. Suite 160
Santa Ana, CA 92704

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ACKNOWLEDGEMENTS

The authors express their appreciation for the assistance and cooperation of the staff of Watkins-Johnson Corporation, including Messrs. J. Aveggio, J. Werner, and B. Bandy. Mr. A. Montaudon, Treasurer, is particularly acknowledged. Also acknowledged are the valuable contributions to the study made by staff members of R. L. Stollar & Associates, Inc. Mr. Gary N. Ryals was responsible for directing and analyzing the June 1988 aquifer test and contributed greatly to the soils investigation. Mr. Trevor Hart and Robert Boudra performed the internal quality assurance program. Mr. Frans Lowman supervised the field studies and contributed greatly to the data analyses. Mr. David Daugherty aided in field work and contributed greatly to the geologic interpretation. Ms. Karen Kahler was responsible for many of the database activities and aided in the field work. Mr. Cliff Schmitt aided in the field work and data compilation and contributed especially to the soil investigation. Mr. B. Basmadjian prepared all the figures. Ms. Peggy Henson and Ms. Mary Reed prepared the manuscripts.

Respectfully submitted,

R. L. STOLLAR & ASSOCIATES, INC.

David S. Peterson, Project Hydrogeologist

Mary Hume Jolly, Project Hydrogeologist

Patrick M. Cobb, Project Manager

Robert L. Stollar, Principal Hydrogeologist
State of California, Registered Geologist #3883

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LIST OF ACRONYMS

BC	benzyl chloride
BP	bis(2-ethylhexyl) phthalate
BWO	Backward Wave Oscillators
c-DCE	cis-1,2-dichloroethene
CA	chloroethane
CAO	Clean-up or Abatement Order
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CF	Chloroform
CRT	Cathode Ray Tube
CVD	Chemical Vapor Deposition
DCB	dichlorobenzene
DCE	dichloroethene
DEP	diethylphthalate
DNBP	Di-n-butylphthalate
DOT	Department of Transportation
EPA	United States Environmental Protection Agency
Freon 113	1,1,2-trichlorotrifluoroethane
Freon 11	trichlorofluoromethane
GAC	Granulated Activated Carbon
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
gpd	gallons per day
gpd/ft	gallons per day per foot
gpd/ft^2	gallons per day per foot squared
gpm	gallons per minute
HNO_3	Nitric Acid
HSA	Hollow-Stem auger
HSP	Health and Safety Plan
ID	Inner Diameter
MC	Methylene Chloride
mg/kg	Milligrams Per Kilogram
MR	Mud Rotary

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MS	Matrix Spike
MSD	Matrix Spike Duplicate
NPL	National Priorities List
PAH	Polynuclear Aromatic Hydrocarbon
PCE	tetrachloroethene
PID	Photo Ionization Detector
ppm	Parts Per Million
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RC	Retardation Coefficient
RI/FS	Remedial Investigation/Feasibility Study
RLSA	R. L. Stollar & Associates
RPD	Relative percent difference
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SQL	Sample quantitation limit
t-DCE	Trans-1,2-dichloroethene
TCA	trichloroethane
TCE	trichloroethene
TH	Total Hydrocarbons
TOC	Total Organic Carbon
ug/l	Micrograms per liter
VC	Vinyl Chloride
VOC	Volatile Organic Compounds
Watkins-Johnson	Watkins-Johnson Company, Scotts Valley, CA

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) proposed the addition of Watkins-Johnson Company's Stewart Division Plant (Watkins-Johnson) located in Scotts Valley, California in Update Number Six to the National Priorities List (NPL). Update Number Six was announced on January 22, 1987. On June 18, 1987, Watkins-Johnson received an EPA Special Notice letter which outlined, according to the Comprehensive Environmental Response, Compensation and Liability Act 42 U.S.C. 9601 et. seq. (CERCLA), the actions necessary for completing the required remedial investigation and feasibility study (RI/FS) at the site. On September 4, 1987, in response to the Special Notice letter, the document entitled "Watkins-Johnson Company, Scotts Valley, California, Work Plan for Remedial Investigation and Feasibility Study" was submitted to the EPA. The work plan presented tasks which the EPA had determined to be required by the EPA RI/FS process as applicable to the Watkins-Johnson site. This document, a characterization of subsurface conditions, fulfills Tasks 4 and 7 of the RI/FS as presented in the workplan. The purpose of Task 4 was to characterize ground-water flow and contaminant migration patterns. The purpose of Task 7 was to perform a soil investigation to determine the degree and extent of soil contamination in the zone of aeration in areas where contamination is suspected.

By the time Watkins-Johnson received the Special Notice letter, many of the steps required by the RI/FS and the actual site cleanup were progressing under the guidance of the California Regional Water Quality Control Board, Central Coast Region (RWQCB). The RI/FS program under the guidance of the RWQCB commenced in 1984 and the actual aquifer restoration program began in October 1986.

Details of the hydrogeologic investigations and cleanup action by Watkins-Johnson have been presented in previous reports by R. L. Stollar & Associates (RLSA), consultants for Watkins-Johnson Company, which were submitted to RWQCB and the EPA. These reports are listed in Section 8.0, Selected References. The purpose of this characterization is to provide a conceptual model of the ground-water system and contamination migration patterns. The conceptual model is based on previously reported information in the hydrogeologic data assessment, from RI/FS Task 1, and on new information provided by the results of the ongoing monitoring programs and the RI/FS Spring 1988 field program.

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1.1 Site Characterization Objectives

The purpose of this characterization of subsurface conditions is to summarize and evaluate relevant regional and site specific information relating to the geologic and hydrologic characteristics of the site and their inter-relationship with contaminant migration patterns. Existing data were evaluated and presented in the Assessment of Existing Hydrogeologic and Contaminant Source Data (RLSA, Januar, 1988) delivered to the EPA on January 25, 1988. The data assessment report identified data gaps and information needed to complete this subsurface characterization and also RI/FS Task 6, the ground-water modeling task.

During March and June, 1988, the first two quarterly rounds of EPA supervised sampling of ground- and surface waters were completed. During April through June 1988, additional field activities were completed. These included: the drilling of soil borings to collect soil samples; the drilling and construction of new monitoring wells to expand and enhance the monitoring network already in place; and an aquifer test. These field activities were performed in accordance with the guidelines and plans presented in the Quality Assurance Project Plan (QAPP; RLSA, February 1988) and the Sampling and Analysis Plan (SAP; RLSA March, 1988). These plans were approved by the EPA prior to commencement of the Spring, 1988 field activities. All field activities were carried out in accordance to the Health and Safety Plan (HSP; RLSA, November 1987) which was reviewed by the EPA.

The results of the new field program have added important information to the characterization of the subsurface conditions. The major objectives of the program are as follows:

- To define the areal and vertical extent of soil and ground-water contamination; thus updating and refining the hydrogeologic system description presented in the Assessment of Existing Hydrogeologic and Contaminant Source Data (RLSA January, 1988) dated January 25, 1988.
- To provide the hydrogeological information needed for redesigning the existing ground-water models.
- To support the screening of final remedial action alternatives and the design of the final remedial action.

In general, the subsurface units of interest beneath the Watkins-Johnson site include the unsaturated zone, the perched and regional zones within the Santa Margarita Formation,

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the Monterey Shale, and the Lompico Formation. Descriptions of the geology, ground-water systems and contamination migration patterns based on previous work are given in RLSA reports which are listed in Section 8.1.

At the completion of the past studies it was determined that additional data were needed to complete the characterization of the subsurface conditions. Therefore, as outlined in the RI/FS Work Plan, the tasks and subtask objectives for the subsurface characterization include the following:

- To determine the degree and extent of soil contamination in the zone of aeration in areas where contamination is suspected, and to determine if contamination exists in the zone of aeration at other locations (Task 7).
- To define the ground-water flow patterns, the distribution of contaminants, and the hydrogeologic properties of the perched zone and underlying aquitard. To estimate the quantity, sources, and effects of recharge to the perched zone. To provide information needed to determine the most efficient clean-up program in the perched zone (Subtask 4.2).
- To define the hydrogeologic properties, the ground-water flow system, and the distribution of contaminants in the regional zone (Subtask 4.1).
- To determine if there is a potential for contaminants to migrate from the Santa Margarita Formation through the Monterey Shale to the Lompico Formation (Subtask 4.3).
- To obtain the hydrogeological data necessary for the development and evaluation of alternatives for expansion or modification of the existing ground-water extraction and treatment system.

Results of the preceding tasks are presented in this report. The interpretive data along with appropriate maps showing potential sources of contamination, concentration contour maps, water-table maps, hydrographs and tables are included in the text. The basic data for boring logs, well logs, well construction, geophysical logs, chemical data for ground- and surface-waters, water-levels, stream flow, quality assurance, and an aquifer test (Task 4.4) are included in the Appendices.

1.2 Overview

The Watkins-Johnson Stewart Division Plant is located in Scotts Valley, Santa Cruz County, California. Since 1963, Watkins-Johnson has manufactured industrial furnaces and

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electronic parts at the Stewart Division. The types of activities occurring at the plant include research and development, and manufacturing. Industrial processes include, or have included in the past, metal machining, degreasing operations, metal plating, glass cleaning, glass etching, welding, soldering, painting, and photo lab activities. A variety of organic chemicals, inorganic acids, and metals have been used at the plant. Detailed discussions of their usage are found in Section 3.1.2.

Organic contamination has been detected in the soil and ground water at the site and in the surface water of Bean Creek near the site. Key constituents detected in the ground water, and of major concern to the EPA, include trichloroethene (TCE), 1,1-dichloroethene (DCE), and vinyl chloride (VC). In the soil, key constituents include TCE, methylene chloride (MC), and chloroform (CF). Of primary concern is the potential for contaminants in the soil to migrate to the ground water.

The Santa Margarita Sandstone is a major aquifer in Scotts Valley. The Santa Margarita is underlain by the Monterey Formation, which consists primarily of mudstone and sandy siltstone; thus, with the exception of interbedded sand bodies, the unit is not a productive aquifer. The Monterey is underlain by the Lompico Formation, which consists of fine to medium-grained bedded sandstones. The Lompico is considered to be an important aquifer of moderate permeability in the Scotts Valley area. The hydrogeologic characteristics of each of these formations are discussed in the following sections.

In the immediate vicinity of the Watkins-Johnson site, a perched ground-water zone is present above the regional ground-water zone in the Santa Margarita aquifer. TCE contamination has been detected in both the perched and regional zones.

In 1984, after it was discovered that ground water had been contaminated, Watkins-Johnson initiated programs to describe the local hydrogeology, to define the severity of the contamination, and to design an aquifer restoration program. Watkins-Johnson is currently remediating the ground-water contamination through a series of pumping wells which extract ground water. The extracted water is then treated utilizing a granulated activated carbon (GAC) adsorption system. The treated water is presently recharged to the perched zone onsite and discharged to Bean Creek.

Figure 1.1 portrays the plant facilities within the regional context. The study area is identified as a radial line drawn one mile from Remedial Action Well RA-1. This well will be used as the point of reference for all distances from the site. Figure 1.2 is a map of the plant layout.

1.3 Scope of Characterization of Subsurface Conditions

The plant has been the site of manufacturing since 1960. It became known as the Stewart Division of the Watkins-Johnson Company in 1963. Over the years, a variety of products has been produced, involving a diversity of industrial processes and resulting in the use of numerous materials, some of which are potential contaminants.

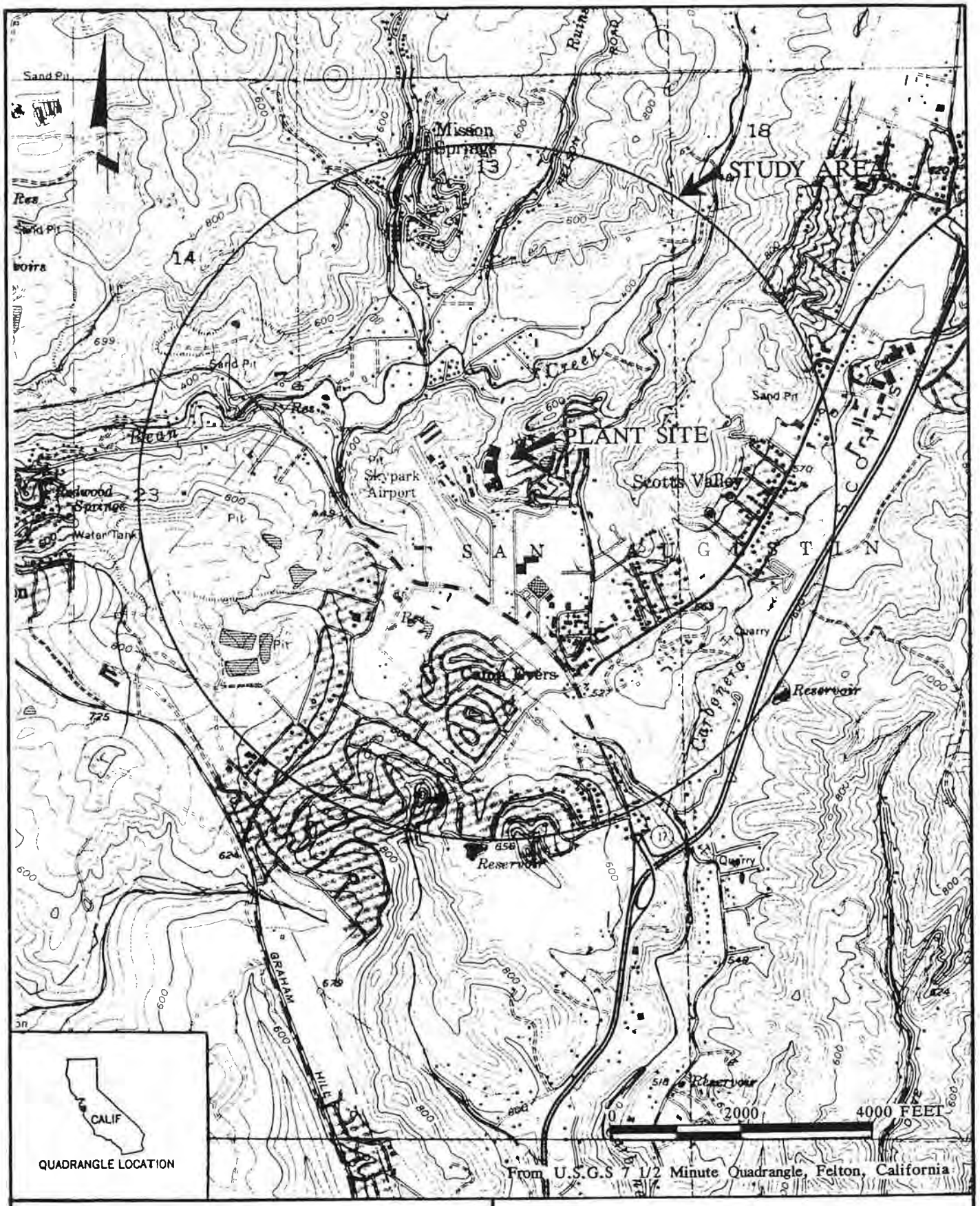
In the summer of 1981, the RWQCB initiated a program to regulate facilities storing hazardous materials. In April 1983, the RWQCB indicated that Watkins-Johnson should initiate a ground-water monitoring program.

In 1984, based on an anonymous telephone call, the RWQCB inspected the dilution tanks at Building No. 2 and 6 and the sanitary septic tanks at Building No. 8. No contamination was found at that time. A few weeks later, based on another anonymous telephone call, the RWQCB again inspected the dilution tank at Building No. 6. This second inspection revealed that this dilution tank was contaminated. Accordingly, the RWQCB issued a Clean Up or Abatement Order (CAO), Number 84-91.

In June 1984, Watkins-Johnson Company developed a plan in conjunction with the RWQCB whereby Watkins-Johnson would clean up the contamination. The plan consisted of four phases:

1. Characterization of the site to develop a Remediation Program;
2. Design of the Remediation Program;
3. Implementation of the Remediation Program; and
4. Implementation of a Monitoring Program to insure the success of the Remediation Program.

The objectives of the initial (1984) field program were to: 1) map the configuration of the water table; 2) define the lateral extent of the contaminated ground-water body; 3)



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PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

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LOCATION OF WATKINS-JOHNSON PLANT
SCOTTS VALLEY, CALIFORNIA

FIGURE 1.1

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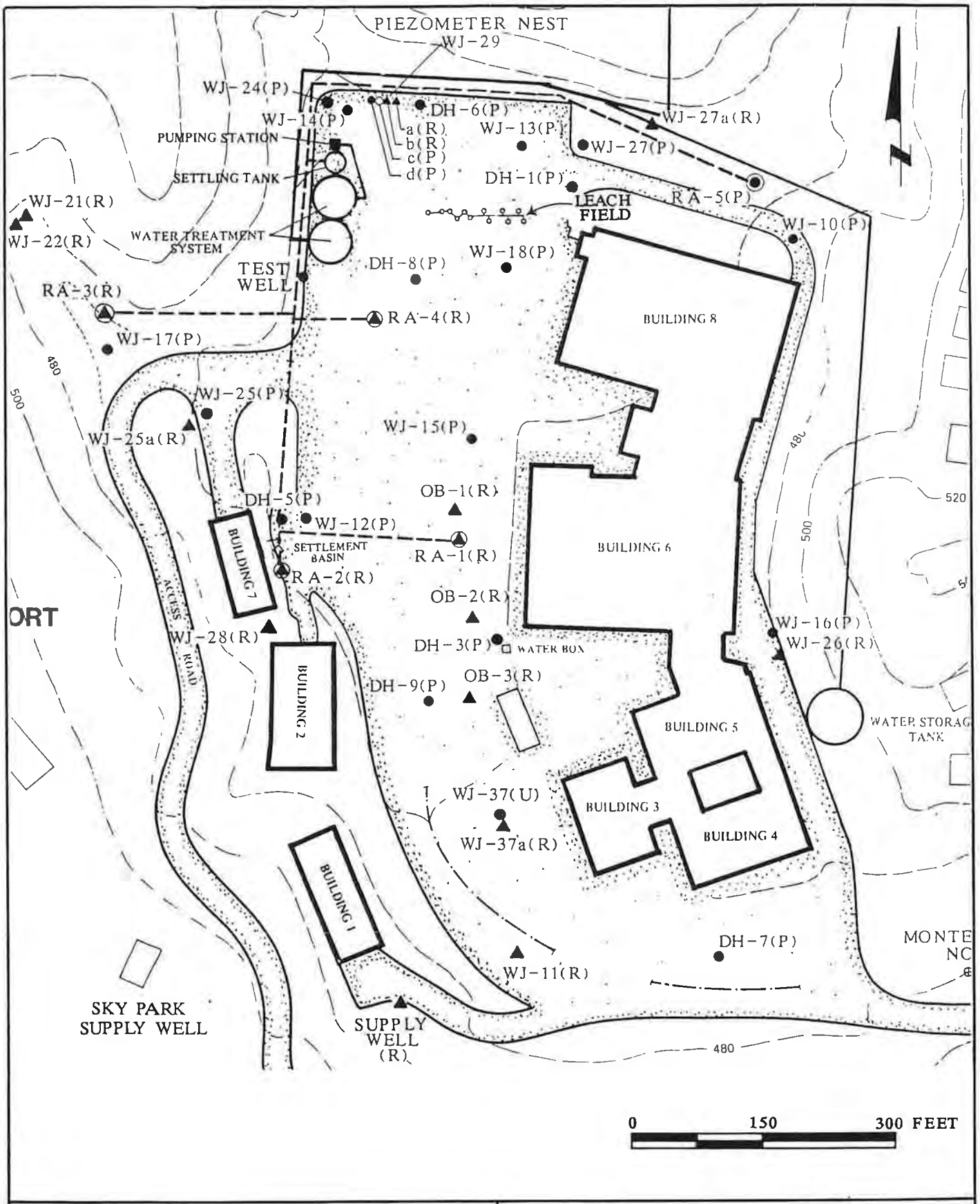

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WATKINS-JOHNSON PLANT LAYOUT

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA	
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FIGURE 1.2

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attempt to estimate the direction and rate of contaminant movement; and 4) measure the concentrations of the major chemical constituents within the contaminated zone.

On July 22, 1985, the RWQCB issued CAO Number 85-135 to Watkins-Johnson. This order required Watkins-Johnson to determine aquifer coefficients in order to design a ground-water extraction system that would lead to the water-quality restoration of the Santa Margarita aquifer.

On July 11, 1986, the RWQCB issued CAO Number 86-213, which required the preparation of a remedial action schedule, a constituent clean-up level, and the design of a program and schedule to monitor the success of the remedial action. Each new CAO superseded the previous one.

In order to accomplish the tasks required by RWQCB and to implement a remedial action program Watkins-Johnson initiated a study to characterize both the regional and site specific hydrogeology and sources and migration patterns of contaminants. The results of these studies were summarized in the report, Assessment of Existing Hydrogeologic and Contaminant Source Data (RLSA, January 1988).

Contamination related to activities at the Stewart Division Plant has been identified in the soil, and in the perched and regional zones of the Santa Margarita aquifer in the immediate vicinity of the site. The source(s) and migration pathways of this contamination have been investigated during the different field programs. Present variations in the ground-water flow system and in the distribution of contaminant concentrations measured during the monitoring program are primarily caused by remedial action pumping. The results of these programs are summarized and discussed in following sections. The interrelationship between the hydrogeology and contaminant pathways is also discussed.

The following sections describe the regional setting (Section 2) and the media or formations through which the potential contaminant pathways at the site can be traced. In order, along the probable contaminant pathway are the soil (Section 3), the perched zone of the Santa Margarita aquifer (Section 4), and the regional zone of the Santa Margarita (Section 5). The potential for contaminants to move from the regional zone to other formations, particularly the Monterey and Lompico, is addressed in the section on

WJ007686

the regional zone. Section 6 summarizes all the quality assurance activities associated with the project including activities by the EPA, the laboratories, and RLSA. Conclusions are contained in Section 7. Selected references for the project are listed in Section 8.

The basic data for the study site are included in the Appendices A through I. Composite well diagrams containing geologic logs, construction details and available geophysical logs are contained in Appendix A along with a table of well completion data and a chart illustrating the sequence of well construction. Appendices C and E through I contain database listings for soil analysis, water-level measurements, ground-water quality analysis, surface-water flow and quality analysis, quality assurance, and treatment system analysis, respectively. Appendix D describes the procedures and analysis for the June 1988 aquifer test in the Santa Margarita aquifer carried out at Silverking Oceanic Farms.

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2.0 PHYSICAL SETTING

The Scotts Valley area is in close proximity to California's Pacific ocean coast and, is located in a mountainous region. These attributes create a climate and physiography which can vary considerably within the region. The following sections describe the physiography, and meteorology and regional geology in the study area.

2.1 Physiography

The study area is located within Santa Cruz County, approximately five miles north of Santa Cruz, in a small valley located west of Scotts Valley and southwest of the Santa Cruz Mountains. This area is considered to be within the California Coast Range. The Watkins-Johnson plant facility is located west of the Sky Park Airport, north of Camp Evers and west of the town of Scotts Valley (Figure 1.1). The San Andreas Fault zone is about 11 miles northeast of the study area.

The northern part of the study area is comprised of forested mountains that are incised by numerous stream channels. Surface elevations within this mountainous area, range from 400 to 1,200 feet above mean sea level. South of the plant the terrain is comprised predominantly of rolling grassy hills with surface elevations ranging from 560 to 800 feet above mean sea level. The elevation at the Watkins-Johnson plant facility is around 460 feet.

Vegetation in the mountainous areas of the study area includes California Redwood, Ponderosa and Douglas-fir trees (USDA, 1980). At lower elevations the vegetation is predominantly comprised of Manzanita and Chemise chaparral (Clark, 1981).

Tourism is the major industry within the study area. Agricultural operations, gravel quarrying and light manufacturing are also conducted within the area.

There are several creeks in the region. These include Bean Creek, Carbonera Creek, Lockhart Gulch, Ruins Creek and Zayante Creek. Bean Creek, which eventually is tributary to Zayante Creek, crosses the study area and roughly divides the major aquifer, the Santa Margarita, into northern and southern halves. In the study area, Ruins Creek and Lockhart Gulch are tributary to Bean Creek from the north. Two unnamed streams

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which are located between Lockhart Gulch Road and Mount Hermon Road are known locally as the Airport and DuFours tributaries. These streams flow northward and drain into Bean Creek. Carbonera Creek drains the eastern side of the study area. Both Zayante and Carbonera Creeks drain into the San Lorenzo River, which is west of the study area. The San Lorenzo River flows southward and eventually enters the Pacific Ocean at Monterey Bay.

2.2 Meteorology

The region is characterized by a cool-summer Mediterranean type climate with moderate to heavy rainfall in the winter months. Coastal fog prevails during the dry summer months and spreads inland at night (Clark, 1981). Temperatures within the region are uniform throughout the area because of the marine influence and the presence of mountains which block the winds from the north and from the hot interior valleys to the east (USDA, 1980).

The estimated long term average rainfall for Scotts Valley is approximately 39.5 inches/year (Todd, 1988). Regionally, annual precipitation can range from 20 inches along the coastline to 50 inches on top of Ben Lomond Mountain. Four rain gauges are operated in the Scotts Valley area and are located as follows: at Kaiser Sand and Gravel Company; at the headwaters of Carbonera Creek on the Scoppertone property; near Lockhart Gulch at Fabrins Circle Ranch; and at Scotts Valley Water District's El Pueblo Facility. Two of these gauges are located within one mile of the Watkins-Johnson plant; the Kaiser Sand and Gravel Company and the Scotts Valley Water District El Pueblo Facility.

An evaporation pan was installed at the Scotts Valley Water District El Pueblo Facility in 1986. Pan evaporation at the facility for June 1986 through May 1987 was approximately 48 inches (Todd, 1987). This value represents a maximum potential evaporation that can occur within an area. Actual evaporation would typically be less.

2.3 Regional Geology

Vegetation and results of erosion largely mask the igneous and sedimentary rock deposits in the area. However, the spatial distribution and the depositional and deformational

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history of the rock units has largely been interpreted through geologic mapping and description of the rock record where exposed on the surface or where explored by drilling. A synopsis of the geologic history and present geologic conditions of the area is presented below.

2.3.1 Geologic Setting

The Scotts Valley area lies in the central Santa Cruz Mountains which are part of the California Coast Ranges. Cenozoic sedimentary rocks underlie much of the area and rest on crystalline rocks of the Salinian block, the basement complex. The Salinian block is bounded on the northwest by the San Andreas fault. Another major strike-slip fault, the San Gregorio fault, cuts the block to the southwest. Tertiary sedimentary rocks ranging in age from Paleocene to Pliocene rest nonconformably on the crystalline basement complex and have been folded and faulted over large areas.

The Watkins-Johnson site is situated on the southern limb of a large, open concave fold known as the Scotts Valley syncline (Figure 2.1). The Scotts Valley syncline extends southwest from Boulder Creek through Scotts Valley. The axis of the syncline trends roughly northwest-southeast and plunges to the southeast. Strata on either side of the fold axis dip five to ten degrees towards the center of the fold. The syncline is bounded to the west by crystalline rock highlands of the northwest-trending Ben Lomond Mountain, and to the northeast by an anticline formed by folded Tertiary rocks. Both limbs of the Scotts Valley syncline are faulted. The Zayante fault strikes parallel to the north limb of the syncline. The fault plane is nearly vertical and the north side of the fault is relatively downthrown at least 1.2 kilometers (Clark, 1981). On the south limb of the syncline, the Ben Lomond fault strikes northwest-southeast, parallel to the strike of the south limb of the fold. The northern side of this fault is also downthrown relative to the southern side, but dislocations of strata on either side of the Ben Lomond fault are relatively minor.

2.3.2 Stratigraphy and Geologic History

At least three Tertiary sedimentary sequences, in addition to Quaternary alluvial sediments, are represented in the Scotts Valley area (Figure 2.2). The sedimentary units

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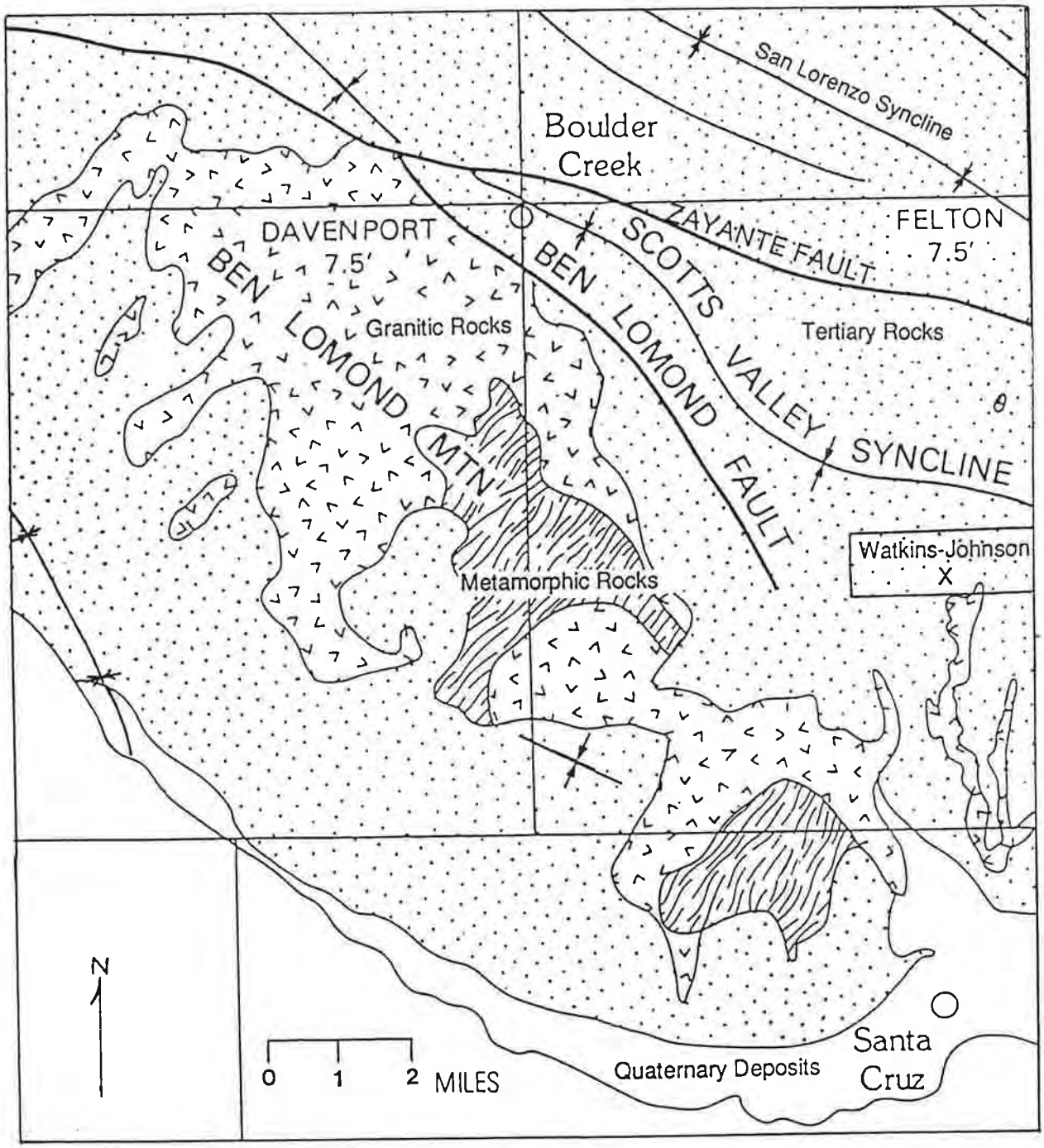

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GEOLOGIC FEATURES OF THE STUDY AREA
(Modified from Clark, 1981)

FIGURE 2.1

WJ007691

SERIES	SEQUENCE	STAGE	FORMATION	LITHOLOGY	DESCRIPTION	THICKNESS (Feet)
REC			Quaternary Alluvium		Unconsolidated light brown gravel, sand and silt	10-20
			Unconformity			
PLIO.	Upper Miocene to Pliocene	?	Purisima Formation		Very thick bedded yellowish-gray tuffaceous and diatomaceous siltstone with thick interbeds of bluish-gray semifriable andesitic sandstone	120
MIOCENE	Upper Miocene to Pliocene	Mohnian and Delmontian	Santa Cruz Mudstone		Medium to thick bedded and faintly laminated pale-yellowish brown siliceous mudstone with scattered spheroidal dolomite concretions; locally grades to sandy siltstone	190
MIOCENE	Upper Miocene to Pliocene	Mohnian and Delmontian	Santa Margarita Sandstone		Very thick bedded and thickly crossbedded yellowish-gray to white friable arkosic sandstone with gravel interbeds in lower portion	200 - 300
			Unconformity			
MIOCENE	Middle Miocene	Luisian	Monterey Formation		Medium to thick-bedded and laminated olive-gray organic mudstone, and sandy siltstone, with interbeds of arkosic sandstone	150 - 350
MIOCENE	Middle Miocene	Relizian	Lompico Sandstone		thick-bedded to massive yellowish-gray arkosic sandstone	120 +
			Unconformity			
PAL.	Pal.	Ynezian	Locatelli Formation		Nodular olive-gray to pale yellowish-brown micaceous siltstone	100 + ?
			Nonconformity			
CRETACEOUS UNDIFFERENTIATED			Crystalline Plutonic Rocks		Quartz diorite to granodiorite	?

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GENERALIZED STRATIGRAPHIC COLUMN FOR THE SCOTTS VALLEY AREA
(Modified from Clark, 1981)

FIGURE 2.2

WJ007692

lie nonconformably on crystalline plutonic rocks of quartz diorite to granodiorite composition. Plutons intruded much older metasedimentary rocks of the Salinian block during the mid to late Cretaceous (Clark, 1981). Paleocene, middle Miocene, and upper Miocene to Pliocene sequences of clastic marine sediments have been identified in the area. Sequences are separated by unconformities which mark major changes in the geologic environment during deposition.

The oldest Tertiary sequence in the area is the Paleocene sequence, represented by the Locatelli Formation. The Locatelli crops out about one mile southwest of Camp Evers (Figure 2.3) and consists of nodular olive-gray to pale yellowish-brown micaceous siltstone. The formation is at least 100 feet thick in the area and overlies crystalline rocks nonconformably. Massive arkosic sandstone exists locally at the basal contact. The Paleocene sediments were deposited under progressively deepening marine conditions as indicated by paleontological evidence. Assemblages of benthic foraminfera, used as paleobathymetric indicators suggest depositional water depths of two to three thousand feet or more (Clark, 1981).

An unconformity at the top of the Locatelli Formation separates the Paleocene sequence from the middle Miocene sequence. Eocene to lower Miocene rocks are absent in outcrop southwest of the study area along the southern limb of the Scotts Valley syncline where the middle Miocene Lompico Sandstone directly overlies the Locatelli Formation in the southwest section of Figure 2.3. The Eocene to lower Miocene units are present on the north limb of the syncline, but do not exist on the south limb of the fold, apparently due to erosion associated with uplift along the Ben Lomond highlands.

The middle Miocene sequence in the Santa Cruz Mountain area is represented by the Lompico Sandstone and the Monterey Formation. The Lompico and Monterey sediments were deposited during a marine transgression in the middle Miocene. The Lompico is a basal transgressive sand deposited in a shallow, near-shore environment. Continued transgression coupled with basinal subsidence led to deposition of progressively finer sediments which comprise the Monterey Formation.

The Lompico Sandstone is a permeable formation. It is typically a yellow-gray arkosic, calcareous sandstone which is medium grained, moderately sorted, and biotite-bearing in the lower third of the section. The formation is finer-grained in the upper two-thirds of

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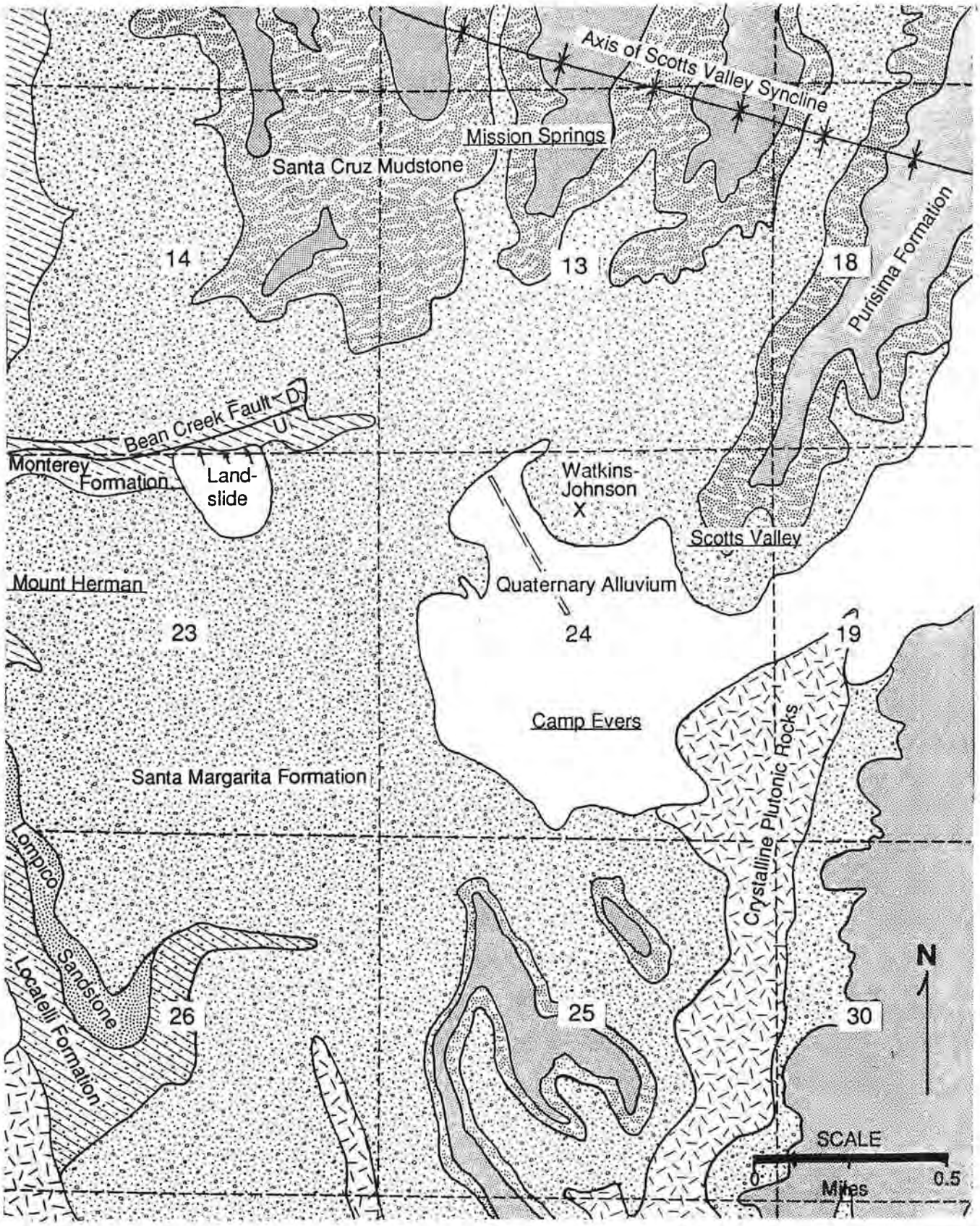

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GENERALIZED GEOLOGIC FEATURES OF THE WATKINS-JOHNSON STUDY AREA
(Modified from Clark, 1981)

FIGURE 2.3

WJ007694

the section (Clark, 1981). The outcrop thickness of the Lompico Sandstone southwest of the study area is approximately 120 feet and the formation may thicken towards the axis of the Scotts Valley syncline.

The Lompico is conformably overlain by the much less permeable Monterey Formation. Units of both formations commonly intertongue at an ill-defined contact. In the Scotts Valley area, the Monterey consists of medium to thick-bedded and laminated olive-gray organic mudstone and sandy siltstone with interbeds of arkosic and lithic sandstone (Figure 2.4). The Monterey coarsens closer to the Ben Lomond crystalline highlands (Figure 2.1) to the west and contains thick to very thick interbeds of arkosic sandstone. The coarsening of the Monterey towards Ben Lomond Mountain suggests the crystalline complex was a topographic high and a source of clastic detritus. Crystalline highlands are in close proximity to Scotts Valley south and southwest of the area (Figure 2.3). Clark (1981) picks the contact between the Lompico and Monterey Formations "at the base of bedded mudstone where mudstone predominates in the section." Unfortunately, the conformable intertonguing nature of the contact and coarser composition of the Monterey on the south limb of the fold make the contact difficult to pick in the Scotts Valley area. The contact between the Lompico and the Monterey was picked where thick, clean sand units were no longer predominate in the section. Therefore, the thickness of the Monterey ranges from 150 to 350 feet in the Scotts Valley area and thickens significantly to the north towards the axis of the syncline.

A very irregular, unconformable surface separates the middle Miocene sequence from rocks of the upper Miocene to Pliocene sequence. Monterey and older strata are more strongly folded compared to younger overlying formations. The folding records late-middle or early-late Miocene deformation prior to deposition of the upper Miocene Santa Margarita Sandstone. The Santa Margarita Sandstone is a very thick bedded and thickly cross-bedded yellowish-gray to white friable arkosic sandstone with gravel interbeds in the lower portion. Transgressive Santa Margarita sands were deposited under high-energy shallow-marine conditions as indicated by large-scale crossbedding and the presence of sharks teeth which are occasionally found in the formation. Gravel beds, common in the lower portion of the formation in the Scotts Valley area may indicate proximity to stream channels feeding into the larger body of water. The Santa Margarita unconformably overlies the Monterey Formation in the Scotts Valley area and most central portions of the Scotts Valley syncline. Toward the limbs of the fold, the Santa Margarita locally

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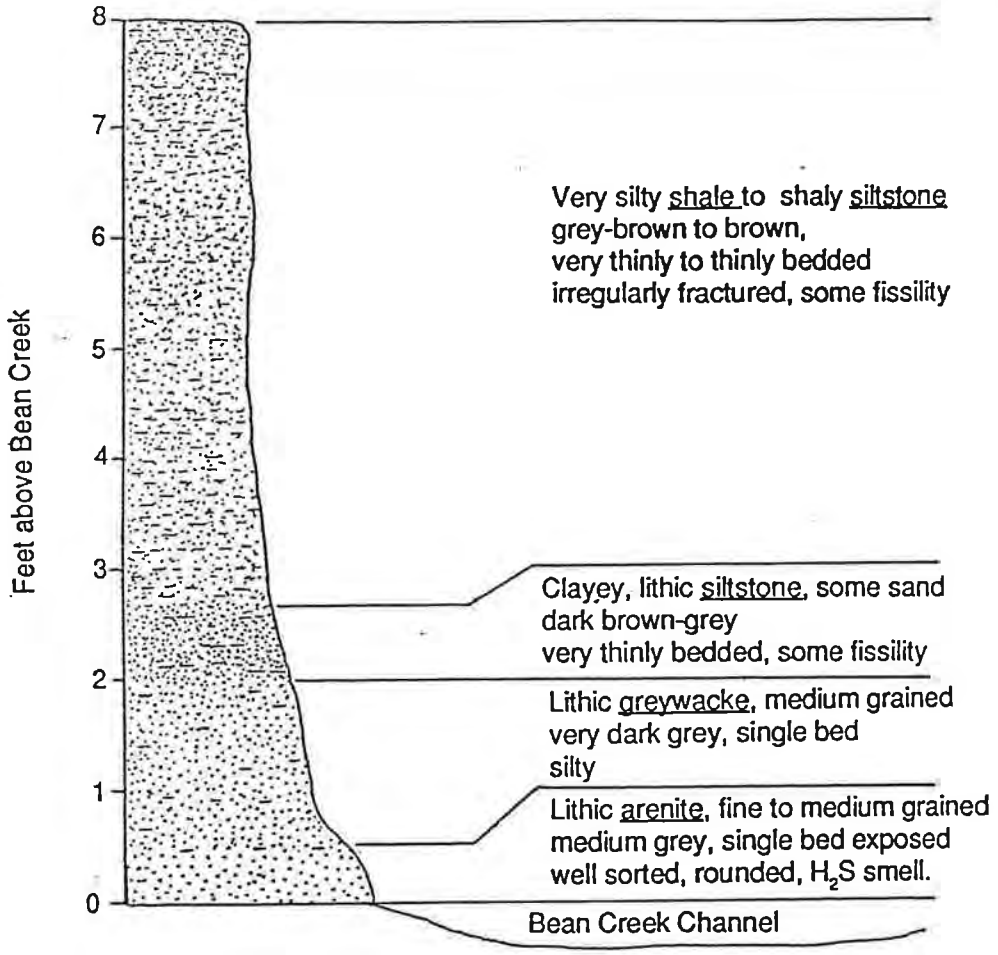
BEAN CREEK SECTION
CUT-BANK MONTEREY FORMATION



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MEASURED SECTION OF MONTEREY FORMATION
EXPOSED ALONG BEAN CREEK

FIGURE 2.4

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overlies Lompico and Locatelli Formations and nonconformably overlies crystalline rocks (Figure 2.3). The formation is 200 to 300 feet thick in the Scotts Valley area and thickens towards the axis of the Scotts Valley syncline, suggesting that downwarp of the fold probably continued during deposition of the sandstone (Clark, 1981). The thickness of the formation varies across the region by up to a hundred feet or more as a result of deposition of the sands over the irregular paleotopographic surface of middle Miocene and older strata. The irregular bottom surface is the Monterey in the Scotts Valley area, which is reported as heavily eroded and channelized (Todd, 1986). The Santa Margarita Formation crops out over a large area in the study area and contains one of the most important aquifers in the region (Figure 2.3). A detailed discussion of the importance of the formation as an aquifer will follow in a later section of this report.

Transgression and progressive deepening of late Miocene seas led to the deposition of finer grained sediments of the Santa Cruz Mudstone Formation conformably over the Santa Margarita Sandstone. The Santa Cruz Mudstone consists of very thick bedded yellowish-brown siliceous mudstone which locally grades to sandy siltstone. The Santa Cruz Mudstone is approximately 190 feet thick. The bulk of the formation lies north of the study area, in the central portion of the Scotts Valley syncline (Figure 2.3).

Shallowing of seas during Pliocene time led to coarser-grained sedimentation over the area, recorded by the Purisima Formation. The Purisima Formation rests conformably on the Santa Cruz Mudstone and consists of very thick bedded yellowish-gray tufaceous and diatomaceous siltstone with thick interbeds of bluish-gray andesitic sandstone. The Purisima Formation is exposed on topographically high areas to the north, east and south of the study area and attains a thickness of approximately 120 feet.

Holocene alluvial deposits line valley floors and consist of unconsolidated light brown gravel, sand and silt. The alluvial sediments were derived from surrounding drainage areas. Alluvium, approximately 10 to 20 feet thick, covers a large area of Camp Evers and Scotts Valley (Figure 2.3).

2.3.3 Structure

The Watkins-Johnson site is located on the southern limb of the Scotts Valley syncline (Figure 2.3). Strata on the south side of the fold dip five to ten degrees to the north-

WJ007697

northeast toward the fold axis. Stratigraphically older beds crop out on the southern limb of the fold to the southwest of the study area, while younger beds are exposed northward toward the central portion of the structure. Crystalline basement highlands border the limb of the fold 1.5 miles west of Mount Hermon and lie at relatively high elevations south and southwest of Scotts Valley. Crystalline rocks crop out as close as two-thirds of a mile southeast of the plant site. As discussed in the following paragraphs the position of crystalline highlands has played a major role in the distribution and composition of sediments deposited in the region since the middle Miocene.

Figure 2.5 shows the location of cross-sections and well control-points that depict the distribution of stratigraphic units in the subsurface of the region shown in Figure 2.3. These cross-sections, A-A', B-B', and C-C' are shown on Figures 2.6 and 2.7. The geologic sections were constructed using well-log data correlated to surficial geology as mapped by the United States Geological Survey (Clark, 1981, Plate 2). Well log data for wells in the Watkins-Johnson monitoring program are contained in Appendix A.

The structural dip of middle Miocene and older sedimentary formations toward the fold axis is illustrated in cross-section C-C'. Cross-sections A-A' and B-B' are tangential to the fold axis. Cross-sections B-B' and C-C' both illustrate general thickening of middle Miocene Formations northward toward the fold axis and thinning of the formations closer to crystalline highlands. Erosion of units was most active on surfaces around the paleotopographic crystalline highlands as indicated by the thinning and removal of some formations. Cross-section A-A' illustrates erosion of the Locatelli Formation in the vicinity of the New Probation well apparently due to erosion or non-deposition around a basement high. All sedimentary units are truncated against the crystalline basement southwest of the Indian Springs #2 well (cross-section B-B'), and Lompico and Monterey formations have apparently been eroded away from crystalline highlands south of the Spring Lake #4 well (cross-section C-C'). Erosion of the fine-grained Monterey sediments in some areas has likely resulted in a broad subsurface contact of permeable Lompico Sandstone with overlying Santa Margarita sands. Cross-section A-A' suggests that such a contact exists southwest of the New Probation well and cross-section C-C' suggests that the contact extends eastward, while it passes between the Hidden Glen and Spring Lakes #4 well. The contact is hydrogeologically significant as a potential recharge area for ground water in the Lompico Formation.

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● Location of Well Plotted on Regional Geologic Cross Section

SCALE

Miles 0 0.5 1.0

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LOCATION OF REGIONAL CROSS-SECTIONS

FIGURE 2.5

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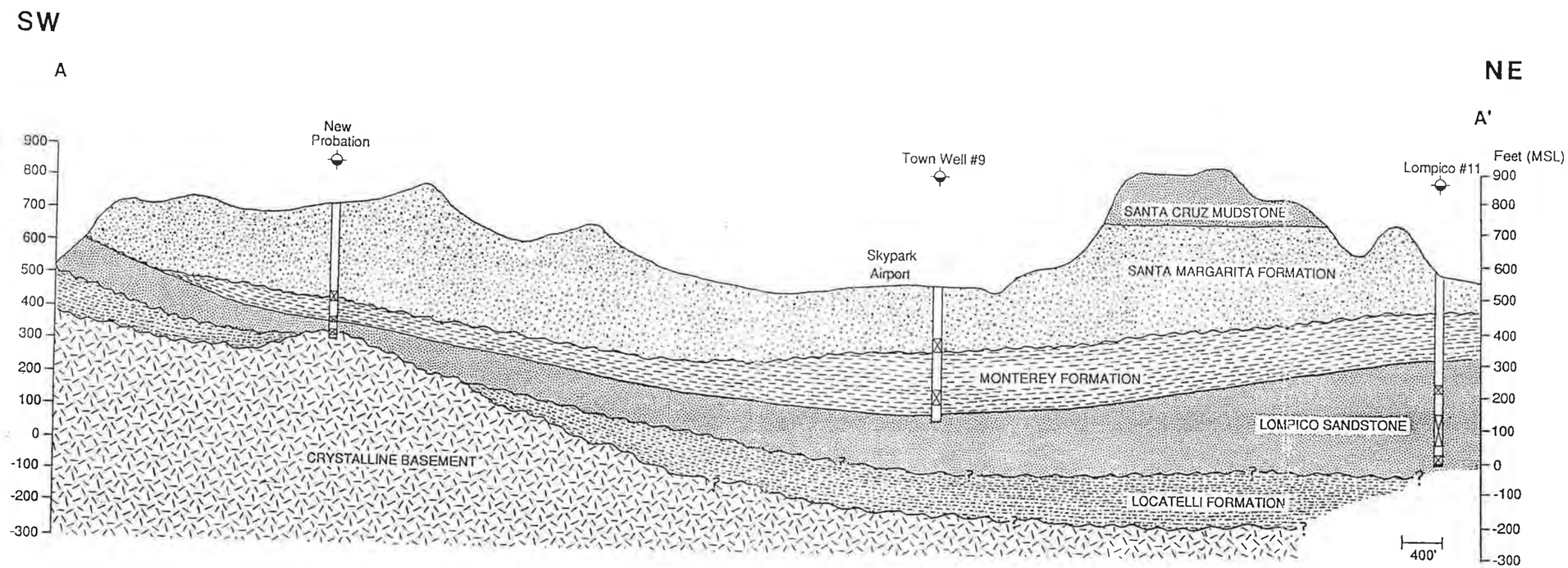

EXPLANATION

CONFORMABLE CONTACT

UNCONFORMABLE CONTACT

SCREENED INTERVAL

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GEOLOGIC CROSS-SECTION A-A'

FIGURE 2.6

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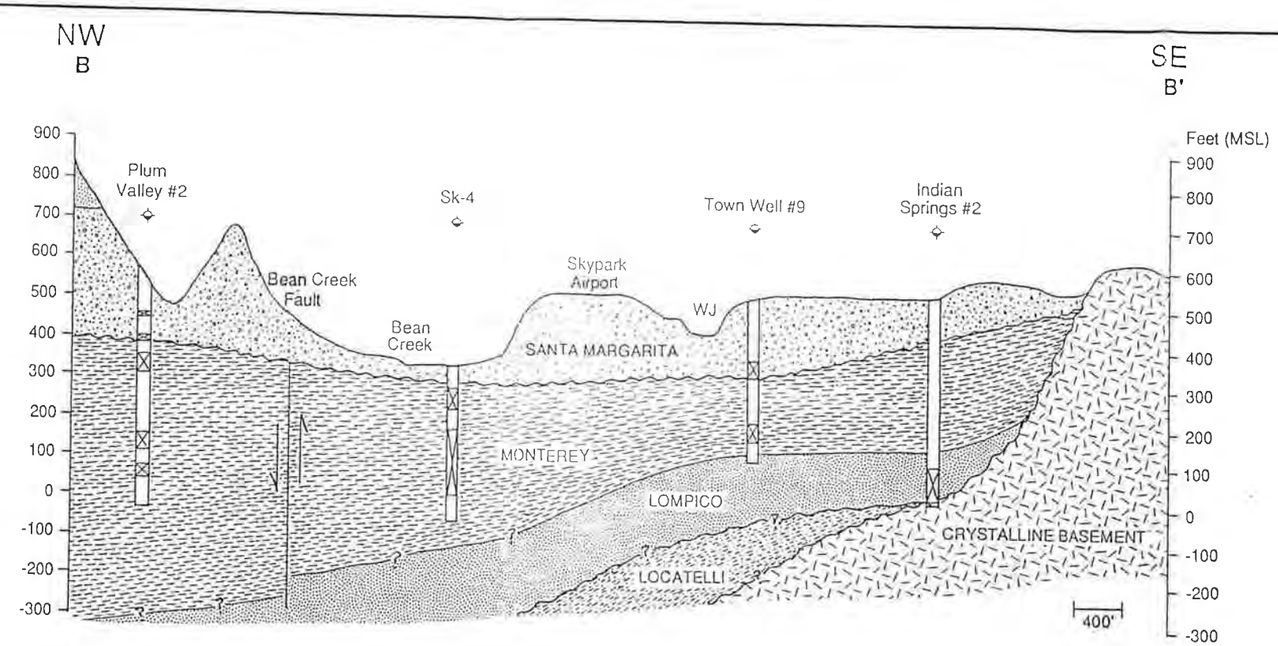

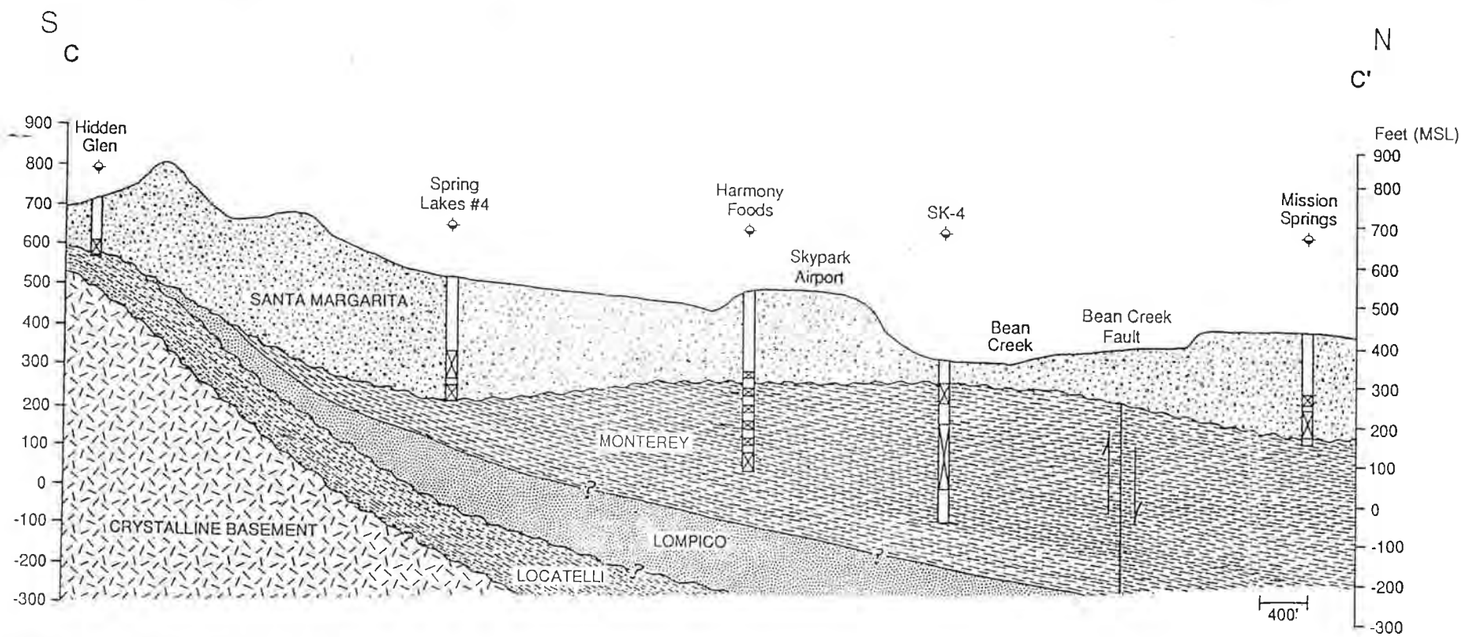

EXPLANATION

CONFORMABLE CONTACT

UNCONFORMABLE CONTACT

SCREENED INTERVAL

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GEOLOGIC CROSS-SECTION B-B' AND C-C'

FIGURE 2.7

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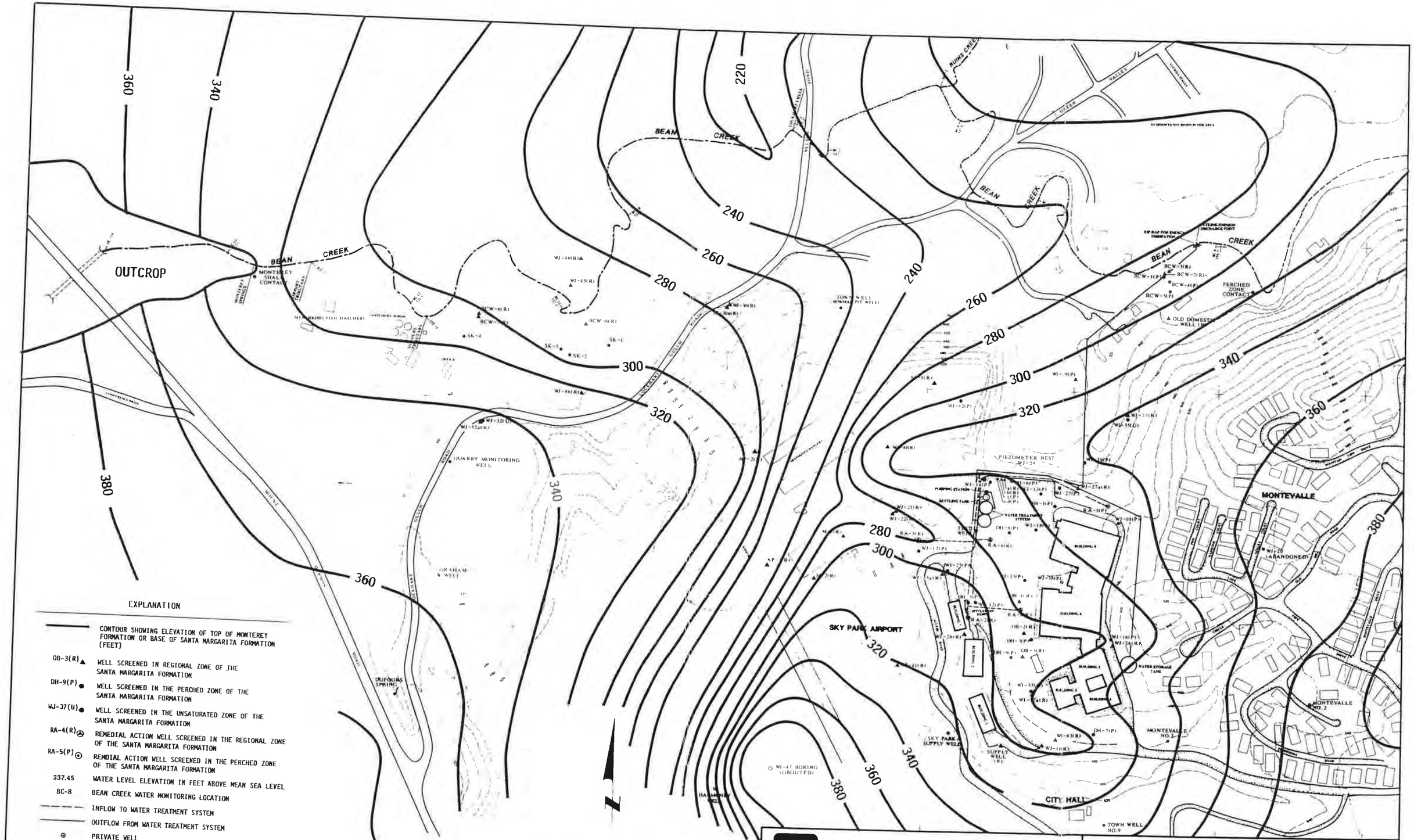
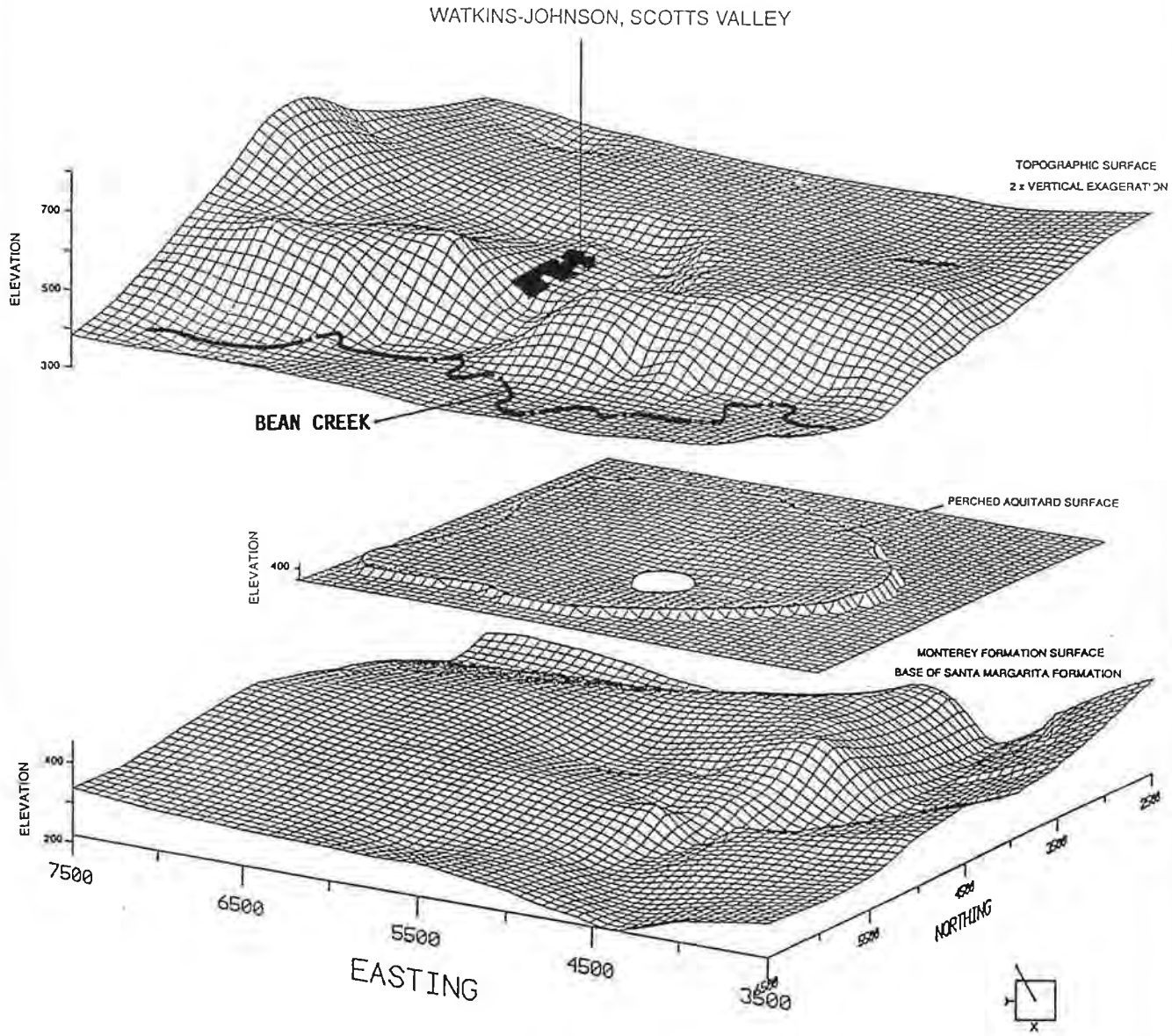
Santa Margarita and younger formations exhibit less regional dip and thickening toward the axis of the syncline. The thickness of the Santa Margarita, however, does vary greatly. The variation is due to: 1) deposition of Santa Margarita sands over a very irregular paleotopographic surface of older units and; 2) present topographic relief which cuts across much of the formation in the region. The top of the Monterey Formation, which underlies most of the Santa Margarita in the region, is reported to be very irregular (Todd, 1986) and exhibits paleo-valleys in the vicinity of the Watkins-Johnson site. The effect of paleo- and present topography on the thickness of the formation is illustrated by the regional cross-sections. The lack of structural variation in the Santa Margarita relative to Monterey and older units is an indication that most of the deformation of the Cenozoic strata occurred prior to the upper Miocene deposition.

Figure 2.8 exhibits one such paleo-valley incised in the surface of the Monterey which extends approximately north-south between the Watkins-Johnson site and Sky Park airport. This paleo-valley, just west of the site, deepens and widens to the north in the direction of Bean Creek. These valleys are also shown on Figure 2.9, a three-dimensional view of land surface, the aquitard in the Santa Margarita, and the upper surface of the Monterey. Detailed discussions related to the aquitard and the hydrogeology of the perched and regional zones of the Santa Margarita and other units are contained in Section 4.0 and 5.0.

A minor fault, the Bean Creek fault, offsets Monterey strata exposed along Bean Creek 0.75 miles west of the Watkins-Johnson site (Figure 2.3). The northern side is downthrown relative to the southern side, resulting in an increased thickness of Monterey strata which is additive to the general thickening of the formation toward the central portion of the Scotts Valley syncline (cross-sections B-B' and C-C', Figure 2.7). The exact vertical displacement and lateral extent of the fault is unknown. The fault has caused sharp folding of Monterey strata in some areas along Bean Creek, but deformation has not been traced upwards into the Santa Margarita Formation.


OUTCROP
BEAN CREEK
MONTEREY SHALE CONTACT
MT. HERMON FISH HATCHERY
QUARRY MONITORING WELL
GRAHAM WELL
DUFOURS SPRING
SKY PARK AIRPORT
SKY PARK SUPPLY WELL
SUPPLY WELL
WI-47 BORING (GROUTED)
RA-3(R)
CITY HALL
TOWN WELL NO.9
MONTEVALLE
MONTEVALLE NO.2
MONTEVALLE NO.1
PERCHED ZONE CONTACT
OLD DOMESTIC WELL
PIEZOMETER NEST
WI-39
WI-20 (ABANDONED)
WATER STORAGE TANK
WATER TREATMENT SYSTEM
SETTLING TANK
PUMPING STATION
BUILDING 1
BUILDING 2
BUILDING 3
BUILDING 4
BUILDING 5
BUILDING 6
BUILDING 7
BUILDING 8
BUILDING 9
BUILDING 10
BUILDING 11
BUILDING 12
BUILDING 13
BUILDING 14
BUILDING 15
BUILDING 16
BUILDING 17
BUILDING 18
BUILDING 19
BUILDING 20
BUILDING



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Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

THREE-DIMENSIONAL VIEWS OF LAND SURFACE, TOP OF AQUITARD IN SANTA MARGARITA AQUIFER AND TOP OF MONTEREY FORMATION

FIGURE 2.9

WJ007704

3.0 SOIL INVESTIGATION

The objectives of the soils investigation are to determine the degree and extent of soil contamination in the zone of aeration in areas where contamination is suspected, and to determine if contamination exists in the zone of aeration at other selected locations. This investigation is outlined in Task 7 of the Work Plan for Remedial Investigation and Feasibility Study (RLSA, September 1987) for the Watkins-Johnson Company, Scotts Valley, California. The soil investigation has been completed and the results are described in the following subsections. Subsection 3.1 is an overview of potential source areas and includes discussions of plant operations, facilities and past waste disposal. Subsection 3.2 presents soil data from previous RI/FS work at the Watkins-Johnson site prior to the EPA assuming the lead role in the RI/FS program. Soils data collected from the site subsequent to the EPA assuming the lead role in the program are presented in subsection 3.3. An interpretation of the analytical results presented in subsections 3.2 and 3.3 is presented in subsection 3.4. Subsection 3.5 is a discussion of the results of the soil investigation. Subsection 3.6 is a discussion of source areas and pathways to ground water.

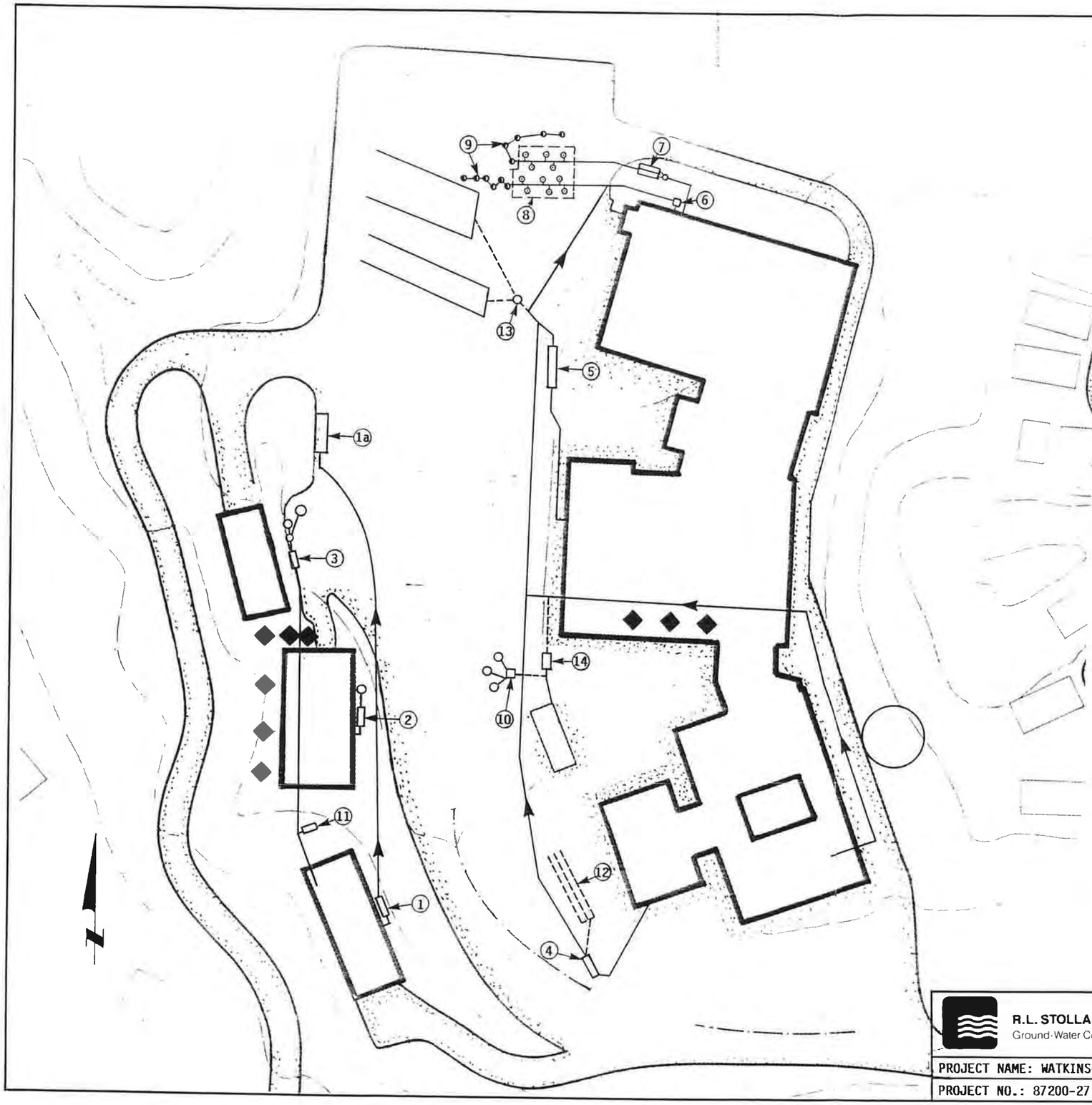
3.1 Potential Contaminant Source Areas

The plant, operated as the Stewart Division of the Watkins-Johnson Company since 1963, has been the site of manufacturing since 1960. Over the years, a variety of products has been produced, involving a diversity of industrial processes and resulting in the use of numerous materials, some of which are potential contaminants. In order to interpret conditions at the site and facilitate discussions in following sections, it is necessary to present the history of plant operations, chemical usage, and waste-disposal systems and methods. Plant operations, chemical usage and waste treatment systems are discussed on a building-by-building basis and in numerical order. Disposal practices associated with wastes generated during manufacturing activities are discussed in the final subsection of section 3.1. The location of the buildings is shown on Figure 3.1.

3.1.1 Plant Operations

- Building No. 1. Existing records indicate that Building No. 1 was originally constructed in 1959. Since production began in 1960, the building has been

WJ007705



EXPLANATION

◆ POTENTIAL CONTAMINATION SOURCE BASED ON COMMUNICATION FROM EPA TO WATKINS-JOHNSON

NOTES: INDUSTRIAL AND SANITARY WASTE WATER TREATMENT AND DIPOSAL FACILITIES

(1) [1] SEPTIC SYSTEM, 1250 GALLONS (1959-1988)

(1a) [1] LEACH FIELD (1959-1988) SERVES (1)

(2) [1] 1250 GALLON SEPTIC SYSTEM DISCHARGES TO A DRY WELL (1959-1988)

(3) [1,2] DILUTION TANK, DIVERSION VALVE AND TWO DRY WELLS (1970-1988)

(4) [1] SANITARY SEPTIC TANK; 3750 GALLON (1962-1968);5000 GALLON (1968-1988)

(5) [1] SANITARY SEPTIC TANK; 7000 GALLON CAPACITY (1968-1988)

(6) DILUTION TANK; 1250 GALLON CAPACITY (1980-1988)

(7) SEPTIC TANKS, TWIN 3000 GALLON CAPACITY (1980-1988)

(8) **DRY-WELL INFILTRATION FIELD (1980-1988); 11 WELLS: 4 FT. DIAMETER x 20 FT. DEEP.

(9) DRY-WELL INFILTRATION FIELD EXTENSION (1980-1988); 12 WELLS 3 FT. IN DIAMETER x 30 FT. DEEP

(10) [1,2] STAND-BY DRY WELL INFILTRATION FIELD (1970-1988); 3 WELLS AND DIVERSION VALVE. 1970-1987 SERVED AS MAIN DISPOSAL FIELD FOR (14); CURRENTLY RETAINED FOR EMERGENCY DISCHARGE OF EFFLUENT FROM (4)

(11) [1] DILUTION TANK FROM PARTS ETCHING UNTIL ABANDONDED (1959-1970)

(12) [1] SEPTIC LEACH FIELD (1962-1968); ORIGINALLY SERVED (4) UNTIL DISCONNECTED

(13) [1] SEPTIC LEACH FIELD (1968-1980); ORIGINALLY SERVED BUILDINGS 3,4,5,6; SYSTEM FAILED

(14) [1,2] DILUTION TANK, 1250 GALLON (1968-1987), RECIEVED INDUSTRIAL WASTE FROM BUILDINGS 4, 5, and 6, REMOVED

1 = REMOVED, ABANDONDED, OR NO LONGER IN SERVICE
2 = SUSPECTED SOURCE OF CONTAMINATION

0 100 200 FEET

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PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

FACILITIES MAP OF WATKINS-JOHNSON SITE, SCOTTS VALLEY, CALIFORNIA

FIGURE 3.1

WJ007706

utilized for the research and development and production of Backward Wave Oscillators (BWO), X-ray tubes, and YIG Filters. The structure is currently dedicated to Laboratory Research and Development for the production of Chemical Vapor Deposition (CVD) furnaces. These furnaces are used primarily for semi-conductor manufacturing.

During the period 1982-1983, a degreaser using Freon was operated as a part of the Spheres Group operations. No waste-water stream resulted from operation of this degreaser, although solvent waste was generated. A parts etching and cleaning process operated in Building No. 1 for a period of time. Process water from this operation was piped to a dilution tank (reference number 11, Figure 3.1) until 1970, at which time a newly installed dilution tank (reference number 3) near Building No. 2 began to receive this waste stream. The locations of the dilution tanks and buildings are shown on Figure 3.1.

- Building No. 2. Building No. 2 (Figure 3.1) was also constructed in 1959. This building served as the original location of the Equipment Department, a machine shop, and a small plating shop. In 1970, following the removal of the machine shop and furnace production facilities, the west side of the building was reconstructed with curbs and duck boards and was occupied by expanded plating shop operations. A portion of Building No. 2 was converted to research and development for CVD furnaces in 1980. The CVD furnace research moved to Building No. 1 in 1985 and the plating shop was relocated to Building No. 4 in 1986. Currently, Building No. 2 houses the Environmental Lab and the Maintenance Department Carpenter Shop.

  During the period of its operation the plating shop generated a waste stream consisting primarily of rinse water; this stream was treated and disposed of in a variety of systems which will be described in the next sections.

- Building No. 3. This building was constructed in 1962 and has been utilized continuously for administrative and reception activities exclusively. Building No. 3 generates only sanitary waste effluent.

WJ007707

- Building No. 4. This building was constructed in 1962. Current operations include glass cleaning and etching related to BWO manufacturing. Building No. 4A was constructed in 1970 and was originally occupied by Stores and Shipping. The plating shop was relocated from Building No. 2 in 1986 and was subsequently closed in the first quarter of 1987. Building No. 4B, which is currently utilized as a conference room, was built in 1978 and originally housed the Solid State Amplifier Assembly Department.

  Process shop waste streams and sanitary waste streams generated in Building No. 4 have been collected, treated, and disposed of in a variety of facilities which will be described in the next sections.

- Building No. 5. Constructed in 1962, Building No. 5 housed the machine shop from 1964 to 1970. Since that time, the building has been occupied by the Solid State Department. Ongoing operations include the Personnel Department, Solid State Engineering offices, and Solid State Assembly. This building has no water supply, plumbing, or drain systems on the production floor.

- Building No. 6. Completed in 1968, this two-story building has housed Industrial Furnace Assembly and Raw Material Storage on the lower floor since it opened. Industrial operations include MIG and TIG welding shops, a paint booth and the utilization of one degreaser. The location of Building 6 is shown on Figure 3.1.

  Until about 1982, two thirds of the upper level was occupied by the Machine Shop and the remainder by Cathode Ray Tube (CRT) Manufacturing. Within the machine shop, parts washers which used naphtha and hexane were utilized to clean parts. The CRT operation used phosphorus, ammonium bifluoride, and lacquers.

  The top floor of Building No. 6 is presently devoted completely to Solid State Department operations. Manufacturing activities include a photographic dark room and small etch room. In the past, chemicals used in these activities included alcohols, acids, TCE, phenols, and various photographic-process related chemicals. Type J100 etching solvent which includes PCE and (ortho) dichlorobenzene has been used in the etching room from 1982 to the present.

WJ007708

Over the years, a variety of waste streams has been generated by operations carried out in Building No. 6. These streams have been collected, treated, and disposed of in a variety of systems described in subsequent sections of this report.

- Building No. 7. This building, constructed in 1967, has four floor drains which were connected to the storm drains. It was originally dedicated to industrial furnace assembly and testing which did not involve any use of chemicals. Since 1969 this building has been used either for production or storage.

- Building No. 8. This three-story structure was built in 1981. The upper level houses Engineering offices and the Bench Assembly Area for manufacturing solid-state oscillators. The location of Building No. 8 is shown on Figure 3.1. Pressurized cans of Freon are used to remove solder flux residues from circuits.

  The main level (middle floor) of Building No. 8 houses the Equipment Department, engineering offices, sales offices, drafting and furnace assembly and test areas. No degreasing operations are conducted in this part of the building.

  The lower floor of Building No. 8 has served as the machine shop since 1982. Parts washers using naphtha and hexane continued to be utilized in the relocated shop.

  A variety of waste streams, including sanitary wastes, is generated by operations on the upper and lower levels. A more detailed discussion of how the wastes are collected, treated, and disposed of will be provided in a later section.

3.1.2 Chemical Usage

A listing of the chemical compounds used in the Watkins-Johnson Company, Scotts Valley plant since operations began is presented in Appendix B. The following is a summary of chemical usage at each building.

WJ007709

- Building No. 1. Types of materials used are:

Electronics Assembly (1960 - 1984).

Chemicals: alcohol, acetone, Freon, "pre-kleano" and polishing machine slurry ("Muron"; one part "Suspendix" [non-toxic]; and deionized water).

Metals: copper, brass, tantalum, gold, silver and solder.

Between 1982 and 1983 Freon was used as a degreaser. Drummed waste chemicals included acetone, alcohol and Freon, which was captured and disposed of in accordance with all applicable regulations.

Chemical Vapor Deposition Lab (1985 - present) see description under Building No. 2.

- Building No. 2. Types of materials used are:

Plate shop activities (1959 - 1986).

Chemicals: fluoroboric acid, chromic acid (alodine 1200), phosphoric acid, nitric acid, hydrofluoric acid, hydrochloric acid, boric acid, sulfuric acid, gold BTD200, stannous fluoroborate, beta naphthal, peptone, nickel chloride, nickel sulfate, "Enbond NE.33", copper cyanide, potassium cyanide, potassium sodium tartrate, sodium carbonate, potassium hydroxide and TCE.

Metals: copper, brass, nickel, aluminum, Monel, molybdenum, and chromium iron and titanium.

Chemical Vapor Deposition Lab activities (1980 - 1985).

Chemicals: acetone, tin chloride, antimony chloride, soda ash, hydrofluoric acid, hydrochloric acid, isopropanol, methanol and nitric acid.

Metals: steel, nickel, copper, chromium, iron and titanium.

WJ007710

- Building No. 4. Types of materials used are:

  Etching/cleaning operation.

  Chemicals: acetone, alcohol, methanol, Freon, hydrochloric acid, formic acid, sulfuric acid, acetic acid, phosphoric acid, nitric acid, hydrofluoric acid, hydrogen peroxide, sodium hydroxide, and stannous chloride.

  Metals: copper, molybdenum, tungsten, nickel, platinum, stainless steel, solder, copper-gold, Kovar, Nichrome, and Monel.

  Thin Film Operation.

  Chemicals: alcohol, acetone, TCE, hydrogen peroxide, potassium iodide, iodine, photo resist, and Q40 etch solution.

  Metals: not applicable.

- Building No. 6. Types of materials used are:

  CRT Activities (1970 - 1982).

  Chemicals: acetone, alcohol, acetic acid, potassium silicate, phosphorus, ammonium bifluoride, barium acetate, zinc ortho-silicate, gallinium sulfide, and lacquers.

  Metals: barium.

  Dark Room/Etch Room (1982 - present).

  Chemicals: alcohols, acids, phenols, MC, and various photographic chemicals. TCE was used in the past. Type J100 Etching Solvent has been used from at least 1982 till the present. This product consists of 35% PCE, 35% (ortho) dichlorobenzene, 10% phenol and 20% alkylaryl sulfanic acid.

WJ007711

Industrial Furnace Assembly operates a degreaser which utilized TCE before 1984 and now uses 1,1,1-trichloroethane (1,1,1-TCA).

The machine shop which occupied a portion of Building No. 6 from 1970 to 1982 utilized naphtha and hexane to wash parts. 1,1,1-TCA was used as a lubricant for machining molybdenum.

All concentrated solutions of the above chemicals are captured and recycled or disposed of in accordance with all applicable regulations.

- Building No. 8. Although no rinse water from chemical cleaning or treating processes is discharged from Building No. 8, several departments use chemicals which are collected as waste and disposed of in an approved fashion.

  Solid State Oscillator Assembly - Freon is used as a degreasing agent in both batch processing and spot cleaning. No rinse water is generated.

  Machine Shop - Naphtha and hexane are utilized in a batch parts cleaning operation which generates no rinse water waste. Spent solvents are collected in drums and recycled.

3.1.3 Waste Treatment Systems

- Building No. 1. Constructed in 1959, this building formerly discharged sanitary waste to a 1,250 gallon septic tank (reference number 1 on Figure 3.1). The septic tank effluent discharged to a leach field located north of Building No. 2 (reference number 1a on Figure 3.1).

  From 1959 to 1970 the etching and cleaning process water was piped to an acid dilution tank located approximately 25 feet north of Building No. 1 (reference number 11 on Figure 3.1). In 1970 this system was abandoned and effluent was diverted to an acid dilution tank and dry well system located north of Building No. 2 (reference number 3 on Figure 3.1)

WJ007712

- Building No. 2. Original 1959 construction included a 1,250-gallon septic tank for handling sanitary waste (reference number 2 on Figure 3.1). Its effluent was disposed of in a dry well 15 feet north of the septic tank. In 1970 a 1,250-gallon capacity acid dilution tank, diversion valve, and two dry wells were installed (reference number 3 on Figure 3.1). The dry wells are 30 inches in diameter and 48 feet deep. Effluent from the Building No. 1 acid dilution tank was diverted to this system in 1970.

- Building Nos. 3, 4, and 5. The original system included a 3,750-gallon septic tank for treating sanitary waste (reference number 4 on Figure 3.1). The septic tank effluent was discharged to a leach field consisting of clay tile laterals (reference number 12 on Figure 3.1).

  In 1968 a 1,250-gallon septic tank was added to the existing system (reference number 4 on Figure 3.1), resulting in a 5,000-gallon capacity system. The original Building Nos. 3, 4, and 5 leach field was abandoned at that time. Septic tank discharge was routed to a new leach field (clay tile laterals) which was built for Building No. 6 (reference number 13 on Figure 3.1).

  In 1980 the Building No. 6 leach field failed and all sanitary effluent from the Building Nos. 3, 4, 5 and 6 system was diverted to a new dry well field built to serve Building No. 8 (reference number 8 on Figure 3.1).

  Rinse water from Building No. 4 glass shop was piped to Building No. 6 industrial waste line starting in 1968.

- Building No. 6. Original construction (1968) included a sanitary waste system and an industrial waste system. The sanitary waste handling system included a 7,000-gallon septic tank (reference number 5 on Figure 3.1) which discharged its treated effluent to a leach field consisting of clay tile laterals (reference number 13 on Figure 3.1). In 1980 the septic tank was connected to a new system of dry wells constructed near Building No. 8, (reference number 8 on Figure 3.1) following the failure of the leach field.

WJ007713

Industrial waste from Building No. 6 was treated in a 1,250-gallon capacity, fiberglass-lined, cast concrete dilution tank, which was installed in 1968 (reference number 14 on Figure 3.1). Industrial wastes from Building No. 4 were also treated in this tank. Effluent from this unit was tied into the line which connected the Building Nos. 3, 4, and 5 septic tank to the Building No. 6 leach field (reference number 13 on Figure 3.1). In 1970, three dry wells and a diversion valve system were constructed west of Building No. 6 (reference number 10 on Figure 3.1). All effluent from the dilution tank and Building Nos. 3, 4, and 5 septic tank was discharged into these dry wells. The dilution tank was removed in March of 1987. Building No. 6 and Building No. 4 rinse water were combined with sanitary septic tank effluent.

- Building No. 8. Original construction in 1981 included an industrial waste system (dilution tank) which is connected to the floor drains (reference number 6 on Figure 3.1) and two 3,000-gallon septic tanks for treating sanitary waste (reference number 7 on Figure 3.1). All floor drains were sealed in 1986. Originally eleven, 48-inch diameter by 20-foot deep, dry wells were completed for infiltrating the combined effluent from Building Nos. 3, 4, 5, 6 and 8 (reference number 8 on Figure 3.1). Twelve additional dry wells were added in 1986 (reference number 9 on Figure 3.1). These dry wells are 36 inches in diameter and 30 feet in depth. In February, 1988 the Watkins-Johnson plant was connected to the Scotts Valley sewer system. Septic tank and dilution tank affluent from Building Nos. 1 through 6, which were previously discharged to leach fields and dry wells, are now being discharged into the sewer system.

3.1.4 Disposal Practices

As part of its production operations, the Stewart Division utilizes numerous industrial processes and materials. Disposal practices associated with wastes generated during manufacturing activities are discussed below. Additionally, there may have been historical incidents of uncontrolled disposal or vandalism by employees at the facility as alleged by anonymous tips to authorities.

- Containerized Concentrated Waste. Currently, several different waste streams are generated at the Stewart Division. Three of the waste streams are

recyclable. The major recyclable waste stream consists of a mixture of acetone, alcohols, paint thinner, oils and developers. The estimated annual volume generated is about 3,000 gallons (approximately fifty-five 55-gallon drums). Two major halogenated solvents waste streams are also collected for recycling. These are 1,1,1-TCA and 1,1,2-trichlorotrifluoroethane (Freon 113) which is used in degreasing and metal fabricating. The estimated annual rate of generation for these solvents is about 800 gallons (about fifteen 55-gallon drums) of each. Two waste streams consist of acidic liquid. About 300 gallons per year (about six 55-gallon drums) of a mixture of hydrofluoric acid, hydrochloric acid, and acetic acid, with traces of other organic acids are generated. About 100 gallons (approximately two 55-gallon drums) of a nitric acid solution are also generated. The metal plating shop (now discontinued) generated about 300 gallons per year each of two waste streams: a cyanide solution and a caustic solution. The final waste stream is a non-toxic calcium silicate solution generated in cutting insulated wall board. The solution is collected in drums and stored prior to treatment. Non-halogenated solvents are recycled by Romic, Inc. while the halogenated solvents are recycled by Barons Blakeslee, Inc., and Safety Kleen. The remaining waste streams are profiled for acceptance by Chemical Waste Management Inc., Kettleman Hills facility.

- On-Site Waste Treatment. Section 3.1.2 described the use of chemicals at the Stewart Division plant, and Section 3.1.3 described the on-site waste-water treatment systems for sanitary and industrial wastes. Certain industrial processes, both historic and ongoing, have produced dilute rinse water. Industrial waste-waters were treated in dilution tanks while sanitary wastes were treated in septic tanks, and the resulting effluents were disposed of in leach fields or infiltration wells. Some of the septic tanks are known to have received only sanitary waste, while others may have also periodically received some process rinse water. As discussed in Section 3.1.3, the sanitary wastes and industrial waste-waters in Buildings Nos. 1 through 6 have been discharged into the Scotts Valley sewer system since February, 1988.

- Potential Past Sources of Contamination. The chief problem identified at the Stewart Division plant is the occurrence of TCE in the ground water. Four potential sources of the contamination have been identified: (1) sabotage by an

employee in one or more locations; (2) minor contributions due to dilute process rinse water; (3) potential surface disposal; or (4) potential off-site contributors.

- In April 1984, several anonymous telephone calls were received by the RWQCB and the County of Santa Cruz alleging improper disposal of solvents at Watkins-Johnson. An investigation by RWQCB resulted in samples of an amber liquid layer being collected from the Building 6 dilution tank (reference number 14 on Figure 3.1) and sent to a laboratory for analysis. The sample proved to be about 82 percent TCE and 10 percent 1,1,1-TCA. Watkins-Johnson was utilizing both of these solvents in its operations at the time of the incident and stored the materials in either 1-gallon or 55-gallon containers. It is not known precisely how the materials may have been introduced into the Building 6 dilution tank, but it is reported that a significant volume of solvent was introduced into the sump by a disgruntled employee. They may have been introduced through the drain line, or possibly through a service hatch at the top of the tank. The concentrations of ground-water contamination caused by this source are probably high.

  In addition, a memorandum to Watkins-Johnson from the Director of Environmental Health, Santa Cruz County, dated March 20, 1985, indicates that "toxic materials, possibly including TCE, may have been repeatedly dumped at the corner of Building No. 2 along the west wall." The memorandum did not specify whether these "chemicals" were unused stock or waste, nor the exact duration of this alleged activity.

- A memorandum to Watkins-Johnson from the EPA Remedial Project Manager, dated September 3, 1987, reports from a confidential source that machine shop wastes were placed in a sand pit. Subsequently, the sand pit was filled and Building 6 constructed at the site of the sand pit.

- A potential source of contamination is the rinse water that is the product of cleaning processes which involve the use of solvents. Plating, photo-etching, and electronics assembly operations utilize solvents as a part of

the cleaning protocol, often followed by a water rinse. Leach fields serving Building Nos. 1, 4, and 6 may have received rinse water containing TCE and/or other solvents. Freon is used in Building No. 8, but no rinse water generation is reported for processes in that building. Operations in Building No. 2 may have periodically generated rinse water containing TCE.

- There is also a potential for sources of contamination to occur from the area surrounding the Watkins-Johnson plant, such as Sky Park Airport.

Other potential ground-water contaminants associated with various processes at the plant include heavy metals and nitrates. Although these problems have been discussed in RWQCB memoranda, the problems have never been substantiated. The Plating Shop (which historically has occupied several different locations, and is now closed) has been the principal source of acid waste possibly containing heavy metals, although the photo-etching operations also produce acidic rinse waste. Soil and ground-water sampling performed for these materials have not indicated abnormal concentrations.

3.1.5 Summary of Key Potential Source Areas

Key areas where contamination or a possible transport pathway to ground water is suspected were identified from the review of plant operations, chemical usage onsite, and the waste treatment systems, together with information from anonymous sources pertaining to spills and improper handling of wastes. The review identified seven key areas of interest:

1. Building 2 Dilution Tank and Vicinity;
2. Building 2 and Vicinity;
3. Building 6 Dilution Tank and Vicinity;
4. Building 6 and Vicinity;
5. Building 8 Leach Field and Vicinity;
6. Sky Park Airport, which is offsite; and
7. Background, which is upgradient of potential source areas onsite.

These seven areas of interest are shown on Figure 3.2. Key potential source areas investigated in previous work at the site included six of the seven listed areas. Building 2 and vicinity was added to the key areas of interest subsequent to previous investigations and prior to the initiation of activities for this RI/FS investigation.

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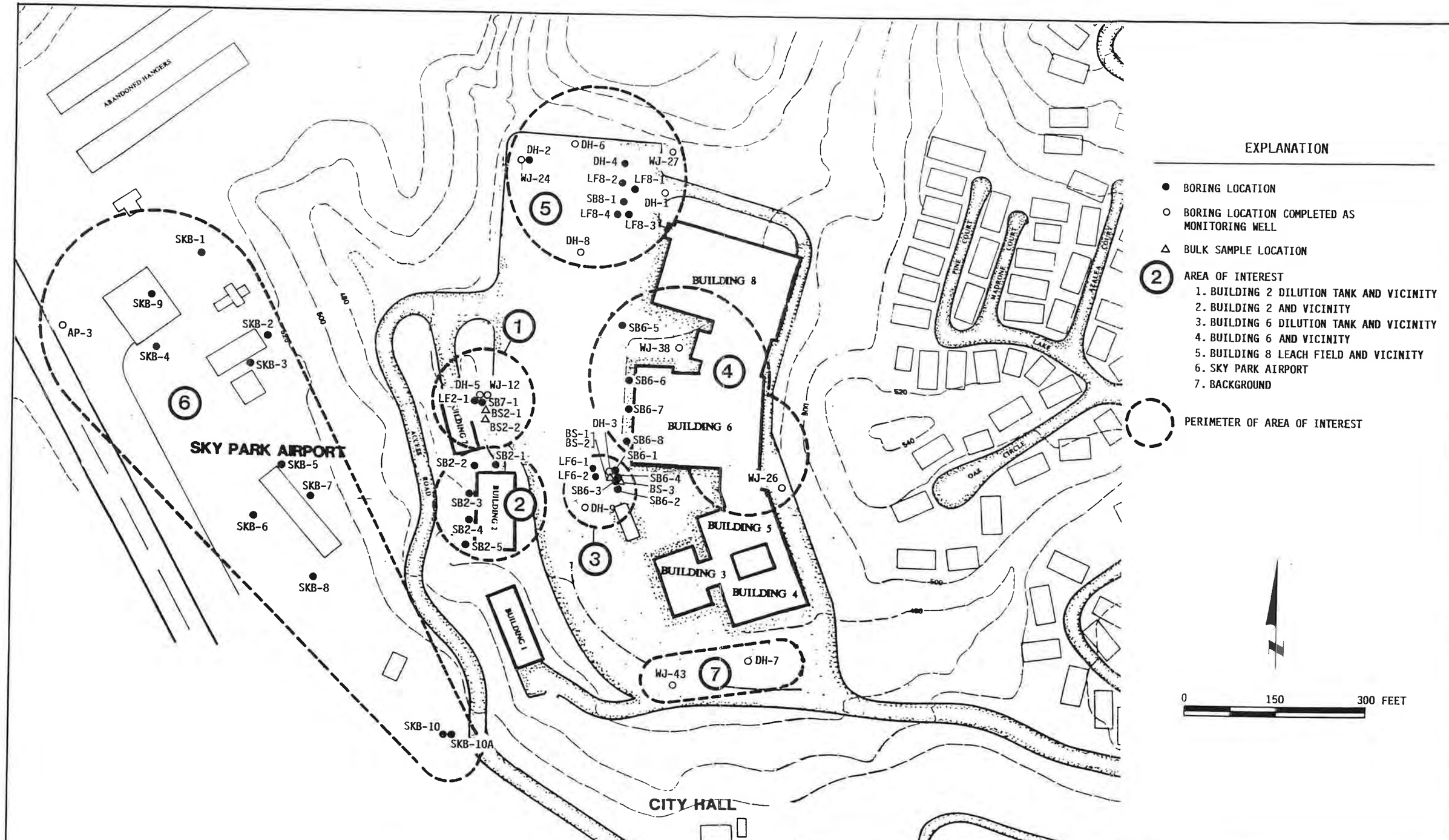

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Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

SOIL SAMPLING LOCATIONS

FIGURE 3.2

WJ007718

3.2 Assessment of Previous Work

Large scale residual concentrations of contaminants in the soil are potential sources of ground-water contamination. To identify such sources of current or future contamination, Watkins-Johnson carried out soil investigations on the plant property and the Sky Park Airport property. Soil samples were collected from 39 locations as bulk samples, from soil borings, and from borings completed as wells. Sampling locations for the soil investigations and sampling locations for the current investigation are shown on Figure 3.2. Table 3.1 summarizes information related to drilling and sampling at each of the 39 locations, together with information from locations which were sampled during the current investigation. The RI/FS soil sampling program is discussed in Section 3.3.

3.2.1 Methodology

Borings which were drilled and sampled during previous investigations were located using information gathered during onsite inspection, from background information, and from the results from previous sampling as the investigation progressed. Soil sampling locations at the Watkins-Johnson site were selected with the assumption that contaminants may have been introduced into the subsurface by leakage from the dilution tank and dry wells associated with Building 2; the dilution tank, infiltration wells, and associated pipelines near Building 6; and the infiltration wells near Building 8. The suspected sources of contamination are discussed in the previous section, 3.1. Discussion of the previous soil investigations is by the area of interest.

The six general areas of interest during the previous investigations were: the Building 2 dilution tank and vicinity; the Building 6 dilution tank and vicinity; Building 6 and vicinity; the Building 8 leach field and vicinity; the Sky Park Airport, which is offsite; and background or upgradient of suspected areas of contamination. These areas of interest are shown on Figure 3.2. As mentioned in Section 3.1.5, the seventh area of interest, Building 2 and vicinity, was not identified until after the completion of the previous investigations. Results from this area are presented in Section 3.3. The work during the previous investigations was carried out primarily in the spring of 1984 and 1987. The procedures used during drilling and sampling and the results obtained are

WJ007719

Table 3.1

Summary of Previous Soil Investigations[1]

Site	Date Drilled	Total Depth (feet)	Number of Samples for Laboratory Analyses	Laboratory Methods[2]	Laboratory	Remarks
Area 1, Building 2 Dilution Tank and Vicinity[4]:						
DH-5	6-15-84	50	9	8010	Stoner Laboratories	Completed as a monitoring well
WJ-12	12-9,10-84	74	6	8010	Multi-Tech Laboratories, Inc.	Completed as a monitoring well
BS2-1	5-6,7-87	35	7	8010, Inorganics	Enseco	Backfilled[3]
BS2-2	5-7-87	25	6	8010, Inorganics	Enseco	Backfilled[3]
LF2-1	5-6-87	25	5	8010	Enseco	Backfilled[3]
Area 2, Building 2 and Vicinity[4]: No borings were drilled in area during previous investigations. Data on new borings presented in following section on Table 3.8 and Table 3.9						
Area 3, Building 6 Dilution Tank and Vicinity[4]:						
DH-3	6-11-84	94	12	8010	Stoner Laboratories	Completed as a monitoring well
DH-9	7-17-84	93	14	8010	Stoner Laboratories	Completed as a monitoring well
SB6-1	3-18-87	85	17	8010, Inorganics	Enseco	Backfilled[3]
SB6-2	3-19-87	85	17	8010, Inorganics	Enseco	Backfilled[3]
SB6-3	5-12-87	40	5	8010	Enseco	Backfilled[3]
BS-1 and BS-2	3-27-87	5,10	2	8010	Enseco	Two bulk samples collected at approximate 5 & 10 foot depths
BS-3	3-27-87	11	1	8010	Enseco	Bulk sample
LF6-1	5-4,5-87	80	15	8010	Enseco	Backfilled[3]
LF6-2	5-5,6-87	80	16	8010	Enseco	Backfilled[3]
Area 4, Building 6 and Vicinity[4]:						
WJ-26	11-5-85	175	1	8010	Soil Control Lab	Completed as a monitoring well
Area 5, Building 8 Leach Field and Vicinity[4]:						
DH-1	6-11-84	90	18	8010	Stoner Laboratories	Completed as a monitoring well
DH-2	6-11-84	91	15	8010	Stoner Laboratories	Abandoned, borehole collapsed
DH-4	6-1-84	81	15	8010	Stoner Laboratories	Abandoned, borehole collapsed
DH-6	7-5-84	88.5	14	8010	Stoner Laboratories	Completed as a monitoring well
DH-8	7-17-84	50	5	8010	Stoner Laboratories	Completed as a monitoring well
LF8-1	5-8-87	30	6	8010	Enseco	Backfilled[3]
LF8-2	5-8-87	30	6	8010	Enseco	Backfilled[3]
LF8-3	5-11-87	35	7	8010	Enseco	Backfilled[3]
LF8-4	5-11-87	30	6	8010	Enseco	Backfilled[3]
WJ-24	10-29-85	140	1	8010	Soil Control Lab	Completed as a monitoring well
WJ-27	10-30-85	108	1	8010	Soil Control Lab	Completed as a monitoring well

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WJ007720

Table 3.1

Summary of Previous Soil Investigations[1] (Continued)

Site	Date Drilled	Total Depth (feet)	Number of Samples for Laboratory Analyses	Laboratory Methods[2]	Laboratory	Remarks
Area 6, Sky Park Airport[4]:						
SKB-1	2-4-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-2	2-4-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-3	2-4-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-4	2-5-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-5	2-5-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-6	2-6-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-7	2-6-87	50	7	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-8	2-6-87	50	3	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-9	2-11-87	40	6	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-10	2-11-87	7	1	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
SKB-10A	2-11-87	15	2	8010-8020-8030-5020-8015	Sequoia	Backfilled[3]
AP-3	2-5 to 7-87	50	5	8010-8020-8030-5020-8015	Sequoia	Completed as a monitoring well
Area 7, Background[4]:						
DH-7	7-5-84	98.5	17	8010	Stoner Laboratories	Completed as a monitoring well
			Total 310			

[1] Information on this table is for borings completed during previous investigations. Information on new borings drilled and sampled during current investigation is presented on Table 3.8 and Table 3.9.
[2] 8010 - Purgeable Halocarbons.
8020 - Purgeable Aromatics.
8030 - Acrolein and Acrylonitrile.
8015 and 5020 - Total Hydrocarbons as gasoline.
[3] Borings were backfilled with a mixture of soil and 10 to 15 percent bentonite by weight with a concrete plug from a depth of 1 foot to land surface.
[4] Area of Interest, shown on Figure 3.2.

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WJ007721

presented in: "Ground Water Remedial Action Plan at Watkins-Johnson Company Stewart Division Plant, Scotts Valley, CA", (RLSA, March 1985); the interim report "Ground Water Flow and Contamination Migration Patterns - November 1985" (RLSA, November 1985); Section 4 in "Remedial Action Program Progress Report, July 1, 1987" (RLSA, July 1987); and Section 3.2.1 in "Hydrogeologic Contaminant Source Data", November 25, 1987.

Prior investigations of soil quality tested primarily for the presence of volatile organic compounds (VOCs). The results of the laboratory analyses from previous investigations are summarized in this report. During previous investigations 310 soil samples were collected, both on- and off-site, from 39 locations and analyzed for purgeable halocarbons (EPA Method 8010). The results are presented in Appendix C. Table 3.2 summarizes the results for sites and indicates where one or more soil samples exceeded the limits of detection for a particular analyte. Sixty-six samples collected from twelve locations at the airport were also analyzed for additional halogenated and aromatic volatile organics and total hydrocarbons. The results are also shown in Appendix C and Table 3.2. Additionally, twelve soil samples were collected from four sites near Buildings 2 and 4, and were analyzed for inorganics. The results are included in Appendix C.

The analytical results for soil samples collected during previous field investigations were not validated. Data validation determines whether data meet criteria related to editing, screening, checking, auditing, verification and review. Laboratories use blanks, duplicates, and spiked sample analyses as part of their quality assurance (QA) and quality control (QC) procedures. Analytical results from previous activities did not contain copies of these analyses, therefore the data can not be validated. The following discussion is based entirely upon non-validated data.

3.2.2 Discussion of Results

The laboratory results of the previous soil investigations are discussed in the following subsections by the area of interest. A table for each area of interest presents the results of all organics analyses of soil samples from all the borings for that area of interest. These tables include all organics data from borings which were drilled during the previous investigations and during the current investigation. Data from new borings are shown in shaded columns on the boring tables. One new boring, SB7-1, was drilled near the Building 2 dilution tank, one boring, SB6-4, was drilled near the Building 6 dilution tank

WJ007722

Table 3.2
Results of Laboratory Analyses for Volatile Organics and Total Hydrocarbons at Sites Where Soil Sample(s) Exceed the Limits of Detection

Site Identification	Area of Interest	Freon 11	1,1 - Dichloroethene	Freon-113	Methylene Chloride	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Chloroform	1,1,1-Trichloroethane	Trichloroethene	1,1,2-Trichloroethane	Tetrachloroethene	Benzyl Chloride	Total Hydrocarbons	TOTAL
AP-3	6													-[2]	0
BS-1 AND -2	3				X			X		X				NA[2]	3
BS-3	3				X			X		X				NA	3
BS2-1	1				X			X						NA	2
BS2-2	1				X									NA	1
DH-1	5													NA	0
DH-2	5									X				NA	1
DH-3	3								X	X		X		NA	3
DH-4	5													NA	0
DH-5	1			X					X	X		X		NA	4
DH-6	5									X				NA	1
DH-7	7													NA	0
DH-8	5									X				NA	1
DH-9	3									X				NA	1
LF2-1	1				X									NA	1
LF6-1	3				X	X				X		X		NA	4
LF6-2	3				X					X				NA	2
LF8-1	5				X									NA	1
LF8-2	5				X									NA	1
LF8-3	5				X			X		X				NA	3
LF8-4	5				X			X						NA	2
SB2-1	2									X				NA	1
SB2-2	2													NA	0
SB2-3	2													NA	0
SB2-4	2													NA	0
SB2-5	2													NA	0

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WJ007723

Table 3.2 (Continued)
Results of Laboratory Analyses for Volatile Organics d Total Hydrocarbons at Sites Where Soil Sample(s) Exceed the Limits of Detection

Site Identification	Area of Interest	Freon 11	1,1 - Dichloroethene	Freon-113	Methylene Chloride	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Chloroform	1,1,1-Trichloroethane	Trichloroethene	1,1,2-Trichloroethane	Tetrachloroethene	Benzyl Chloride	Total Hydrocarbons	TOTAL
SB6-1	3						X			X				NA	2
SB6-2	3									X				NA	1
SB6-3	3				X					X				NA	2
SB6-4	3									X			X	NA	2
SB6-5	4													NA	0
SB6-6	4													NA	0
SB6-7	4													NA	0
SB6-8	4													NA	0
SB7-1	1									X				NA	1
SB8-1	5													NA	0
SKB-1	6													X	1
SKB-2	6													-	0
SKB-3	6													X	1
SKB-4	6													X	1
SKB-5	6													X	1
SKB-6	6													-	0
SKB-7	6													-	0
SKB-8	6													-	0
SKB-9	6													X	1
SKB-10	6													X	1
SKB-10A	6													X	1
WJ-12	1		X	X		X			X	X	X	X		NA	7
WJ-24	5													NA	0
WJ-26	4													NA	0
WJ-27	5													NA	0
WJ-38	4													NA	0
WJ-43	7	X							X					NA	2
TOTAL		1	1	2	12	2	1	5	4	18	1	4	1	7	

[1] Area of Interest shown on Figure 3.2 and described in Section 3.1.5.
[2] NA = Not Analyzed, - Not Detected.

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WJ007724

and one boring, SB8-1, was drilled near the Building 8 leach field. As discussed in Section 3.3, these borings were located to verify the results from the previous investigations. The results from the current investigation are discussed in Section 3.3.3.3. A discussion of the data from the previous and current investigations combined is presented in Section 3.4 and the potential source areas and pathways to ground water is discussed in Section 3.6.

3.2.2.1 Building 2 Dilution Tank and Vicinity. During previous investigations, soil samples were collected from three soil borings and two borings completed as wells in the vicinity of the Building 2 dilution tank. The locations are listed in Table 3.1 and are shown on Figure 3.2. The results of the laboratory analyses for these locations are shown in Table 3.3, together with validated data from boring SB7-1, which was drilled during the current investigation.

Data from the previous investigations indicate that MC was detected in the soil in samples collected near the dilution tank (BS2-1 and BS2-2) and in samples collected from Boring LF2-1, which was located near the two dry wells that formed the leach field associated with Building 2. Chloroform (CF) was also detected in BS2-1 below a depth of 20 feet.

A different suite of contaminants was detected in soil samples collected from DH-5 and WJ-12. These locations are further removed from the dilution tank and leach field than the other borings. The suite of contaminants included TCE, tetrachloroethene (PCE), 1,1,1-TCA, and Freon-113. Soil from WJ-12 also contained 1,1-dichloroethene (1,1-DCE), trans-1,2-DCE (t-DCE), and 1,1,2-TCA.

3.2.2.2 Building 6 Dilution Tank and Vicinity. The previous soil sampling investigations have indicated elevated concentrations of TCE and MC in the vicinity of the Building 6 dilution tank. Soil samples were collected from five soil borings, two borings completed as wells, and two bulk sampling locations. The locations are listed in Table 3.1 and are shown on Figure 3.2. The laboratory results and sampling depths for each location are shown on Table 3.4, together with validated data from Boring SB6-4, which was drilled as part of the current investigation.

As shown in Table 3.4, data from the previous investigation indicate that TCE was detected in the soil at all nine sites. Where detected, the concentration ranged from 11

Table 3.3

Laboratory Results of Soil Samples Collected from Borings Drilled near the Building 2 Dilution Tank (in micrograms per kilogram) Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[1] (feet)	Boring Number[2]					
	BS2-1	BS2-2	LF2-1	DH-5	WJ-12	SB7-1[4,6]
1	---[5]	---[5]	---[5]	---[5]	---[5]	1,3-DCB[3]:40* Pyrene:74* TCE:1** BPL[3]:47*
5	ND[3]	ND[3]	ND[3]	TCE[3]:190 PCE[3]:1,400 FREON:21,000 1,1,1-TCA[3]:310	ND[3]	---
10	ND	MC[3]:730	ND	TCE:60 PCE:350 FREON:2,400 1,1,1-TCA:50	1,1-DCE:100 FREON:100 t-DCE:100 1,1,1-TCA:100 TCE:100 1,1,2-TCA:100 PCE:100	
15	ND	ND	ND	ND	1,1-DCE:100 FREON:100 t-DCE:100 1,1,1-TCA:100 TCE:100 1,1,2-TCA:100 PCE:100	---
20	ND	MC:2,000	MC:730	FREON:10	TCE:9300	---
25	MC:5,300 CF[3]:130	MC:750 (TD 25 feet)	ND (TD 25 feet)	---	1,1-DCE:100 FREON:100 t-DCE:100 1,1,1-TCA:100 TCE:100 1,1,2-TCA:100 PCE:100	1,3-DCB:23*
30	MC:8,100 CF:200			---	ND	---
35	ND (TD 35 feet)[3]			---		---
40				ND		---
45				FREON:10		---
50				FREON:10 (TD 50 feet)		1,3-DCB:28* DEP:17*
80					(TD 74 feet)	ND (TD 85 feet)

[1] Depth below existing grade.
[2] Location shown on Figure 3.2. Boring SB7-1, shaded area, was completed during current phase of work, all other borings were completed as part of previous investigations.
[3] ND = Not detected; MC = Methylene Chloride; TCE = Trichloroethene; TD = Total Depth of boring, BPL = Benzo (g, h, i) perylene; PCE = Tetrachloroethene; 1,1,1-TCA = 1,1,1-trichloroethane; CF = Chloroform; 1,3-DCB = 1,3-dichlorobenzene; Freon = Freon 113; DEP = Diethylphthalate; 1,1-DCE = 1,1-dichloroethene; t-DCE=Trans-1,2-dichloroethene; 1,1,2-TCA = 1,1,2-trichloroethane.
[4] Soil samples collected from boring SB7-1 analyzed by EPA Methods listed in Table 3.9. Only results for EPA Methods 8010, 8240 and 8270 are shown here. Soil samples from all other borings at this site analyzed by EPA Method 8010.
[5] No sample collected for laboratory analysis.
[6] Reported values fom this boring may include estimated concentration values of compounds detected at concentrations below the quantitation limit but which did meet the identification criteria (*) or concentration values above the quantitation limit (**).

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Table 3.4

Laboratory Results of Soil Samples Collected from Borings Drilled near the Building 6 Dilution Tank (in micrograms per kilogram) Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[1] (feet)	Boring Number[2]									
	SB6-1 (inflow)	SB6-2 (outflow)	SB6-3	SB6-4[5,6]	DH-3	DH-9	BS-1 BS-2	BS-3	LF6-1	LF6-2
5	TCE[3]:560	TCE:650	---[4]	TCE:46** BP[3]:34* BC[3]:3**	TCE[3]:>1000 PCE[3]:13 TCA[3]:12	ND[3]	MC:11,000 CF:610	---[4]	ND[3]	ND[3]
10	ND[3]	ND[3]	---	---[4]	TCE:19	ND	MC:8,000 CF:380	MC:2,700 CF:73	ND	ND
15	TCE:1,600	TCE:120	MC[3]:1,300	---	TCE:200 TCA:10	ND	TCE:520 (TD 10 feet)	TCE:540 (TD 11 feet)	TCE:290 PCE:150	TCE:64
20	ND	ND	TCE:5,500	---	TCE:45 TCA:10	ND			ND	ND
25	ND	ND	TCE:2,200 MC:990	TCE:1* BP:440** BA:140*	TCE:500 TCA:10	ND				
30	ND	ND	ND	---	TCE:300	ND			ND	ND
35	ND	ND	ND	---	TCE:200	ND			ND	ND
40	ND	ND	MC:1,900 (TD 40 feet)[3]	---	TCE:18	ND			ND	ND
45	ND	ND		---	---	ND			MC:960 t-DCE:89	ND
50	ND	ND		BA:51*	TCE:13	ND			ND	ND
55	ND	ND		---	TCE:11	ND			ND	ND
60	ND	ND		---	TCE:15	ND			ND	ND
65	ND	ND		---	TCE:10	ND			ND	ND
70	ND	ND		---	---	ND			ND	MC:1,900
75	ND	ND		---	---	TCE:20			ND	ND
80	ND	ND		BP:130*	---	---			ND (TD 80 feet)	MC:800 (TD 80 feet)
85	ND (TD 85 feet)	ND (TD 85 feet)		(TD 85 feet)	--- (TD 94 feet)	--- (TD 95 feet)				

[1] Depth below existing grade.
[2] Locations shown on Figure 3.2. Boring SB6-4, shaded area, was completed during the current phase of work, all other borings were completed as part of previous investigations.
[3] TCE = Trichloroethene,
TCA = 1,1,1-trichloroethane,
t-DCE = Trans-1,2-dichloroethene,
CF = Chloroform,
PCE = Tetrachloroethene,
MC = Methylene Chloride,
BP = Bis (2-ethylhexyl) phthalate,
BC = Benzyl Chloride,
BA = Benzoic Acid, and
TD = Total Depth.
[4] No sample collected from this interval for laboratory analysis.
[5] Soil samples collected from boring SB6-4 analyzed by EPA Methods listed in Table 3.9 but only results for EPA Methods 8010, 8240 and 8270 are shown here. Soil samples from all other borings at this site analyzed by EPA Method 8010.
[6] Reported values from this boring may include estimated concentration values for compounds detected at concentrations below the quantitation limit but which did meet the identification criteria (*) or concentration values above the quantitation limit (**). If a duplicate sample was collected the highest value, duplicate or original, is listed here.

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micrograms per kilogram (ug/kg) in the boring for DH-3 to 5,550 ug/kg five feet below the middle of the dilution tank, from Boring SB6-3. TCE was not detected in soil below a depth of 15 feet below grade in Borings SB6-1, SB6-2, LF6-1 and LF6-2; it was not detected below a depth of 25 feet in SB6-3. However, TCE was detected at greater depths in DH-3 and DH-9.

MC was detected in samples collected from the near vicinity of the dilution tank, from Boring SB6-3, and in bulk samples BS-1, BS-2, and BS-3. MC was also detected at or below a depth of 45 feet in Borings LF6-1 and LF6-2, which were drilled in the leach field formerly connected to the dilution tank. The leach field consisted of three dry wells.

Four additional organic contaminants were detected in the area. CF was detected only at the bulk sample locations. PCE and t-DCE were detected in LF6-1. PCE was also detected in DH-3, together with 1,1,1-TCA.

A discussion of potential source areas and pathways to ground water is presented in Section 3.6.

3.2.2.3 Building 6 and Vicinity. One soil sample was collected from one boring completed as Well WJ-26 during one of the previous investigations. The ocations are listed in Table 3.1 and are shown on Figure 3.2. The locations are listed in Table 3.1 and are shown on Figure 3.2. The results are listed in the appendix. The results are not shown on the summary table for this area because no contaminants were detected above the limits of detection. Five borings were sampled in this area as part of the current investigation. The results are presented and discussed in the following section, RI/FS Soil Sampling Program.

3.2.2.4 Building 8 Leach Field and Vicinity. Soil samples were collected from four soil borings and five borings completed as wells during previous investigations. The locations are listed in Table 3.1 and are shown on Figure 3.2. The results of laboratory analyses for both the previous and current investigations are shown on Table 3.5. However, the results for WJ-24, WJ-27, DH-1 and DH-4 are not shown because no contaminants were detected above the limits of detection. The leach field consists of 23 dry wells; eleven of which received discharge from the Building 6 dilution tank.

Table 3.5

Laboratory Results of Soil Samples Collected from Borings Drilled near the Building 8 Leach Field and Vicinity (in micrograms per kilogram) Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[1] (Feet)	Boring Number [2]							
	LF8-1	LF8-2	LF8-3	LF8-4	SB8-1[4,7]	DH-2	DH-6	DH-8
5	ND[3]	MC[3]:2,900	MC:760 TCE[3]:53	MC:610	ND[3,5]	ND[3]	ND[3]	TCE:30
10	ND[3]	ND[3]	MC:6,200 CF[3]:100	MC:8,100 CF:230	---[6]	ND	ND	ND[3]
15	ND	MC:4,900	MC:950	MC:1,000	---	ND	ND	ND
20	ND	MC:1,800	MC:540 TCE:63	MC:570	CF:52**	---[6]	ND	ND
25	ND	ND	MC:740	ND[3]	---	ND	ND	ND
30	MC:1,200 (TD 30 feet)[3]	MC:2,500 CF:71 (TD 30 feet)	MC:3,900	ND (TD 30 feet)	DNBP:90[3]* TOL:0.6* BA:140* BP:950**	ND	ND	---[6]
35			ND (TD 35 feet)		---	ND	ND	---
45					BP:55*	ND	ND	--- (TD 50 Feet)
65					BP:60*	ND	ND	
70					(TD 70 feet)	ND	TCE:50 (TD 89 feet)	
75						TCE:10		
80						ND (TD 91 feet)		

[1] Depth below existing grade.

[2] Location shown on Figure 3.2. Boring SB8-1, shaded area, was completed during the current phase of work, all other borings were completed as part of previous investigations. Borings WJ-24, WJ-27, DH-1 and DH-4 not shown because no compounds were detected in the samples.

[3] ND = Not detected,
CF = Chloroform,
MC = Methylene Chloride,
TCE = Trichloroethene,
TD = Total Depth of boring,
DNBP = Di-n-butylphthalate,
TOL = Toluene,
BA = Benzoic Acid,
BP = Bis(2-ethylhexyl) phthalate.

[4] Soil samples from boring SB8-1 analyzed by EPA Methods listed in Table 3.9 but only results for EPA Methods 8010, 8240 and 8270 are shown here. Soil samples from all other borings at this site analyzed for EPA Method 8010 only.

[5] Sample collected from 1 foot depth.

[6] No sample collected for laboratory analysis.

[7] Reported values may include estimated concentration values for compounds which were detected at concentrations below the quantitation limit but which did meet the identification criteria (*) or concentration values above the quantitation limit (**). If a duplicate sample was collected the highest value, duplicate or original, is listed here.

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MC was the major contaminant detected in borings in the immediate vicinity of the leach field (LF8-1 through LF8-4). Where detected, the concentrations ranged from 540 ug/kg in LF8-3, to 8,100 ug/kg in LF8-4. In boring LF8-1 through LF8-4 TCE was only detected twice; at depths of 5 and 20 feet in Boring LF8-3.

No contaminants were detected in DH-1 and DH-4, which are northeast of the leach field. Soil samples from DH-2, DH-6, and DH-8, which are west of the leach field, only contained one contaminant, TCE. The TCE was detected near the surface in DH-8 which is to the southwest, and was detected at depth in the two locations to the northwest of the leach field.

3.2.2.5 Sky Park Airport. The Sky Park Airport is offsite. Soil samples were collected for laboratory analyses from eleven soil borings and one boring completed as a well (AP-3) during previous investigations. The locations are listed on Table 3.1 and are shown on Figure 3.2. The samples were analyzed for purgeable halocarbons (EPA Method 8010), purgeable aromatics (EPA Method 8020), acrolein and acrylonitrile (EPA Method 8030) and for total hydrocarbons (TH) as gasoline by EPA Methods 5020 and 8015. The results of the analyses are listed in Appendix C.

As shown in the Appendix and on Table 3.6, only TH was detected at the Sky Park Airport, in seven of the twelve borings. Concentrations above detection ranged from 1,300 ug/kg in SKB-10 to 28,000 ug/kg in SKB-1.

3.2.2.6 Background Boring. Soil samples from the boring completed as Well DH-7 (Figure 3.2) were analyzed for purgeable halocarbons (EPA Method 8010). The results are shown on Table 3.7, together with validated data from boring WJ-43, which was drilled during the current investigation. As shown, no VOCs were detected in boring DH-7.

3.3 RI/FS Soil Sampling Program

The source(s) of ground-water contamination at the Watkins-Johnson site was not confirmed during the previous field investigations. The RI/FS soil sampling program was initiated in an attempt to identify the source(s) and spatial extent of contamination at the site. Additional data were necessary to help identify actual or potential contaminant transport pathways through the environment.

Table 3.6

Laboratory Results[1] of Total Petroleum Hydrocarbons for Soil Samples Collected from Borings Drilled in the Sky Park Airport Area (in micrograms per kilogram) Watkins -Johnson Company Site, Scotts Valley, California

	Boring Number[3]											
Depth of Sample[2]	SKB-1	SKB-2	SKB-3	SKB-4	SKB-5	SKB-6	SKB-7	SKB-8	SKB-9	SKB-10	SKB-10A	AP-3
5	2100	ND	18,000	ND	ND	ND	ND	ND	ND	1300	—[6]	—
10	ND	ND	1600	ND	1700	ND	ND	ND	ND	(TD 7 feet)	1900	ND
15	ND	ND	ND	ND	1500	ND	ND	ND (TD 15 feet)	ND		ND (TD15 feet)	—
20	28,000	ND	ND	6000	1500	ND	ND		3000			ND
30	ND	ND	ND	ND	ND	ND	ND		ND			ND
40	ND	ND	ND	ND	ND	ND	ND		ND			ND
50	ND (TD[5] 50 feet)	ND (TD 50 feet)	ND (TD 50 feet)	ND (TD 50 feet)	ND (TD 50 feet)	ND (TD 50 feet)	ND (TD 50 feet)		(TD 40 feet)			ND (TD 50 feet)

[1] Samples analyzed for purgeable halocarbons using EPA Methods 8010, for acrolein and acrylonitrile (EPA Method 8030) and Total Petroleum Hydrocarbons using EPA Methods 5020 and 8015. All analyses were below the detection limit except for total petroleum hydrocarbons.
[2] Depth below existing grade.
[3] Boring locations shown on Figure 3.2.
[4] ND = Not detected.
[5] TD = Total depth of boring.
[6] --- Not analyzed.

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WJ007731

Table 3.7

Laboratory Results of Soil Samples Collected from Borings Used For Background Data (in micrograms per kilogram) Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[1] (feet)	Borehole Number[2]	
	WJ-43[6]	DH-7
1	---[4]	---[4]
5	1,1,1-TCA[3]: 1** Freon 11[3]: 1**	ND[3]
10	ND[3]	ND
25	ND	ND
30	---	ND
35	TOL[3]:0.6*	ND
60	ND	ND
65	---	ND
70	ND	ND
90	ND	(TD 99 feet)
100	TOL:1* (TD[5] 101 feet)	

[1]Depth below existing grade.
[2]Locations shown on Figure 3.2. Boring WJ-43, shaded area, was completed during the current phase of work, boring DH-7 was completed as part of a previous investigation. Reported values from these borings may include estimated concentration values of compounds detected at concentrations below the quantification limit but which did meet the identification criteria. WJ-43 samples analyzed by EPA Methods 8010 and 8240, samples from DH-7 were analyzed using EPA Method 8010.
[3]1,1,1-TCA = 1,1,1-trichloroethane,
ND = Not Detected,
TOL = Toluene,
TD = Total Depth.
[4]No sample collected for laboratory analysis.
[5]Total depth for hollow-stem auger drilling method.
[6]Reported values from this boring may include estimated concentration values for compounds detected at concentrations below the quantitation limit but which did meet the identification criteria (*) or concentration values above the quantitation limit (**).

3.3.1 Rationale for Soil Sampling Program

The purpose of the current RI/FS soil sampling program was to determine the degree and extent of contamination in the unsaturated zone in areas where contamination is suspected. This included resampling adjacent to previous boring sites for additional parameters specified by the EPA, and defining some chemical parameters which may affect contaminant movement from the source area, through the unsaturated zone, to the ground water. Previous studies by RLSA at the site have collected 310 soil samples from 37 borings and two bulk sample locations. This soils investigation involved collection of soil samples from 12 soil borings and 10 boreholes which were drilled for completion as monitoring wells.

3.3.1.1 Rationale for Soil Sampling Locations. The locations of the 12 soil borings and 2 of the 10 boreholes (Figure 3.2) for monitoring wells drilled for this phase of the RI/FS were based on the following rationale:

- To determine locations of possible sources of ground-water contamination. Boring locations were based on documented "hot spots" of ground-water contamination; sites of existing or previously existing structures known to have received or stored hazardous materials or hazardous waste, or reports of incidents or practices resulting in a release of hazardous materials into the soil (borings SB2-1 through SB2-5, SB6-5 and WJ-38).

- To verify results of previously sampled soil boring sites where hazardous materials storage or disposal is suspected and elevated concentrations of hazardous compounds were found during previous investigations (borings SB6-4, SB7-1 and SB8-1).

- To document that an area was not a source of ground-water contamination prior to construction of a building in that area (borings SB6-6, SB6-7 and SB6-8).

- To provide information on background levels of volatile organics (EPA Method 8240) and purgeable halocarbons (EPA Method 8010) in the soil in an area which is upgradient of site contamination and is not suspected of being a contaminant source location (WJ-43).

Five borings were drilled along the west and north sides of Building 2 to locate possible disposal sites (Figure 3.2). An unnamed party reported to the EPA that "toxic materials possibly including TCE, may have been repeatedly dumped at the corner of Building 2 along the west wall." Elevated levels of MC and CF were found in soil samples collected north of Building 2 in earlier investigations. Boring SB2-1 was drilled midway along the

north side of Building 2, boring SB2-2 was drilled off the northwest corner of Building 2 and borings SB2-3, SB2-4, and SB2-5 were drilled adjacent to the west side of the building, in a limited access area.

Boring SB6-5 was drilled near the Building 6 septic tank (Figure 3.2) which is suspected of leaking. The borehole for well WJ-38 was located in an area where an unnamed source reported that a spill had occurred in sandy, highly permeable soil (Figure 3.2).

Boring SB6-4 was drilled in close proximity to previously drilled soil borings SB6-1, SB6-2, SB6-3, and DH-3 (Figure 3.2). The borings were located in the vicinity of the Building 6 dilution tank which has since been removed. Elevated concentrations of TCE and MC had been found in samples from soil borings drilled during previous investigations of the dilution tank and in ground-water samples from a nearby well (DH-3). Boring SB6-4 was drilled through the pit backfill. Results from boring SB6-4 were used for verification of soil quality data obtained from SB6-3 and for providing additional chemical information on the interval from 40 feet to the water table.

Boring SB7-1 was drilled to verify sampling results of borings LF2-1 and DH-5 near the Building 2 dilution tank and associated leach field. Boring SB8-1 was drilled near the Building 8 infiltration wells to verify sampling results of Borings LF8-3 and LF8-4 (Figure 3.2).

Borings SB6-6, SB6-7 and SB6-8 were drilled adjacent to the western side of Building 6 (Figure 3.2). Watkins-Johnson plans to extend Building 6 about 10 feet into the adjacent parking lot so these borings aided in identifying any potential sources of contamination in the soil underlying the proposed building extension. These borings also provided background data for compounds analyzed by EPA Methods 8240 and 8270 for the plant area since no contaminant sources are known or suspected in this area.

Soil samples were also collected from the nine boreholes which were later completed as monitoring wells and one abandoned borehole (Table 3.8 and Figure 3.2). However, only the location of well WJ-38 was directly influenced by the rationale of the soil sampling program. Machine shop wastes were reportedly disposed of in a sand pit over which Building 6 was constructed. The location of well WJ-43, a replacement well for WJ-11,

Table 3.8

Soil Samples Collected for the RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Boring Number	Total Depth[1]	Drilling Method[2]	Laboratory Analysis[3]	Soil Sample Depths for Laboratory Analysis[1,3]
SB2-1	90	HSA	A	1, 30, 50[4], 80
SB2-2	96	HSA	A	1, 30, 65, 90
SB2-3	15	HA	A	3, 5, 10, 15
SB2-4	15	HA	A	2.5, 5, 10, 15
SB2-5	15	HA	A	1, 5, 10, 15
SB6-4	85	HSA	A	5, 25[4], 50, 80
SB6-5	81	HSA	A	10, 35, 55, 75
SB6-6	90	HSA	A	1, 30[4], 70, 85
SB6-7	90	HSA	A	1, 25, 70, 85
SB6-8	90	HSA	A	5, 30, 50, 85
SB7-1	85	HSA	A	1, 25, 50, 80
SB8-1	70	HSA	A	1, 30[4], 45, 65
WJ-38	90[6]	HSA	A	1, 30, 65, 90
	110[6]	MR	B	98
WJ-39	83	HSA	None[5]	
	55	MR	None	
WJ-40	205	MR	C	1, 80, 180, 195
		MR	D	1, 80, 180, 195
WJ-41	88	HSA	None	
	220	MR	C	1, 80, 140, 165
		MR	D	1, 80, 140, 165
WJ-42	195	MR	None	
WJ-43	101	HSA	B	85
		HSA	C	40, 80, 85
		HSA	E	5, 24[4], 60, 90
		HSA	F	10, 35[4], 70, 100
	180	MR	B	150
		MR	C	150[4]
		MR	D	40, 80, 85, 150
WJ-44		MR	C	44
	77	MR	D	44

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Table 3.8 (Continued)

Soil Samples Collected for the RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Boring Number	Total Depth[1]	Drilling Method[2]	Laboratory Analysis[3]	Soil Sample Depths for Laboratory Analysis[1,3]
WJ-45	60	MR	None	
WJ-46	40	MR MR	C D	20 20
WJ-47	90 155	HSA MR	None None	

[1] In feet below ground surface.
[2] HA = Hand auger; HSA = Hollow-stem auger; MR = Mud Rotary.
[3] Sample Analysis:
A - Samples analyzed by EPA Method listed in Table 3.9.
B - Effective porosity using Bromide Breakthrough Monitoring Method.
C - Total Organic Carbon.
D - Retardation Coefficient.
E - Purgeable Halocarbons (EPA Method 8010).
F - Volatile Organics (EPA Method 8240).
[4] Duplicate sample collected at this interval.
[5] Soil sampled for lithologic description only, sample intervals were every 5 feet for HSA, for MR every 10 feet to 100 feet then every 20 feet below 100 feet for interval not sampled with HSA rig.
[6] If a borehole was drilled by more than one method the total depth by each method is listed.

was also selected to provide background soil samples because it is upgradient of suspected sources of contamination, it is representative of the plant area lithology and previous analysis of soil samples collected from this area did not indicate any contamination. The locations of the other boreholes (WJ-39, WJ-40, WJ-41, WJ-42, WJ-44, WJ-46 and WJ-47) from which samples were collected, were located to gain hydrogeologic information as discussed in Section 4.2.

Five boreholes, WJ-40, WJ-41, WJ-43, WJ-44, and WJ-46, had soil samples collected for total organic carbon (TOC) analysis. The sites were selected in order to establish background data on the organic carbon content for each soil horizon and to characterize the site areally. Only uncontaminated areas were sampled because organic contaminants in the soil would interfere with the determination of the natural organic carbon content of the soil.

3.3.1.2 Rationale for Soil Sample Analysis. During the RI/FS field program soil samples were collected for lithologic description, headspace analyses, and laboratory analysis for the compounds specified by the EPA, TOC, effective porosity, and the retardation coefficient (RC). Information about the soil samples collected during the RI/FS program are shown on Table 3.8. Samples collected for lithologic descriptions were used to characterize the study area geologic setting, including the areal and vertical extent of geologic units and correlation of those units between sampling locations. Understanding the geologic setting aids hydrogeologic interpretation of the ground-water flow system in the site vicinity. Lithology samples were collected at regular intervals from the 12 soil borings and 10 monitoring well boreholes drilled for this field program.

Soil samples were collected for headspace analysis to allow identification in the field of soil zones which may be contaminated by VOCs. If headspace analysis of samples from a particular zone indicated possible contamination, samples from that zone were selected for laboratory analysis.

Prior investigations of soil quality tested for the presence of VOCs. Because other hazardous compounds have been used at the facility, soil samples collected during this investigation were analyzed for purgeable halocarbons, volatile organics, semivolatile organics, metals, and total cyanides. The method for analysis is shown on Table 3.9. Chemical analysis of soil samples were used to identify areas where soil contamination has

Table 3.9

Analytical Methods Used for Chemical Analysis of Soil Samples for the RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

EPA Method Number	Compound Class or Analyte
8010	Halogenated Volatile Organics
8240	Volatile Organics
8270	Semivolatile Organics
6010[1]	Aluminum, Antimony, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Silver, Sodium, Vanadium and Zinc
7060[2]	Arsenic
7421[2]	Lead
7610[2]	Potassium
7740[2]	Selenium
7841[2]	Thallium
7470[3]	Mercury
9010[4]	Cyanide
---	Total Organic Carbon
---	Retardation Coefficient

[1] Induced Coupled Plasma Metals.
[2] Atomic Absorption, Furnace Method.
[3] Atomic Absorption, Cold Vapor.
[4] Total and Amenable Cyanide.

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occurred. These areas could be a source of ground-water contamination. Samples of the drilling mud from each borehole were also collected and analyzed for the same analytes to determine if the mud had become contaminated due to interaction with the soil or ground water. Results of the analyses determined how to properly dispose of the drilling mud.

The TOC content and RC analysis of selected soil samples will be used to support the contaminant transport modeling effort by providing information on conditions which may influence how contaminants move through the subsurface, including both the unsaturated and aquifer zones. The results of the analysis for effective porosity will also be used to support the modeling effort. The EPA requested analysis for TOC. The results are given and discussed in Subsection 3.3.3.3.2 of the perched zone ground-water investigation.

3.3.1.3 Rationale for Soil Sampling Intervals. The rationale for determining sampling intervals for lithologic and headspace analyses was based on the need to accumulate sufficient data for detailed geologic interpretation and to identify any soil zones which were grossly contaminated. Lithologic and headspace samples were collected from the same intervals and in the same manner during the RI/FS soil sampling field program. As the boreholes were drilled with hand or hollow-stem auger rigs, samples were collected every five feet. For those boreholes drilled with the mud-rotary rig, the sampling interval was increased to every ten feet down to a depth of 100 feet below land surface and then every twenty feet to the total depth of the borehole.

Sampling intervals for chemical analysis from borings drilled using the hollow-stem auger rig included one near surface sample, collected from a depth of five feet or less, two samples from zones with the highest anticipated or apparent contamination, and one sample from just above the water table. The two middle sample intervals were selected based on historical information regarding contamination detected during previous sampling programs in the area, if available, on results of headspace analyses, and on visual inspection of samples for obvious signs of contamination. Sample intervals for borings drilled with the hand auger included one near surface sample, and samples collected from depths of 5, 10, and 15 feet.

The rationale for TOC and RC samples was to provide representative information on the soil column. Samples were collected from the near surface and deep unsaturated zone,

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perched zone, aquiclude and regional zone where possible, or just in the regional zone in areas where the water table was very shallow.

3.3.2 Methodology of the RI/FS Soil Sampling Program

The SAP (RLSA, March 1988) documents the procedures and protocols to be used during the RI/FS field program. A brief discussion of these procedures is given here. Deviations from the SAP have been noted.

3.3.2.1 Drilling and Soil Sampling Methods. Soil borings and boreholes to be completed as monitoring wells were drilled utilizing four methods; portable hammer-driven sampler, hand auger, hollow-stem (power) auger and mud rotary. The method used was dependent on site access, borehole depth, and whether the borehole was to be completed as a well or grouted up after collection of the soil samples.

3.3.2.1.1 Portable Hammer-Driven Sampler and Hand Auger Drilling and Soil Sampling. The SAP proposed using portable (mechanized) drilling equipment at SB2-3, SB2-4 and SB2-5; sites where access was too limited to use a truck mounted drill rig. Instead a portable hammer-driven sampler was at first used for collecting samples. However, this method was unable to penetrate more than four feet of soil at the boring SB2-3, SB2-4 and SB2-5 locations. A hand auger was then utilized by RLSA staff with success to a depth of 15 feet. The hand auger consisted of a 3-inch inner diameter (ID) sampling tube, 12 inches in length with cutting teeth at one end. The hand auger was advanced manually by turning it and applying downward pressure. After boring approximately one foot, the hand auger was pulled from the borehole and the cuttings were removed from the sampler. At intervals where a sample for lithologic, headspace and/or laboratory analysis was required, the sample tube apparatus was decontaminated by procedures outlined in Section 3.3.2.4. After decontamination, the hand auger was rotated down until the sample tube was full, it was then removed from the borehole and the cuttings were extruded directly into a clean 6-inch long by 2-inch diameter brass sleeve and tightly compacted. When the brass sleeve was full, the ends were covered with Teflon film, capped and taped. A label (Section 3.3.2.7) was affixed to the sample prior to storage in a cooler with ice. Chain-of-Custody procedures (Section 3.3.2.7) were followed for all laboratory samples.

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After the laboratory sample requirements had been fulfilled, the remaining soil was used for lithologic description and headspace analysis (Section 3.3.2.2). Boreholes were backfilled to grade with a cement grout containing 5 percent bentonite and marked for surveying with orange spray paint.

3.3.2.1.2 Hollow-stem Auger Drilling and Soil Sampling. Soil borings SB2-1, SB2-2, SB6-4 through SB6-8, SB7-1 and SB8-1 and pilot boreholes for WJ-38, WJ-39, WJ-41, WJ-43 and WJ-47 were drilled and sampled using a Mobile B-61 hollow-stem auger (HSA) rig operated by Beylik Drilling Company. Procedures outlined in the SAP were followed except for geophysical logging and drilling the pilot boreholes. Natural gamma ray logs were proposed to be run in the HSA borings to verify lithologic logs. Due to the homogenous lithology and a good sample return rate using this drilling method, only borings SB6-7 and SB6-8 had geophysical logs run. The boreholes for WJ-39, WJ-41, and WJ-47 were originally proposed to be drilled entirely using the mud rotary (MR) rig. However, the HSA rig was used to collect samples because sample acquisition was much faster with the HSA rig compared to the MR rig and the sample would not be contaminated with drilling fluid. The HSA rig was used until auger refusal occurred (WJ-38, WJ-41, WJ-43 and WJ-47) or the total borehole depth was reached (WJ-39).

Soil samples were collected at specific intervals (Table 3.8) for lithologic description, headspace analyses and/or laboratory analyses. Sample collection was done with a split-spoon sampler and samples were handled, labeled and transported as described in the SAP. Chain-of-Custody procedures (Section 3.3.2.7) were followed for all samples which were submitted to a laboratory.

Cuttings from drilling operations were disposed of in accordance to Waste Handling Procedures (Section 3.3.2.5). Borings and pilot boreholes were backfilled with a slurry of cement with five percent bentonite except WJ-38 and WJ-43 which were reamed with the mud rotary rig and used for construction of monitoring wells. The grout column was finished to grade with a one foot plug of cement and marked with orange spray paint prior to surveying.

3.3.2.1.3 Mud Rotary Drilling and Soil Sampling. Boreholes for monitoring wells WJ-38 through WJ-47 were drilled using mud rotary rigs operated by Beylik Drilling Company.

Mud rotary drilling methods detailed in the SAP were followed throughout the program with the following exceptions.

In order to complete the boreholes drilled by mud rotary in a timely manner a second mud rotary rig was utilized to complete the shallower wells. The Gus Pesh Brat MR2 rig completed boreholes WJ-39 through WJ-43, WJ-46, and WJ-47, while WJ-38, WJ-44 and WJ-45 were completed with an Ingersol-Rand TH-10 rig. Due to the large amount of unconsolidated fine to medium sand in the Santa Margarita Formation, desanders were used to aid separation of cuttings from the drilling mud. The cuttings were placed in drums directly from the desander screens through which drilling mud was recirculated.

The Gus Pesh Brat MR2 rig used a Pitcher tube apparatus to collect soil samples. The drill stem was tripped out of the borehole upon reaching the interval to be sampled and the Pitcher tube was tripped in to the required depth. A sample was collected by rotating the Pitcher tube into undisturbed sediment. The sample was retained in a 3-foot long 3-inch diameter stainless steel tube from which a six-inch section was cut for shipment to the laboratory in accordance to procedures given in the SAP.

Samples were collected using a standard split-spoon sampler driven ahead of the drill bit with the Ingersol-Rand TH-10 rig. Samples were retained in 6-inch by 2-inch brass sleeves for shipment to the laboratory in accordance to procedures given in the SAP.

Upon completion of drilling a suite of geophysical logs was run to verify the lithology and to aid in well design. The geophysical logs included long-normal and short-normal resistivity, spontaneous potential and natural gamma ray. Point-resistivity, as proposed in the SAP, was not run due to large borehole diameter which precluded good wall contact.

The boring locations and elevations were surveyed at the completion of the ground-water investigation (Section 4.2).

3.3.2.2 Lithologic Descriptions and Headspace Analysis. Soil samples were collected at prescribed intervals for lithologic description and headspace analysis. The lithologic samples were described and logged by the on-site hydrogeologist onto a "Field Log of Boring" form. The description included the soil classification according to the Unified Soil Classification System, depth interval, relative percent gravel, sand and fine material,

moisture content and density. A portion of the soil used for lithologic description was kept in brass tubes, sealed and labeled for archiving.

After processing any sample required for laboratory analyses, a portion of the remaining soil recovered from the brass sleeves was placed in a clean wide-mouth glass jar for headspace analysis. The jar was sealed with Teflon film, capped and labeled. The samples were then set aside at least 15 minutes to allow equilibration of the soil gas with the air in the headspace of the jar. The headspace air was then tested for volatile organic vapors using a HNu model PI-101 photo ionization detector (PID). Headspace and background readings were recorded in ppm in the field logbook. The PID lamp was replaced and recalibrated part way through the soil sampling program due to problems with calibration and anomalous readings. The manufacturer's instructions were followed for calibration with a standard of 56 ppm isobutylene at a span of 9.8.

3.3.2.3 Quality Control Samples. Field duplicates, which reflect the precision of sampling techniques, were collected from zones that were suspected to be contaminated at a frequency of ten percent. The duplicates were collected, numbered, sealed, handled and transported in the same manner as other samples. The laboratory was not informed of which samples were field duplicates.

3.3.2.4 Field Equipment Decontamination. All drilling equipment, including the drill rig and related tools, was decontaminated prior to first use on the project and between each drilling site. Soil sampling equipment was cleaned prior to each use. Decontamination procedures were followed as outlined in the SAP. Discharge water from the ground-water treatment system was used to supply the steam cleaner. A sample of this water was retained for laboratory analysis as part of the ground-water sampling program. The field hydrogeologist inspected all equipment prior to use to verify that the equipment was clean.

3.3.2.5 Waste Handling. Wastes produced during the soil sampling program included soil cuttings, drilling mud, water from the decontamination process and uncontaminated trash. Soil cuttings resulting from hand auger, HSA or MR drilling were kept in Department of Transportation (DOT) approved 17H 55-gallon drums in a fenced and locked area. The drums had a heavy-duty lid which was secured with a ring and bolt. Each drum was labeled with the information listed in the SAP.

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After completion of each borehole drilled using the mud rotary rigs, the drilling mud was put into DOT 17H drums for storage until the mud could be pumped into a 13,000 gallon tank for settling. After the solids had settled out the clear water was run through the water treatment system. The solids from WJ-38 through WJ-47 were disposed of onsite after laboratory results indicated that the drilling mud was not contaminated. Water resulting from the decontamination process was contained and run through the water treatment system. Approval for waste disposal was obtained from the EPA prior to disposal.

3.3.2.6 Sample Preparation for Analysis. Soil samples for headspace analysis were collected in clean, wide-mouth sample jars with tight fitting lids. Soil samples for laboratory analysis were collected in 6-inch long by 2-inch diameter brass sleeves if acquired using the hand auger or HSA rig, or 6-inch long by 3-inch diameter stainless steel tubes for MR drilled boreholes. All brass sleeves and stainless steel tubes were steam cleaned prior to use.

After collection, taping and labeling, most samples were stored in ice-filled coolers and chilled to 4°C prior to daily shipment by courier to the laboratory. Exceptions to this procedure include samples for TOC and RC which were kept chilled until they were shipped at the end of the field program to the laboratories. All samples which were stored overnight at the site were kept in coolers within a locked enclosure with custody seals attached to prevent tampering. Two custody seals were placed on each cooler, one on the opposite side near the front and one on the opposite side near the back. Clear tape was placed over the seals to insure that they would not be accidentally broken during shipment and handling.

Samples were shipped in the same cooler in which they were stored. Ice was added on an as-needed basis. The coolers were securely taped shut. The original Chain-of-Custody Record was placed in a plastic pouch and affixed to the lid of the cooler, duplicate Chain-of-Custody Records were kept onsite in case the original was lost or the laboratory Sample Control Custodian had questions concerning the shipment.

During sample transfer from one party to another, the individual relinquishing and accepting custody wrote their signatures, organization and date and time of transfer on

the Chain-of-Custody Record. Any irregularities related to conditions of the samples upon receipt, such as a broken custody seal or inadequately chilled samples, were noted by the laboratory in the Remarks Section of the Chain-of-Custody Record.

3.3.2.7 Sample Documentation. Sample documentation includes sample labels, Chain-of-Custody forms and the field logbook. Sample labels contained the following information:

- Project number;
- Date and time of sampling;
- Sample identification number;
- Preservatives used, if any;
- Type of analyses to be performed; and
- Name of sample collector.

The preprinted, self adhesive labels were affixed to the samples in the field as soon as possible after collection to minimize the chance of mislabeling samples. The sample identification number was unique to each sample and allowed tracking and retrieval of pertinent information regarding the sample. The sample identification numbers consisted of two parts, the date and a unique number. The date portion consisted of six digits representing the month, day and year when collected. A hyphen separated the date portion from the unique number which was two-digits, and was numbered sequentially for a given day.

The field logbook documented day to day activities and contained headspace analyses results. The logbook contained information which includes the following:

- Date and time of entries;
- Personnel present during field operations;
- Health and safety information;
- Waste disposal procedures and amount generated at each site;

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- Field measurements such as borehole and breathing zone PID readings for volatile compounds, instruments used and calibration results; and
- Any unusual circumstances or conditions which came up during field operations.

3.3.3 Results of Soil Sampling Program

This section presents data obtained from lithologic interpretation, headspace analyses and laboratory chemical and physical parameter analyses. Interpretation of these results is presented in Section 3.4.

3.3.3.1 Geology and Geophysical Results. Lithologic descriptions were used to construct geologic logs of each soil boring (Appendix C). Geologic logs of boreholes which were used for monitoring well construction and borehole WJ-47 are given in Appendix A. The logs for borings SB6-7 and SB6-8 also include the gamma ray geophysical logs (Appendix C). All the borings were drilled until first water was encountered except borings SB2-3, SB2-4 and SB2-5, which were each completed at a depth of fifteen feet.

The geologic logs from the borings were interpreted to represent the Santa Margarita Formation. The Santa Margarita Formation is composed of poorly sorted, unconsolidated sands with some discontinuous lenses of silty sand in the unsaturated zone. As shown on the figures, units of obviously low permeability such as clay are absent above the perched aquifer.

3.3.3.2 Headspace Analysis Results. Headspace analysis results are shown in Table 3.10 for samples collected from borings drilled with the HSA rig. Results from soil boring SB7-1 and boreholes WJ-39 and WJ-41 are suspect due to probable PID lamp malfunction. Readings were consistently in the 3 to 6 parts per million (ppm) range. A blank sample (distilled water) was run in between soil samples and it registered a similar reading. The PID lamp was replaced and the PID recalibrated. Later measurements were deemed reasonable.

Results of the headspace analysis were used to help determine which samples would be sent to the laboratory for analysis. As proposed in the SAP, four of the samples collected from each boring were retained for laboratory analysis. Of these, one was a

Table 3.10

Results of Headspace Analysis (in parts per million) for the RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[1] (feet)	Soil Boring or Borehole Number												
	SB2-1	SB2-2	SB6-4	SB6-5	SB6-7	SB6-8	SB7-1[2]	SB8-1	WJ-38	WJ-39[2]	WJ-41[2]	WJ-43	WJ-47
0	ND[4,6]	0.4[4]	---[5]	---[5]	5[4]	0.4	---[5]	0.1	ND[4]	4	---[5]	---[5]	---[5]
5	ND	17.5	14[4]	---	ND	ND[4]	2[4]	ND[4]	ND	---	---	---[4]	---
10	ND	0.2	8	1[4]	1.4	0.1	4	ND	ND	4	6	2.2[4]	ND
15	ND	0.1	21	0.4	ND	1.6	4.5	ND	ND	---	---	1.2	---
20	ND	ND[3]	200	ND	4	0.4	4.5	ND	ND	4.5	5	0.2	0.2
25	0.1	ND	210[4]	ND	6.8[4]	2.3	4.5[4]	ND	ND	---	---	---[4]	---
30	ND[4]	ND[4]	12	ND	<1	14[4]	5	---[4]	ND[4]	4	5	---	ND
35	5	ND	21	4[4]	3	4	4.5	---	ND	---	---	---[4]	---
40	2	ND	29	2.2	0.5	8.8	3	---	ND	4	5	---	ND
45	4	ND	9	1.2	0.8	6	3.5	ND[4]	ND	---	---	---	---
50	3[4]	ND	ND[4]	ND	1	21[4]	4[4]	ND	ND	5	5	ND	ND
55	---	ND	5	2[4]	2.8	11.4	4.5	ND	0.2	5	---	ND	---
60	---	ND	7	0.5	6	3.8	4	ND	ND	3	4.5	ND[4]	ND
65	2	0.2[4]	ND	1	7	4.8	5	ND[4]	0.5[4]	4	---	ND	---
70	1	ND	ND	---	14.8[4]	3.2	5	---	ND	4	4	ND[4]	0.1
75	0.8	ND	0.8	0.5[4]	9	ND	5		ND			---	
80	0.6[4]	ND[4]	0.5[4]	---	ND	ND	5[4]		0.5			---	
85	0.1	---	---		ND[4]	ND[4]			0.5			---	
90		ND	---						0.5[4]			---[4]	
95												---	
100												---	

[1]Depth below existing grade.
[2]HNu PID lamp malfunctioning therefore readings considered suspect.
[3]Bad seal on headspace sample jar.
[4]Laboratory sample collected from this interval for analyses by EPA methods listed in Table 3.9.
[5]No sample collected for headspace analysis.
[6]ND = Not detected.

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near surface sample and one was from just above the water table. The remaining two samples were from zones with the highest anticipated or apparent contamination. Headspace readings greater than 10 ppm only occurred at 12 intervals in 4 borings; SB2-2, SB6-4, SB6-7 and SB6-8. Of those intervals, five had samples retained for laboratory analysis. Analytical results are given in Section 3.3.3.3. The analytical results did not correlate well with the headspace readings. The concentrations of VOCs detected were low; the maximum concentration of TCE detected in the soil during the RI/FS investigation was 46 ug/kg in SB6-4. Direct comparison of headspace results with laboratory results is not possible due to differences in equipment sensitivity and output information. Results are given in ppm (on a volume basis) for the PID versus ug/kg for laboratory analysis. Additionally, the PID does not distinguish between different volatile compounds, therefore results are a cumulative amount for all volatiles, not the quantity of a specific compound as reported by the laboratory. However, the PID is used to scan the samples for the presence of high concentrations of VOCs. It provides a gross assessment of potential contamination.

3.3.3.3 Laboratory Analysis Results. During the RI/FS soil sampling program samples were analyzed by laboratories for chemical constituents as specified by the EPA, and TOC, effective porosity and RC (Table 3.8). Completed Chain-of-Custody forms are in RLSA project files. A summary of the data validation is given in Section 6.

3.3.3.3.1 Results of Analyses of Constituents Specified by EPA. A total of 59 samples from 14 sites were analyzed for purgeable halocarbons (EPA Method 8010), 61 samples were analyzed for volatile organics (EPA Method 8240), and 56 samples were analyzed for semivolatile organics (EPA Method 8270), metals, and total cyanides (EPA Method 9010). The results of the purgeable halocarbons (EPA Method 8010), volatile organics (EPA Method 8240) and semivolatile organics (EPA Method 8270) are summarized and presented by area of interest and by depth on Tables 3.3, 3.4, 3.5, 3.6, 3.7, 3.11, and 3.12. The results of the inorganic analyses are summarized on Table 3.13 for compounds of interest and in Appendix C. The results of the inorganics analyses indicate extremely low concentrations in the soil; well below regulatory criteria, where criteria are available. Therefore, the following discussion of the results of laboratory analyses will be with respect to the primary contaminants of interest, organic compounds.

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Table 3.11

Laboratory Results[1] of Soil Samples Collected from Borings Drilled near Building 2 (in micrograms per kilogram) RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[2] (feet)	Boring Number [3,6]				
	SB2-1	SB2-2	SB2-3	SB2-4	SB2-5
1	DEP[4]:19*	BA[4]:170* BP[4]:45*	---[5]	---[5]	DNBP[4]:680**
2.5	---[5]	---[5]	ND	---	---[5]
3.5	---	---	---	ND	---
5	---	---	ND	ND	ND
10	---	---	ND	ND	ND
15	---	---	ND (TD 15 feet)[4]	ND (TD 15 feet)	ND (TD 15 feet)
30	TCE[4]:33**	BA:96*			
50	ND	---			
65	---	BA:73*			
85	DEP:38* DNBP:72* BP:240*	---			
90	--- (TD 90 feet)	BP:51* (TD 96 feet)			

[1] Samples analyzed by EPA Methods 8010, 8240 and 8270.
[2] Depth below existing grade.
[3] Location shown on Figure 3.2.
[4] DEP = Diethylphthalate,
BA = Benzoic Acid,
BP = Bis (2-ethylhexyl) phthalate,
DNBP = Di-n-butylphthalate,
TCE = Trichloroethene,
ND = Not Detected,
TD = Total Depth.
[5] No sample collected for laboratory analysis.
[6] Reported values from borings may include estimated concentration values of compounds detected at concentrations below the quantitation limit but which did meet the identification criteria (*) or concentration values above the quantitation limit (**).

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Table 3.12

Laboratory Results[1] of Soil Samples Collected from Borings Drilled near Building 6 (in micrograms per kilogram) RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Depth of Sample[2] (feet)	Boring Number[3,6]				
	SB6-5[7]	SB6-6	SB6-7	SB6-8	WJ-38
1	---[4]	DEP[5]:15	BA[5]:180 BP[5]:96	---[4]	---[4]
5	---	---[4]	---[4]	ND[5]	---
10	---	---	---	---	---
25	---	---	BA:130 BP:76	---	---
30	---	DEP:20	---	BP:150	DNBP:67 BP:300
35	BP:70	---	---	---	---
50	---	---	---	DNBP:22 BP:62	---
55	---	---	---	---	---
65	---	---	---	---	---
70	---	ND[5]	ND	---	---
75	DNBP[5]:31 BP:64 (TD[5] 81FT)	---	---	---	---
85		ND	BP:48	BP:44	---
90		(TD 90 Feet)	(TD 90 Feet)	(TD 90 Feet)	BP:36 (TD 90 Feet)

[1]Samples analyzed by EPA Methods 8010, 8240, and 8270.
[2]Depth below existing grade.
[3]Locations shown on Figure 3.2.
[4]No sample collected for laboratory analysis.
[5]DEP = Diethylphthalate,
BA = Benzoic Acid,
BP = Bis (2-ethylhexyl) phthalate,
DNBP = Di-n-butylphthalate,
ND = Not Detected,
TD = Total Depth.
[6]Reported values from borings are estimated concentration values of compounds detected at concentrations below the quantitation limit but which did meet the identification criteria.
[7]Boring SB6-5 drilled near the Building 6 septic tank.

Table 3.13

Summary of Metal Analyses, in mg/kg, RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Boring Number	Sample Depth[1]	Arsenic	Barium	Beryllium	Cadmium	Chromium[4]	Cobalt	Copper	Lead	Nickel	Silver	Vanadium	Zinc
BS2-1	10	ND[3]	14	0.17	ND	4.5	ND	10	ND	5.3	ND	3.9	24
	15	ND	11	0.14	ND	4.9	ND	17	ND	7.5	ND	3.9	34
BS2-2	10	ND	14	0.14	ND	4.1	ND	7.4	ND	4.9	ND	3.8	17
	15	ND	11	0.17	ND	4.8	ND	6.7	ND	4.2	ND	4.3	16
SB2-1	1	ND	ND	ND	ND	5.15	ND	3.76	0.71	ND	ND	ND	7.89
	30	ND	ND	ND	0.78	5.08	ND	2.56	1.0	4.56	ND	ND	8.70
	50	ND	ND	ND	ND	5.04	ND	7.62	0.87	ND	ND	ND	10.9
	50D[2]	ND	ND	ND	ND	6.40	ND	7.26	0.71	ND	ND	4.96	11.7
	85	ND	ND	ND	ND	4.70	ND	13.4	1.5	ND	ND	ND	19.0
SB2-2	1	ND	ND	ND	ND	1.84	ND	6.35	ND	ND	ND	ND	3.3
	30	ND	ND	ND	ND	3.0	0.63	8.58	ND	ND	ND	ND	6.83
	65	ND	ND	ND	ND	ND	ND	5.67	ND	ND	2.32	ND	9.59
	90	ND	ND	ND	ND	1.72	ND	4.99	ND	ND	ND	ND	5.90
SB2-3	3	ND	19	ND	ND	9.48	ND	56.1	0.9	3.82	ND	5.39	66.2
	5	ND	ND	ND	ND	5.3	ND	3.5	2.0	ND	ND	ND	4.2
	10	ND	ND	ND	ND	5.5	ND	ND	ND	ND	ND	3.3	4.8
	15	ND	ND	ND	1.0	6.3	ND	ND	0.62	ND	ND	ND	10.6

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Table 3.13 (Continued)

Summary of Metal Analyses, in mg/kg, RI/FS Soil Sampling Program,
Watkins-Johnson Company Site, Scotts Valley, California

Boring Number	Sample Depth	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Silver	Vanadium	Zinc
SB2-4	2.5	1.4	16.5	ND	ND	11.3	8.78	47.4	2.3	66.9	ND	6.56	94.0
	5	ND	ND	ND	ND	6.4	ND	ND	0.69	ND	2.1	ND	9.7
	10	ND	ND	ND	ND	6.1	ND	ND	ND	ND	ND	ND	6.5
	15	ND	ND	ND	ND	4.9	ND	ND	ND	ND	ND	ND	5.1
SB2-5	1	ND	9.12	ND	ND	9.18	0.43	25.8	0.87	2.83	ND	4.65	17.2
	5	ND	ND	ND	ND	6.8	ND	11.0	0.58	ND	ND	ND	6.1
	10	ND	ND	ND	ND	4.3	ND	ND	0.61	ND	ND	ND	4.8
	15	ND	ND	ND	ND	5.2	ND	ND	0.82	ND	ND	ND	5.5
SB6-1	15	ND	ND	ND	ND	3.6	ND	ND	ND	ND	ND	ND	11
SB6-2	15	ND	ND	ND	ND	5.8	ND	ND	ND	ND	ND	ND	7.8
SB6-4	5	ND	36.8	ND	ND	3.88	ND	12.6	ND	4.46	ND	5.31	30.4
	25	ND	ND	ND	ND	2.62	ND	3.98	ND	ND	ND	ND	14.36
	25D	ND	ND	ND	0.62	4.67	0.62	4.77	ND	ND	ND	ND	13.09
	50	ND	ND	ND	ND	4.77	ND	ND	ND	ND	ND	6.01	13.43
	80	ND	8.39	ND	ND	1.75	ND	14.77	ND	ND	ND	ND	15.44

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WJ007752

Table 3.13 (Continued)

Summary of Metal Analyses, in mg/kg, RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Boring Number	Sample Depth	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Silver	Vanadium	Zinc
SB6-5	10	1.4	ND	ND	ND	5.29	0.45	5.88	1.2	ND	ND	ND	11.06
	35	ND	ND	ND	ND	6.5	0.45	ND	1.4	ND	ND	ND	8.40
	55	ND	ND	ND	ND	7.01	ND	ND	1.0	ND	ND	ND	5.78
	75	ND	ND	ND	ND	5.64	ND	4.56	1.1	ND	ND	ND	6.72
SB6-6	1	ND	8.46	3.15	ND	5.78	ND	ND	1.1	3.36	ND	3.65	8.40
	30	ND	9.96	ND	ND	6.45	ND	9.90	0.94	2.48	ND	3.52	11.7
	30D	ND	12.9	ND	ND	7.71	ND	3.21	1.4	3.50	ND	4.63	9.30
	70	ND	6.82	ND	ND	8.20	ND	11.8	0.8	2.45	ND	5.05	11.1
	85	ND	4.42	ND	ND	5.69	ND	9.52	0.6	ND	ND	2.67	8.85
SB6-7	1	2.9	83.4	ND	ND	6.21	ND	106.0	1.3	2.93	ND	36.5	22.2
	25	1.6	12.8	ND	ND	7.25	ND	12.3	1.1	5.16	ND	4.33	35.4
	70	ND	7.08	ND	ND	7.04	5.09	3.88	0.74	2.01	ND	5.25	15.4
	85	ND	5.57	ND	ND	7.04	ND	4.42	0.64	1.37	ND	3.71	12.5
SB6-8	5	ND	10.4	ND	0.2	7.28	ND	6.16	0.65	3.50	ND	4.69	10.8
	30	ND	7.50	ND	ND	9.01	ND	ND	0.85	2.97	ND	5.7	7.97
	50	ND	5.09	ND	ND	8.37	ND	2.88	0.73	3.00	ND	5.14	8.96
	85	ND	7.07	ND	ND	7.39	ND	33.1	0.62	ND	ND	3.53	5.23

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Table 3.13 (Continued)

Summary of Metal Analyses, in mg/kg, RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Boring Number	Sample Depth	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Silver	Vanadium	Zinc
SB7-1	1	15.0	45.3	ND	ND	5.95	ND	10.43	1.3	ND	ND	11.0	37.3
	26	ND	ND	ND	ND	4.17	ND	ND	0.62	5.76	ND	2.17	9.91
	50	ND	8.38	ND	ND	5.56	1.1	22.5	0.65	ND	ND	3.64	16.3
	80	ND	4.75	ND	ND	7.30	ND	6.80	ND	ND	ND	3.65	14.6
SB8-1	1	ND	ND	ND	ND	4.67	ND	13.46	0.96	2.57	ND	3.00	17.6
	30	ND	ND	ND	ND	7.10	ND	11.2	2.0	4.22	ND	3.76	20.7
	30D	ND	ND	ND	ND	5.92	ND	3.09	0.88	ND	ND	5.16	15.7
	45	ND	ND	ND	ND	4.85	ND	4.15	0.96	ND	ND	ND	9.4
	65	ND	ND	ND	ND	6.89	ND	7.83	0.87	ND	ND	4.05	ND
WJ-38	1	ND	ND	ND	ND	7.03	ND	5.81	0.88	ND	ND	ND	13.07
	30	ND	6.55	ND	ND	5.94	ND	5.59	1.3	1.59	ND	2.54	11.42
	65	ND	ND	ND	ND	9.15	ND	12.99	ND	1.70	ND	5.89	11.84
	90	ND	ND	ND	ND	8.31	ND	24.6	0.94	ND	ND	ND	125.1

[1] Depth in feet below ground surface.
[2] D = Duplicate sample.
[3] ND = Not Detected.
[4] Total Chromium.

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There were 13 volatile and semivolatile organic compounds found at concentrations which met the identification criteria (Table 3.14). Of these 13 compounds only 7 were detected at concentrations above the sample quantitation limit (SQL). TCE was detected at three locations at concentrations above the SQL. Bis(2-ethylhexyl)phthalate (BP) was the most frequently detected compound while seven compounds were detected at only one site each (benzyl chloride (BC), 1,3-dichlorobenzene (1,3-DCB), pyrene, benzo(g,h,i) perylene, 1,1,1-TCA, CF, and trichlorofluoromethane (Freon 11)).

Samples from borings drilled near Building 2 (SB2-1 through SB2-5) contained five organic compounds at concentrations above the detection limit (Table 3.11). Of these analytes, di-n-butylphthalate (DNBP) and TCE were detected above the SQL. DNBP was found at its highest concentration (680 ug/kg) of the field program in the surface sample of boring SB2-5. TCE was detected at 30 feet in boring SB2-1 at a concentration of 33 ug/kg.

Samples from boring SB7-1, near the Building 2 dilution tank, contained four organic compounds at concentrations above the detection limit (Table 3.3). The compound 1,3-DCB at this site during previous investigation was found in three of four samples. TCE was the only compound detected in the soil samples from both a boring from a previous investigation and boring SB7-1. MC had been found in samples from three of four borings sampled as part of prior studies but was not detected in samples from boring SB7-1.

Four organic compounds were detected in samples from boring SB6-4, drilled near the Building 6 dilution tank (Table 3.4). TCE was detected in boring SB6-4 and in samples from all four of the borings drilled at the site as part of previous investigations. Concentrations of TCE were lowest in boring SB6-4, however.

Samples from borings drilled near Building 6 for this program contained concentrations of four organic compounds above their detection limits (Table 3.12). BP was detected in a total of ten samples from four of the borings.

Three organic compounds were detected in samples from borehole WJ-38 (Table 3.12).

Samples from boring SB8-1, drilled near the Building 8 Leach Field, contained detectable concentrations of five organic compounds (Table 3.5). MC, which was found in four

Table 3.14

Results of Laboratory Analysis of Soil Samples that Exceeded the Limits of Detection[1]
RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Compound	SB2-1	SB2-2	SB2-3	SB2-4	SB2-5	SB6-4	SB6-5	SB6-6	SB6-7	SB6-8	SB7-1	SB8-1	WJ-38	WJ-43
BENZOIC ACID	---[2]	O	---	---	---	O	---	---	O	---	---	O	---	NA[4]
BENZYL CHLORIDE	---	---	---	---	---	X	---	---	---	---	---	---	---	NA
BIS (2-ETHYLHEXYL) PHTHALATE	O[3]	O	---	---	---	X	O	---	O	O	---	X	O	NA
1,3-DICHLOROBENZENE	---	---	---	---	---	---	---	---	---	---	O	---	---	NA
DIETHYLPHTHALATE	O	---	---	---	---	---	---	O	---	---	O	---	---	NA
DI-N-BUTYLPHTHALATE	O	---	---	---	X	---	O	---	---	O	---	O	O	NA
CHLOROFORM	---	---	---	---	---	---	---	---	---	---	---	X	---	NA
PYRENE	---	---	---	---	---	---	---	---	---	---	O	---	---	NA
BENZO (g. h, i) PERYLENE	---	---	---	---	---	---	---	---	---	---	O	---	---	NA
TOLUENE	---	---	---	---	---	---	---	---	---	---	---	O	---	O
1,1,1-TRICHLOROETHANE	---	---	---	---	---	---	---	---	---	---	---	---	---	X
TRICHLOROETHENE	X	---	---	---	---	X	---	---	---	---	X	---	---	---
FREON 11	---	---	---	---	---	---	---	---	---	---	---	---	---	X

1 Samples analyzed using EPA Methods 8010, 8240, and 8270.
2 --- Not Detected.
3 X Compound detected at concentrations above quantitation limit.
O Compound detected at concentrations below the quantitation limit but which did meet the identification criteria.
4 NA = Not Analyzed.

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borings sampled during previous investigations, was not detected in samples from boring SB8-1.

Samples from borehole WJ-43 provide background information for the project for purgeable halocarbons and volatile organics. Three organic compounds were detected in the samples (Table 3.7). All three were at trace concentrations (less than 3 times the detection limit).

Results of drilling mud analyses are located in the Appendix H. A total of 8 organic compounds and 19 inorganic analytes were found in concentrations above their respective detection limits. However, the results indicated that the mud was not contaminated. These results were used to determine disposal procedures for the waste solids. Upon approval by the EPA, the solids from the drilling mud were disposed of onsite.

Results of field duplicate sample analyses are located in Appendix C. Of the results from EPA Methods 8010, 8240 and 8270 analyses only one EPA Method 8240 results, the sample from boring SB6-4 at 25 feet, contained concentrations of an analyte (TCE) above the SQL for both the original and duplicate samples (both were 3 ug/kg).

3.3.3.3.2 Results of Total Organic Carbon, Effective Porosity, and Retardation Coefficient Analyses. The TOC and RC analysis will be used to support the contaminant transport modeling effort. Both analyses provide information on conditions which may influence how contaminants move through the subsurface, including both the unsaturated and aquifer zones. A brief summary of the result of the TOC analysis follows. Results of the RC analysis will be discussed in the report on the modeling task. The results of the analysis for effective porosity will also be used to support the modeling effort. The results of the analysis are discussed in Section 4.4 of the perched zone ground-water investigation.

Studies have generally shown that the organic carbon content of soils controls the sorption of nonpolar organic solutes (including TCE), provided the organic carbon content is greater than approximately 0.1 percent (Mackay, et al., 1986). Results of the 15 samples from 5 locations which were retained for TOC analyses are shown in Table 3.15. Results are recorded as percent organic carbon by weight of the soil sample. Values range from less than 0.05 percent TOC to greater than 1 percent for surface samples (WJ-40 = 1.1 percent and WJ-41 = 3.8 percent). A field duplicate result from 150 feet in

Table 3.15

Laboratory Results for Total Organic Carbon Soil Analyses[1], RI/FS Soil Sampling Program, Watkins-Johnson Company Site, Scotts Valley, California

Borehole Number[2]	Depth of Sample (feet)[3]	TOC (percent weight)
WJ-40	1	1.1
	80	0.06
	180	<0.05[4]
	195	0.09
WJ-41	1	3.8
	80	0.30
	140	<0.05[4]
	165	0.14
WJ-43	40	0.22
	80	0.15
	85	0.41
	150	0.31
	150 (DUP)[5]	0.36
WJ-44	44	1.0
WJ-46	20	0.66

[1] Mebius method of analysis by Data Chem, Salt Lake City, Utah.
[2] Location shown on Figure 3.2.
[3] Depth below existing grade.
[4] Detection limit is 0.05 percent TOC for this method.
[5] DUP = Duplicate sample collected from this interval.

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borehole WJ-43 was close to the original sample value. Most samples (73 percent) collected during this study contained greater than 0.1 percent TOC.

3.4 Discussion of Laboratory Analyses

3.4.1 Purgeable Halocarbons

As shown on Table 3.16, of the 39 analytes included in the laboratory analyses for purgeable halocarbons (EPA Method 8010), 12 were found in concentrations at or above the SQL. Purgeable halocarbons were detected at 26 of the 53 locations where soil was sampled.

The 12 analytes detected in soil samples can be divided into three groups: 1) compounds that were used onsite; 2) compounds that are degradation products of compounds that were known to be used onsite; and 3) compounds where a source has not been identified. The first group is based on the general list of chemicals reportedly used at the site, which appears in Appendix C. The second group is based on the known products of abiotic and biotic transformations of chlorinated aliphatic compounds. Table 3.16 shows the 12 analytes detected, which ones were used onsite, which analytes are potential degradation products of compounds used or detected onsite, and the range of concentrations detected onsite.

The degradation pathway of chlorinated aliphatic compounds may be through a combination of abiotic and biotic steps (Vogel,et al.,1987). The exact micro environment necessary for each individual step is still a topic open to on-going research. Biotic steps require microorganisms, whereas abiotic steps do not require microbes. Abiotic processes take place on mineral surfaces or in solution where proper conditions exist. Both biotic and abiotic steps take place under aerobic and anaerobic conditions. As examples applicable to this site, there are three possible degradation pathways of chlorinated aliphatic compounds which may explain the occurrence of certain compounds found in the soil onsite.

The relationship for the chlorinated ethenes found at the site is summarized as:

(1) PCE -> TCE -> 1,1-DCE or cis-1,2-DCE (c-DCE) or t-DCE -> VC

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Table 3.16

Measured Chlorinated Compounds
Watkins-Johnson Company Site, Scotts Valley, California

Compound	Frequency of Detection[1]	Used Onsite[2]	Potential Degradation Product of Other Detected Compounds[3]	Range of Concentrations Detected On Site (ug/kg)	
				Minimum	Maximum
Freon	1/1	Yes	No	1	1
1,1 - DCE	1/3	No	Yes	100	100
Freon 113	2/10	Yes	No	10	21,000
MC	12/30	Yes	Yes	540	11,000
t-DCE	2/3	No	Yes	89	100
c-DCE	1/1	No	Yes	89	89
CF	5/9	No	No	52	610
1,1,1-TCA	4/12	Yes	No	1	310
TCE	18/41	Yes	Yes	1	9,300
1,1,2-TCA	1/3	No	No	100	100
PCE	4/9	Yes	No	10	1,400
Benzyl Chloride	1/1	No	No	3	3

1 Number of locations/number of times where compound exceeded the limit of detection during previous and current investigations.

2 Appears in General List of Chemicals Reportedly used by Watkins-Johnson, Appendix B.

3 Potential degradation product of compound used or found onsite.

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An alternative pathway which can produce chlorinated ethenes from ethanes can be summarized as:

(2) 1,1,1-TCA -> 1,1-DCE -> VC

The third possible degradation pathway which can produce chlorinated methanes is:

(3) CF -> MC -> CM

As shown on Table 3.16, five compounds have been detected onsite which were used onsite and five could be degradation products of compounds found at the site. Of these, two (TCE and MC) have also been used onsite. Comparison of these two compounds with their possible parent compounds indicates that TCE and MC are most likely not degradation products. TCE is found in association with one or more possible parent compounds at only four out of 14 sites and MC is found in a similar association at five out of 12 sites. In virtually all instances of such an association, the concentration of the possible degradation product, TCE or MC, greatly exceeded the concentration of the potential parent compound PCE or CF, respectively. Therefore, the occurrence of TCE and MC in the soil at the site is probably not due to the degradation of parent compounds. Comparison of the concentrations of the remaining three compounds which could be degradation products, 1,1-DCE, c-DCE, and t-DCE, with their possible parent compounds indicates that the occurrence of these three compounds in the soil at the site may be due to degradation. At each site, the potential degradation product is found in association with one or more parent compounds.

As shown on Table 3.16, six analytes do not have an identified source. The concentrations of 1,1,2-TCA and BC are extremely low; at or close to the detection limit. The source of these analytes could be contaminants in purchased compounds.

3.4.2 Volatile Organics

Soil samples collected during the current investigation were also analyzed for VOCs (EPA Method 8240). Of the 34 analytes analyzed for by this method, two were given estimated values. No analytes were detected above the SQL.

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The two tentatively identified compounds,TCE and toluene, were detected at three sites. TCE was detected in one soil sample from boring SB6-4. The results were confirmed by the 8010 analysis of the same sample.

Toluene, an aromatic hydrocarbon, was detected in one soil sample from boring SB8-1 and in two soil samples from WJ-43. However, these results are suspect. In two of the three samples, a duplicate sample from the same interval did not indicate the presence of toluene.

3.4.3 Semivolatile Organics

Soil samples collected during the RI/FS field program were analyzed for semivolatile organics (EPA Method 8270). Eight of the 65 analytes included in the laboratory analyses were detected. The analytes were detected 44 times at 25 sites. Only two analytes were detected above the SQL; the remainder of the results are estimated values based on results greater than zero but less than the SQL.

Pyrene, benzo(a)pyrene, and benzo(g,h,i)perylene were detected only one time in one sample from Boring SB7-1, which was collected at a depth of one foot. These are naturally occurring compounds found in coal tar and are water insoluble and therefore not expected to be mobile. These compounds are included in general classification of polynuclear aromatic hydrocarbons, PAH. Current literature on the degradation of PAH compounds is generally limited to compounds composed of three or less aromatic rings (benzene is a single ring, naphthalene is two rings, anthracene is three rings, pyrene is four rings and perylene is five rings). In general, it appears the PAHs with three or less rings are degradable, with ring substitution being very important, under aerobic conditions and to a lesser degree under anoxic conditions. As the number of rings increase, microorganisms' capability to degrade the compound decreases. Therefore the pyrene and perylene compounds measured are likely to be degraded poorly.

The chlorinated aromatic hydrocarbon, 1,3-DCB, was detected three times at one site, SB7-1, at estimated levels an order of magnitude less than the SQL. Ortho-dichlorobenzene, 1,2-DCB, was reportedly used onsite (Appendix C), however meta-dichlorobenzene, 1,3-DCB, is not on the list.

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Benzoic acid was detected in eight samples from four locations. All results are estimates, reported at levels approximately an order of magnitude below the SQL. The results are suspect and could be due to analytical errors. Five of the eight samples which indicated the presence of the analyte were analyzed on one day when there were continuing calibration problems. In one sample from boring SB8-1 a duplicate sample collected from the same interval did not confirm the presence of the compound. Benzoic acid was not used at this site per the general list of chemicals used. No obvious source for benzoic acid can be found, and it is not known or expected to be a degradation by-product since benzoic acid is an easily degradable compound and has been used in microbiology as a carbon source in preparing media (Grainger and Lynch, 1987). Most investigations into the degradation of aromatic compounds, including benzoic acid, have been conducted with the aerobic bacteria of the Pseudomonas family, (Doetsch and Cook, 1974). The aerobic degradation of benzoic acid may explain its detection in soil samples and the lack of detection in any water samples.

Three phthalates were detected at the site, diethylphthalate (DEP), DNBP and BP. These phthalates are esters of phthalic acid. Only DNBP was used onsite per the general list of chemicals used. Merck (1983) lists BP as being used in vacuum pumps, presumably as an anti-foaming agent in vacuum pump oil, thus BP appears to have been used onsite as well. Esters of phthalates are used as plasticizers in the manufacture of plastics. It is not uncommon for samples to become contaminated by phthalates as a result of the sample coming into contact with new plastic (such as sample pump tubing, plastic endcaps on core samples, or if plastic bottles are used). Also many chemicals now come in plastic bottles and it may be possible the analytical laboratory caused the detection by using a drying agent (such as anhydrous sodium sulfate) from a plastic bottle. Phthalates are easily biologically degraded under aerobic conditions.

Boring SB2-1 is the only location where all three phthalates were detected together. DEP was also detected in borings SB6-6 and SB7-1. However, the results from boring SB6-6 are suspect; a duplicate sample did not confirm the results. DNBP was detected in one sample from each of six borings. Only the sample from Boring SB2-5 exceeded the SQL. The results from Boring SB8-1 are suspect because a duplicate sample did not confirm the results. BP was detected 19 times at eight locations. However, only two samples exceeded the SQL, and in each case the results were not confirmed by the results of duplicate samples.

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3.4.4 Inorganic Analyses

Available information pertaining to background levels of metal concentrations in the soil is lacking. However, the concentrations of metals found in the soil at the site are significantly less than regulatory criteria.

3.5 Summary of Results From Current RI/FS Investigation

The purpose of the RI/FS soil sampling program was to determine the degree and extent of contamination in the unsaturated zone in areas where contamination is suspected. The rationale for selecting the locations of the 12 soil borings and 2 of the 10 boreholes for monitoring wells drilled for this phase of the RI/FS was presented in Section 3.3.1.1.

Borings SB2-1 through SB2-5, SB6-5, and WJ-38 were located to help determine possible sources of ground-water contamination. Results from Borings SB2-1 through SB2-5 do not indicate possible sources of contamination. The borings were located in areas of reported dumping. One sample collected at a depth of 30 feet in Boring SB2-1 contained 33 ug/kg TCE. The results from SB6-5 do not indicate a source of contamination in the vicinity of the Building 6 septic tank, which was suspected of leaking. WJ-38 was located near an area where wastes were reportedly placed in a sand pit. Results of soil sample analysis do not indicate a source of ground-water contamination.

Borings SB6-4, SB7-1 and SB8-1 were located to verify results of previously sample soil boring sites. Boring SB6-4 was located in the vicinity of the Building 6 dilution tank. TCE was detected in Boring SB6-4 and in samples from every boring sampled in previous investigations. Boring SB7-1 was drilled to verify results in the vicinity of the Building 2 dilution tank. The results indicated 1 ug/kg of TCE which did not confirm much higher concentrations which were detected in previous investigations. Boring SB8-1 was located near the Building 8 leach field to verify previous results. MC, which was found in four borings sampled during previous investigations, was not detected in samples from Boring SB8-1. However, CF was detected in SB8-1 and in three other borings.

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Borings SB6-6, SB6-7 and SB6-8 were located to document that an area was not a source of ground-water contamination prior to construction of an extension of Building 6 in the area. The results do not indicate sources of contamination.

Boring WJ-43 was sampled to provide information on background levels of VOCs and purgeable halocarbons in an area upgradient of site contamination. Trace levels of 1 ug/kg or less of three contaminants, 1,1,1-TCA, Freon 11, and toluene were detected.

3.6 Source Areas and Pathways to Ground Water

Purgeable halocarbons are the primary contaminants of concern at the site. As shown on Table 3.2, TCE was detected the most frequently, at 18 of the 53 locations where soil was sampled. These locations are clustered around the Building 6 dilution tank and the leach field associated with the Building 2 dilution tank. Lower concentrations of TCE were detected in borings near the Building 8 leach field.

Other contaminants which were frequently detected include MC, which was detected at 12 locations; CF which was detected at 5 locations; and 1,1,1-TCA and PCE which were each detected at 4 locations.

3.6.1 Building 2 Dilution Tank and Vicinity

Soil samples collected in the vicinity of the Building 2 dilution tank contained two different suites of contaminants; MC and CF in one area and primarily TCE, PCE, Freon 113, and 1,1,1-TCA in another area. Samples collected from borings adjacent to the dilution tank and from the boring between the two dry wells in the leach field contained MC and CF. MC and CF were detected at depths of 20 feet or greater in BS2-1, BS2-2 and LF2-1. MC was also detected at a depth of 10 feet in BS2-2.

Samples collected from borings to the north and northeast of the dry wells contained PCE, TCE, Freon 113 and 1,1,1-TCA, with lesser amounts of 1,1-DCE, t-DCE, and 1,1,2-TCA. The samples did not contain any MC or CF. The concentrations of Freon 113, PCE, 1,1,1-TCA, and TCE decrease with depth in DH-5. However, this is not the case in WJ-12. The highest concentration of TCE (9,300 ug/kg) found in the soil at the site came from a sample collected at a depth of 20 feet in WJ-12. The confirmatory boring drilled

and sampled as part of the RI/FS program indicated 1 ug/kg of TCE and estimated amounts of several semivolatile compounds.

3.6.2 Building 2

Soil samples collected from borings in the vicinity of Building 2 did not contain TCE, with the exception of one sample collected at a depth of 30 feet in Boring SB2-1. This sample contained 33 ug/kg TCE. Several semivolatile compounds were detected in three of the five borings. DNBP was the only analyte detected above the SQL; it was detected in SB2-5 at a depth of one foot. However, no analytes were detected in three samples collected in the same boring at greater depths.

3.6.3 Building 6 Dilution Tank and Vicinity

Samples collected from the ten borings in the vicinity of the Building 6 dilution tank contained TCE and MC, with lesser amounts of PCE, 1,1,1-TCA, CF, and t-DCE. TCE was detected in samples from every boring. The highest concentration of MC detected onsite was from a sample collected adjacent to the dilution tank (BS-1).

TCE was not detected below a depth of 25 feet except in borings DH-3 and DH-9. The confirmatory boring (SB6-4) drilled and sampled as part of the RI/FS program confirmed the presence of TCE in the soil at this location. The highest concentrations of TCE were adjacent to and directly below the dilution tank. At one point in the past, effluent from the tank was discharged into the three dry wells west of the dilution tank. Soil samples from borings located between the dry wells also contained TCE.

MC was detected in concentrations ranging from 2,700 to 11,000 ug/kg in samples collected adjacent to and directly below the dilution tank. CF was also detected in the shallow samples. As with the TCE, MC was also detected in samples collected from borings located near the associated dry wells.

3.6.4 Vicinity of Building 6

Soil samples collected from borings in the vicinity of Building 6 contained estimated amounts of several semivolatile compounds. No analytes were detected above the SQL.

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3.6.5 Building 8 Leach Field and Vicinity

Soil samples collected from four of the five borings in the immediate vicinity of the Building 8 leach field contained concentrations of MC ranging from 540 to 8,100 ug/kg. MC was not detected below a depth of 30 feet. TCE was detected in concentrations ranging from 10 to 63 ug/kg in one boring adjacent to the leach field and in three borings to the northwest and southwest of the leach field. TCE was detected near the surface to the southwest, at DH-8. It was detected at depths of 70 to 75 feet to the northwest, in DH-6 and DH-2, respectively. The source of the TCE in these borings may be due to migration of TCE from the perched zone through the capillary fringe. The dry wells in the leach field have received rinse water from Buildings 4 and 6 since 1980. TCE was used in both buildings and MC was used in Building 6.

3.6.6 Sky Park Airport

Only TH was detected in soil samples collected from the borings at Sky Park Airport. Hydrocarbons were not detected below a depth of 20 feet in any boring. The hydrocarbon contamination appears to be localized and probably from several small sources rather than from one large source.

3.6.7 Conclusions

Examination of the data reveals considerable variation of concentration and occurrence of specific analytes with respect to space and time. Several conclusions are possible, based on these conclusions:

1. Over the period of time during which this investigation has progressed, nearly five years, contaminants have been transported out of the soil through volatilization or leaching, or have succumbed to some form of biodegradation.

2. The major concentrations of contaminants are extremely limited spatially and are not frequently encountered.

3. A synthesis of the two previous conclusions. This represents the best conceptual model possible, based on the scope of the soils investigation.

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4.0 CHARACTERIZATION OF PERCHED ZONE IN THE SANTA MARGARITA AQUIFER

A perched aquifer was identified above the regional aquifer in the Santa Margarita Formation. Data acquired from the drilling and testing of Well RA-1 (Figure 4.1), installed in September 1985 as part of the remedial action program, indicated the presence of a previously uninterpreted ground-water body lying 35 to 40 feet above the regional aquifer. Since that time, existing geophysical logs, drilling logs and geologic data have been reevaluated and the well installation program was expanded to investigate the extent of the low permeability layer or aquitard that defines the base of the perched zone.

The aquitard has been identified beneath the Watkins-Johnson plant and the Sky Park Airport areas. Typically an aquitard is a layer of high clay content and low permeability which can support perched ground water. The existence of a perched zone is usually dependent on two factors: the thickness or clay content of the aquitard and thus its ability to retard water movement; and, the rate of recharge from sources above. The aquitard at the Watkins-Johnson, Scotts Valley study site is not a typical clay zone but a moderately cemented conglomerate. Identification of the perched zone has been accomplished by combining information from geophysical logs, water levels, and field identification of outcrop features. Each new drilling program has in turn aided and expanded knowledge of the aquitard and the geometry of the perched zone.

Water levels in the perched zone have been monitored at least once per month since the start of remedial action pumping in October, 1986. Water quality sampling has generally been carried out on a quarterly basis. The EPA has reviewed and approved the monitoring program activities since March, 1988. Contamination originally detected in perched zone samples in January 1985, is still present in the perched zone. Many of the contaminants identified in the perched zone are the same or natural breakdown products of chemicals used at the plant. Many of the contaminants were also detected in the unsaturated zone as described in the previous Section 3.0 on the soil investigation.

Presently there are 30 wells in the monitoring program that are screened in the perched zone of the Santa Margarita aquifer. Drilling and constructing monitoring wells began in 1983 and has continued in several phases through the Spring of 1988. All wells drilled before 1988 were drilled under work related to fulfilling monitoring and remedial action requirements of the RWQCB. Following nomination of the site for the National Priority

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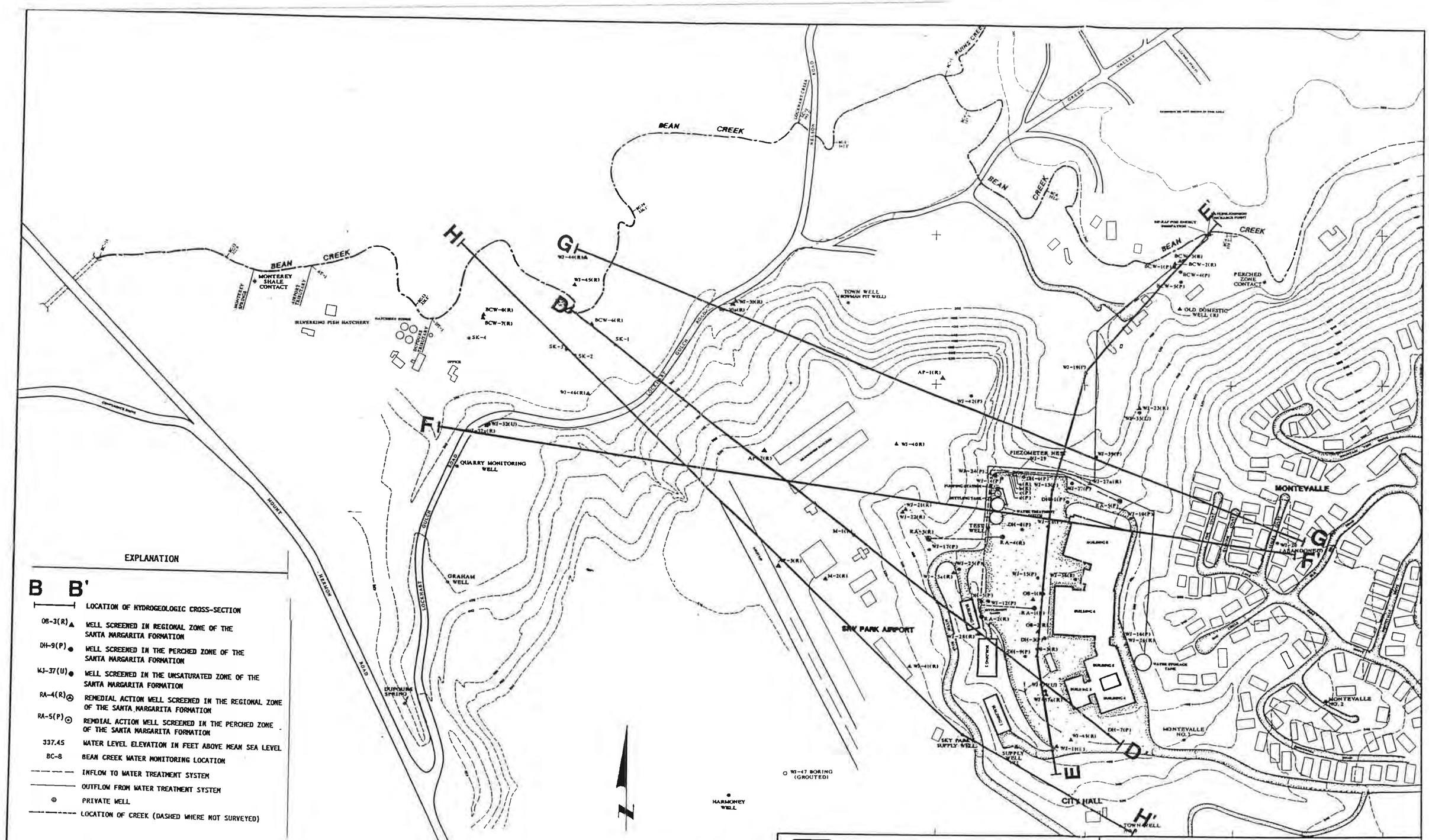


R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1983

LOCATION OF WELLS, SURFACE-WATER STATIONS HYDROGEOLOGIC CROSS SECTIONS D-D', E-E', AND F-F', G-G' AND PROFILE G-G' POTENTIOMETRIC SURFACE

FIGURE 4.1

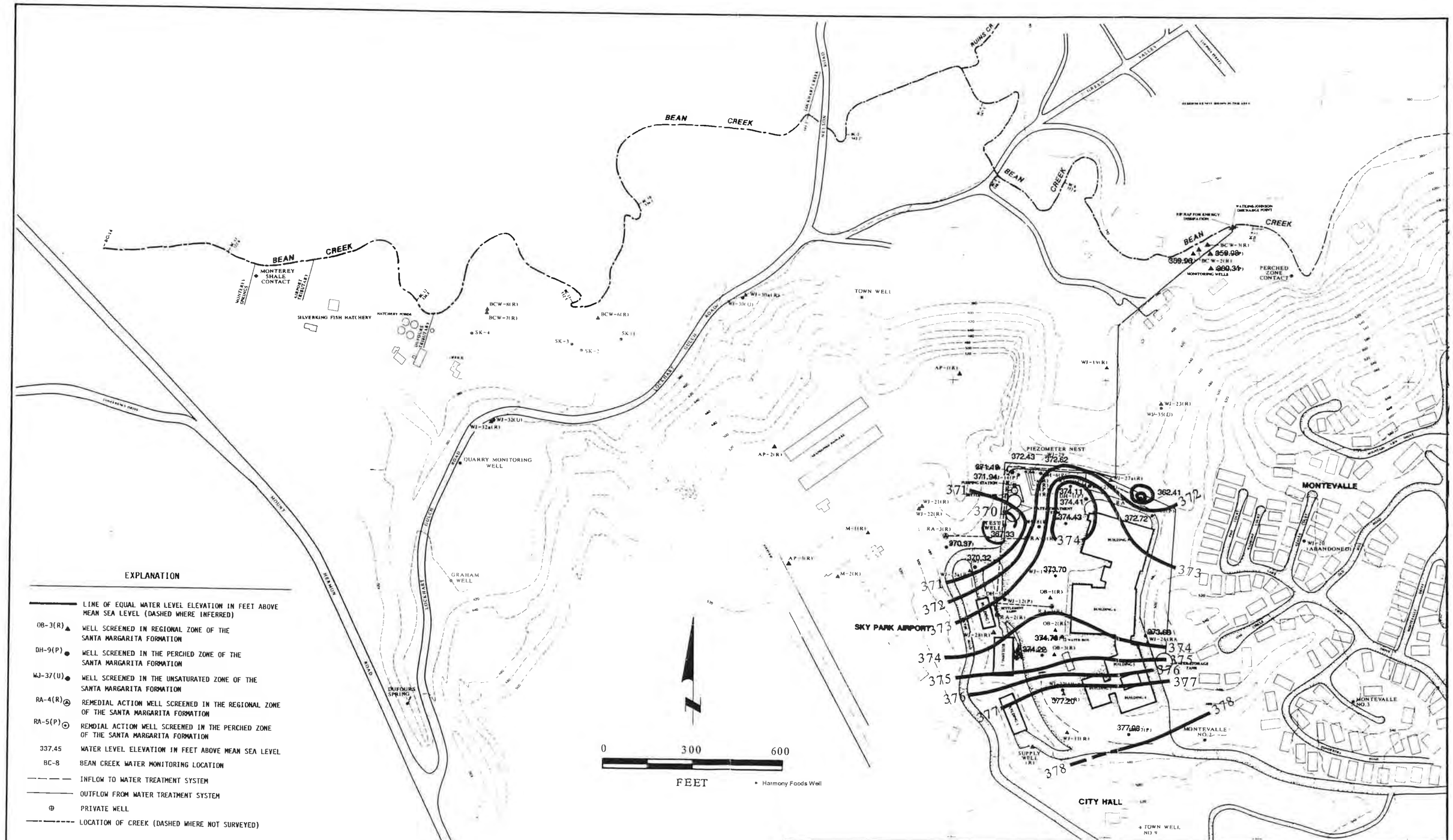
List, all work was conducted with EPA approval. The well drilling program undertaken in April and May 1988 was conducted under the EPA RI/FS program.

The following sections summarize the previous characterization studies and well completion with the perched zone, the RI/FS perched zone program, the geometry and hydraulic characteristics of the perched aquifer, changes in the perched zone configuration, select contaminant plumes, and a discussion of results of the chemical analysis from the sampling programs.

A chart of the well drilling history at Watkins-Johnson, Scotts Valley, well inventory, well location map based on a coordinate system, and diagrams showing well completion data, geology/lithology and geophysical logs are contained in Appendix A.

4.1 Previous Characterization of the Perched Zone

Well drilling under the RWQCB program identified a perched water table in the Santa Margarita aquifer which lies above and is separated from the regional water table. The location and extent of this perched zone was determined by water levels in shallow wells and by geophysical responses. At the plant site the perched water table was found about 35 to 40 feet above the regional water table in the Santa Margarita aquifer. It was found to extend beneath the Watkins-Johnson plant, the Sky Park Airport and north to Bean Creek. Near Bean Creek the difference in water levels between the perched and regional zones is less than seven (7) feet. The composition of the aquitard, the semi-confining unit which supports or perchs the shallow water table was determined from an outcrop along Bean Creek. The aquitard was found to be a poorly sorted conglomerate of well rounded gravels grading to finer grained materials. The abundance of fine materials filing spaces between the larger gravels and a moderate degree of cementation of the conglomerate give the unit the confining ability of an aquitard. Ground-water flow patterns in the perched zone were mapped frequently during the RWQCB monitoring program. Flow in the perched zone was generally northward with some movement to the northeast and northwest around a ground-water mound under the north parking lot (Figure 4.2) apparently formed by recharge from the Watkins-Johnson plant. Water from the perched zone has been pumped as part of the remedial action program. A summary of well drilling activities in the perched zone is given below. Following sections will contain a more detailed characterization.



EXPLANATION

- LINE OF EQUAL WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) ⊗ REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) ⊙ REMEDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

NOTE: WJ-27 NOT USED TO CONSTRUCT THIS MAP.

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF WATER TABLE IN THE PERCHED ZONE, OCTOBER 22, 1987

FIGURE 4.2

The Test Well located just west of the Building 8 Leach Field was completed in September 1983 to monitor ground water near the leach fields (Figure 4.1). To determine ground water contamination present at the plant site, nine borings (DH-1 through 9) were drilled under the direction of Terratech in April 1984. Soil samples were recovered for analysis. Seven of these borings were completed as monitoring wells. The remaining two borings had collapsed and were never completed as monitoring wells. The borings were generally located near suspected contamination sources. In December 1984, an additional 9 wells, WJ-10 through WJ-18 (Figure 4.1) were completed under the direction of RLSA. These wells were placed to provide information to interpret the configuration of the ground-water table beneath the plant area and to confirm contaminant levels and plume definition.

WJ-10 through 18 were relatively shallow wells drilled to intersect the water-table. These wells also provided some background information for the design of a remedial action plan. A ground water remedial action plan was prepared in March, 1985. In order to develop the remedial action plan an aquifer test was conducted.

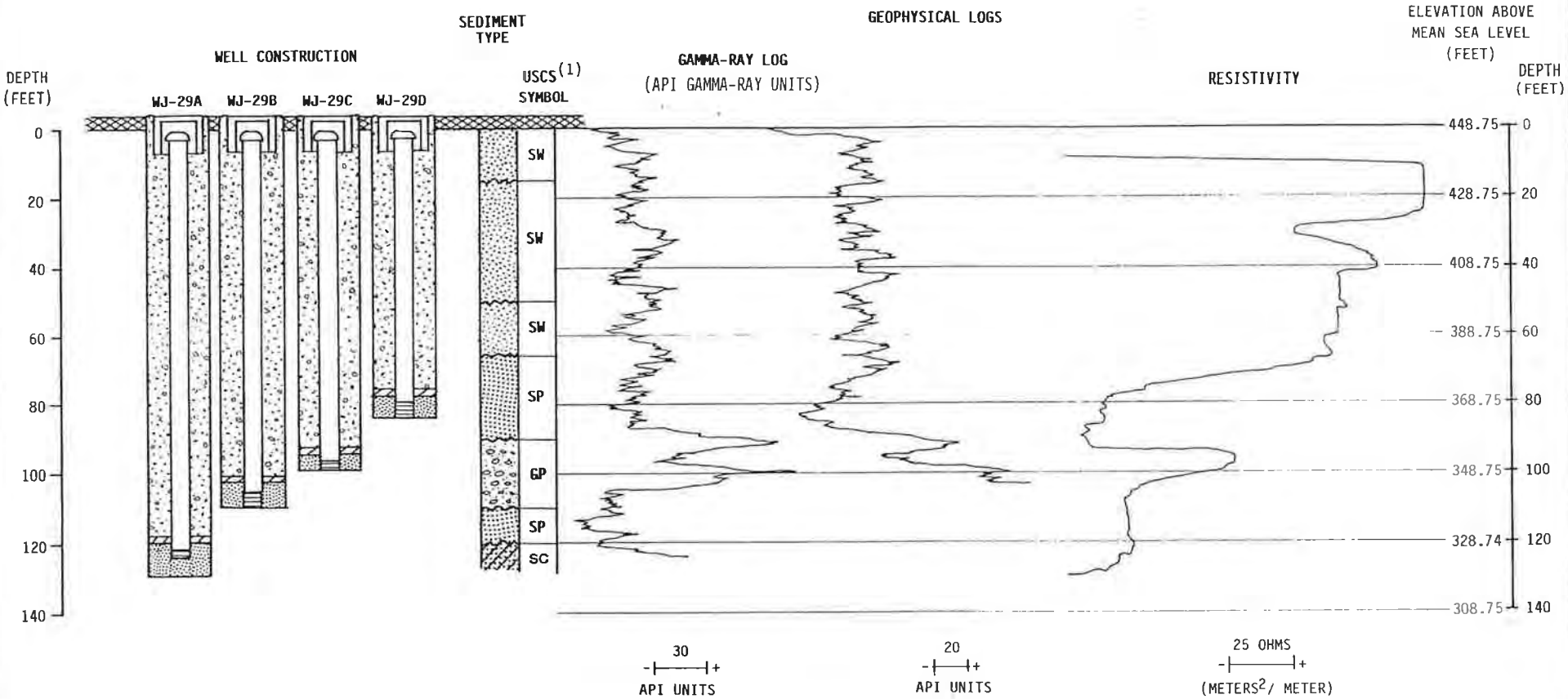
Data from subsequent drilling and well construction further defined the hydrogeology. Wells WJ-19 and WJ-20 were drilled for additional information off of the plant site (Figure 4.1). WJ-19 is located approximately 300 feet north of the plant lot between the plant and Bean Creek. WJ-20 was located in an area of higher elevation to the east in the Montevalle trailer park. During the drilling of WJ-20 the borehole was abandoned. Drilling of the exploratory boring for the test/production well, RA-1, commenced in June 1985. The boring was drilled to the top of the Monterey Formation in order to determine the saturated thickness of the Santa Margarita aquifer and to construct a fully penetrating test and production well. Data from the drilling, testing, and development of RA-1 and the associated deep observation wells OB-1, OB-2 and OB-3, indicated that there was a sharp contrast between water levels measured in wells screened deep in the Santa Margarita Formation versus those monitoring wells screened in the shallow section of the formation. At that time water-levels at an elevation of approximately 380 feet above mean sea level had been measured in shallow monitoring wells adjacent to RA-1. In the Production Well RA-1, the water table was approximately at a 350 foot elevation indicating of vertical head difference of 30 feet. Subsequent field activities including geophysical logging proved the existence of a perched zone and an aquitard supporting the perched water.

In October and November 1985 another series of wells were completed to characterize and to define the difference between the two zones and the interrelationship between the zones. An example of this phase of construction is the multiple well piezometer nest, WJ 29-A, B, C, and D, consisting of four wells (Figure 4.3). WJ-29D was screened in the perched zone. Two wells, WJ-29B and WJ-29C, were screened in the aquitard and WJ-29A was screened in the regional zone. In July 1986, five wells were drilled north of the plant near Bean Creek. The wells were screened at different intervals and located so that collected data would help define the interaction between the creek and the aquifer and to allow evaluation of the remedial action pumping on stream flow in Bean Creek. The well nest consisted of Wells BCW-1 through 5. BCW-1,4, and 5 were completed as perched zone wells. A production well for remedial action pumpage, RA-5, was completed in the perched zone on September 3, 1986. Remedial action pumping commenced in October 1986.

Figure 4.3 shows the lithologic, construction, and geophysical log for the WJ-29 well nest. The geophysical logs were used to locate the well screen above, in, and below the aquitard.

Even with the available data and interpretation it is very difficult to locate the top of the perched zone during drilling unless the saturated thickness of the perched zone is great. This is partially due to the nature of the aquitard. It is a conglomerate which is only slightly cemented. During drilling and collecting of soil samples, the field geologist cannot differentiate between the aquitard or the Santa Margarita materials. Therefore, it is very difficult to plan and accurately complete wells tapping the perched zone. Use of geophysical logs in identifying the perched zone and aquitard and the nature of the aquitard are described in Sections 4.3 and 4.4.

Four wells, WJ-30, WJ-32, WJ-35 and WJ-37, were drilled in the upper sections of the Santa Margarita aquifer in May, 1987 as part of perched/regional well nests. When drilling each well set, the regional well, the deeper well, (for example Well WJ-30A) was drilled first. Because drilling was conducted, with the mud rotary method, the borehole was kept open with drilling fluid and suites of geophysical logs could be performed. The logs of the deeper regional boreholes were used to interpret the perching aquitard. Once the aquitard was located, the borehole depth for the perched zone well could be determined. The bottom of the well was placed in the upper aquitard and the well screen



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-29A, WJ-29B, WJ-29C AND WJ-29D

FIGURE 4.3

set above the perching zone. Each of these well sets were located to enhance plume definition and understanding of aquifer geometry and to identify the extent of the perching aquitard. WJ-30 and WJ-32 have displayed regional water-levels and are not considered as perched zone wells but as wells screened in the upper regional zone. WJ-35 completed near existing WJ-23, along a topographic slope north of the plant area, has been dry since August, 1987. Well WJ-37A is located near the south end of the plant area and has been used for perched zone plume definition.

4.2 RI/FS Perched Zone Well Construction

In order to further characterize the lateral extent of the perched zone and the migration of the contaminant plume in the perched zone of the Santa Margarita Sandstone, new monitoring wells were installed in April and May, 1988. During drilling, soil samples were collected for chemical analysis. The field procedures, drilling specifications, construction details are outlined in the SAP (RLSA, March 1988).

Well WJ-38 was installed downgradient of Building 6, the site of reported disposal of waste into a sandy area. Due to the high permeability of the site, the potential for contamination of the perched ground-water zone is high. WJ-38 (Figure 4.1) was also be located downgradient of high concentrations of TCE, which have been detected in well DH-3. The location of WJ-38 was directly influenced by the need to collect soil samples at this location.

Monitoring well WJ-39 (Figure 4.1) was installed to characterize the extent of the perched aquifer contaminant plume in the region north of the plant. The well is located downgradient of the northward most extension of the plume so far detected in the perched zone, midway between wells RA-5 and WJ-35. Monitoring well WJ-40 (Figure 4.1) was installed near the northwest corner of the Watkins-Johnson site to define the extent of any contaminant migration moving away from the plant in that direction. It was completed as a regional well because no distinct aquitard or perched zone was found. Monitoring well WJ-41 (Figure 4.1) was installed west of the plant at Sky Park Airport to further define the flow regime and to determine if there was any perched zone contamination in that area. Interpretation of the samples collected during drilling and the geophysical logs indicate that the perched zone does not exist in this area. Therefore, the well was completed as a regional well.

The efficiency of pumping from the Test Well in preventing migration of contamination off-site was to be evaluated by the installation of a downgradient ground-water monitoring well, WJ-42. Presently there is no saturation in the perched zone at WJ-42. Recharge to the perched zone had ceased in January, 1988. As will be discussed in following sections, recharge has resumed and will be increased over time, WJ-42 will be used to monitor the recharge and any plume migration moving northwest in the perched zone.

At the completion of the well construction program the wells were surveyed by professional surveyors for horizontal and vertical control. For horizontal control the wells were tied into an existing coordinate system. For vertical control elevations were measured for ground surface, rim of the protective casing, and top of the well casing for the water-level measuring point. These data on horizontal and vertical control are shown in the well inventory listing in Appendix A.

4.3 Identification and Composition of the Aquitard

In May 1987 the new wells installed in the regional aquifer and many existing wells were geophysically logged to further define the hydrogeology of the area. Special attention was given to define the perching aquitard and perched water zone. The configuration of the perched aquifer was further defined for the RI/FS program using data acquired during the May-June, 1988 drilling and well installation program. Evaluation of recent geophysical logs and drilling logs combined with existing data indicate the aquitard which supports the water in the perched zone is discontinuous and variable in thickness and stratigraphic position.

Four types of geophysical logging techniques have been used at the study site: spontaneous potential, resistivity, neutron, and gamma. As spontaneous potential and point resistivity logs require mudfilled uncased boreholes, they could only be performed on the new boreholes drilled with mud rotary. The SP and PR logs provide information on lithology and fluids within the formation. Neutron logs were obtained only from only cased holes to comply with State regulations. Neutron logs also depicted zones of saturation. Gamma logs are useful in determining the location of clay layers or layers with high natural radiation. Therefore, they can usually determine locations of aquitards

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and can be run on either cased or uncased boreholes. Figure 4.3 is an example of borehole geophysical logs used in well construction of the WJ-24 well nest.

Gamma logs from two cased wells, WJ-24 and WJ-26, were compared with previous gamma logs from their uncased boreholes to determine if the perching aquitard could be adequately defined in both types of logs. Similar characteristics of in the gamma activity curves were detected in both logs, providing confidence that the perching aquitard could be mapped to some extent through use of gamma logs. As mentioned in Section 4.1 the perched zone and aquitard are difficult to locate since the field geologist cannot differentiate between the aquitard and Santa Margarita. During the Spring 1987 field program, many existing wells and the new holes were gamma logged to provide information for mapping the perching aquitard. Wells WJ-20, WJ-24, WJ-26, RA-2, RA-3, RA-4 and RA-5 had previous gamma logs which were also used for mapping. The perching aquitard is present over most of the mapped area except in areas lying below its outcrop to the north near Bean Creek, and near Well WJ-32 (Figure 4.4). As shown on cross-sections D-D', E-E', F-F', and G-G' (Figures 4.5 and 4.6), the aquitard appears to vary in thickness and stratigraphic position by several feet. The location of the cross-sections are shown on Figure 4.1. In many logs multiple aquitards are indicated, although the presence of multiple perched aquifers has not been established.

The geophysical logs obtained during the May 1987 field investigations, combined with previous geophysical logs obtained from wells on the site, were useful in constructing the aquitard map and cross-sections depicting hydrogeologic conditions at the site as previously reported in the Assessment of Existing Hydrogeologic and Contaminant Source Data (RLSA, January 1988).

4.4 Perched Zone Geometry and Hydraulic Characteristics

The composition of the aquitard has been determined from geophysical log characteristics and its outcrop along Bean Creek (Figure 4.7). The intraformational aquitard supporting the perched water is a dense, moderately cemented, very poorly sorted conglomerate composed of well-rounded gravel, sand, and fine material. Fine material and sand comprises the matrix which fills voids between larger gravel components. The resulting low porosity and moderate degree of cementation accounts for the low permeability of the

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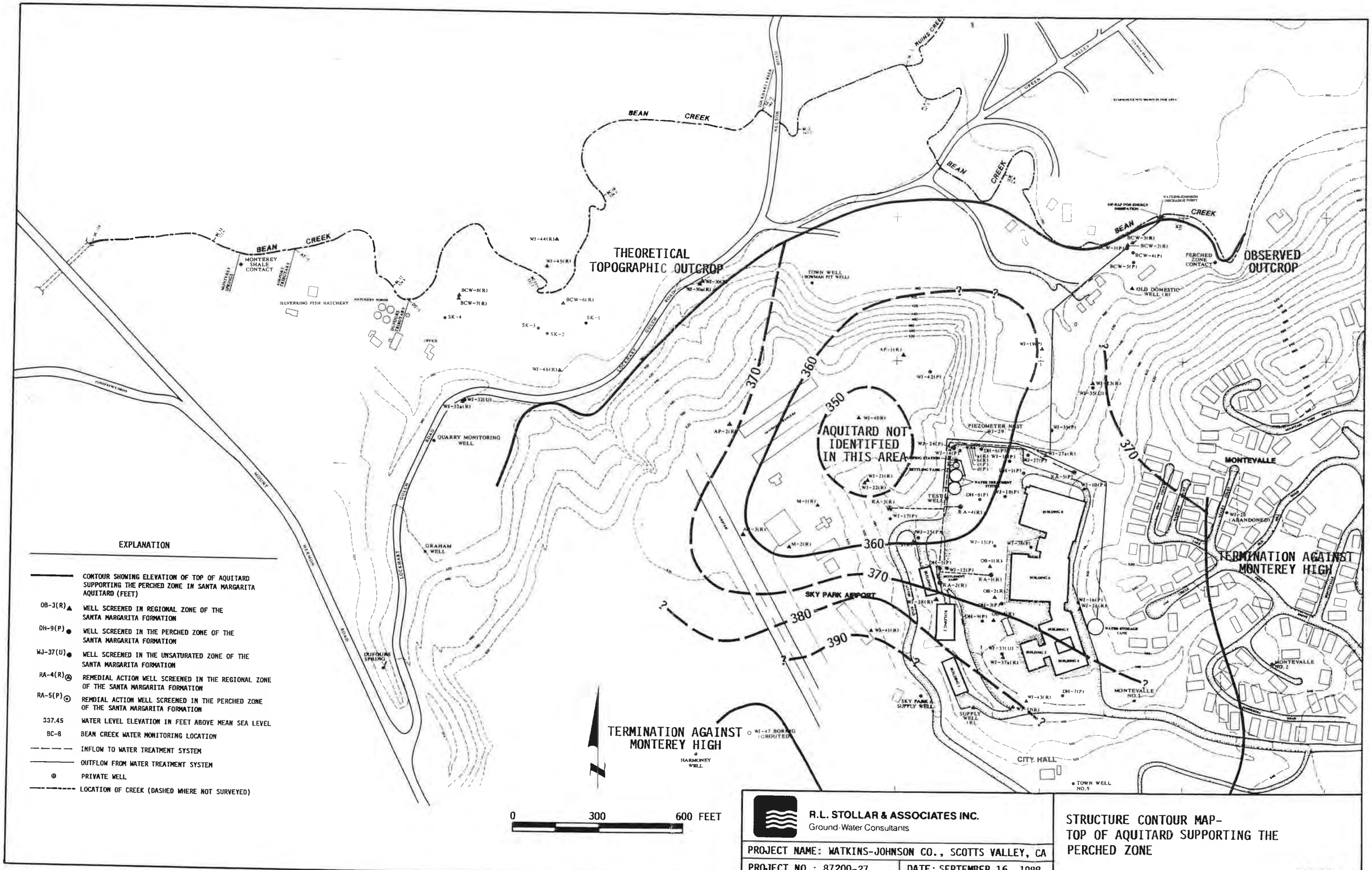
BEAN CREEK
MONTEREY SHALE CONTACT
SILVERKING FISH HATCHERY
THEORETICAL TOPOGRAPHIC OUTCROP
OBSERVED OUTCROP
PERCHED ZONE CONTACT
WATKINS-JOHNSON (DISCHARGE POINT)
OLD DOMESTIC WELL (R)
TOWN WELL (BOWMAN PIT WELL)
QUARRY MONITORING WELL
GRAHAM WELL
DUFOURS SPRING
AQUITARD NOT IDENTIFIED IN THIS AREA
PIEZOMETER NEST WJ-29
TEST WELL
SKY PARK AIRPORT
SKY PARK A SUPPLY WELL
SUPPLY WELL (R)
MONTEVALLE
MONTEVALLE NO.1
MONTEVALLE NO.2
TERMINATION AGAINST MONTEREY HIGH
CITY HALL
TOWN WELL NO.9
HARMONEY WELL
WJ-47 BORING (GROUTED)
370
360
350
380
390
EXPLANATION
CONTOUR SHOWING ELEVATION OF TOP OF AQUITARD SUPPORTING THE PERCHED ZONE IN SANTA MARGARITA AQUITARD (FEET)
OB-3(R) WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
DH-9(P) WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
WJ-37(U) WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
BC-8 BEAN CREEK WATER MONITORING LOCATION
INFLOW TO WATER TREATMENT SYSTEM
OUTFLOW FROM WATER TREATMENT SYSTEM
PRIVATE WELL
LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)
0 300 600 FEET
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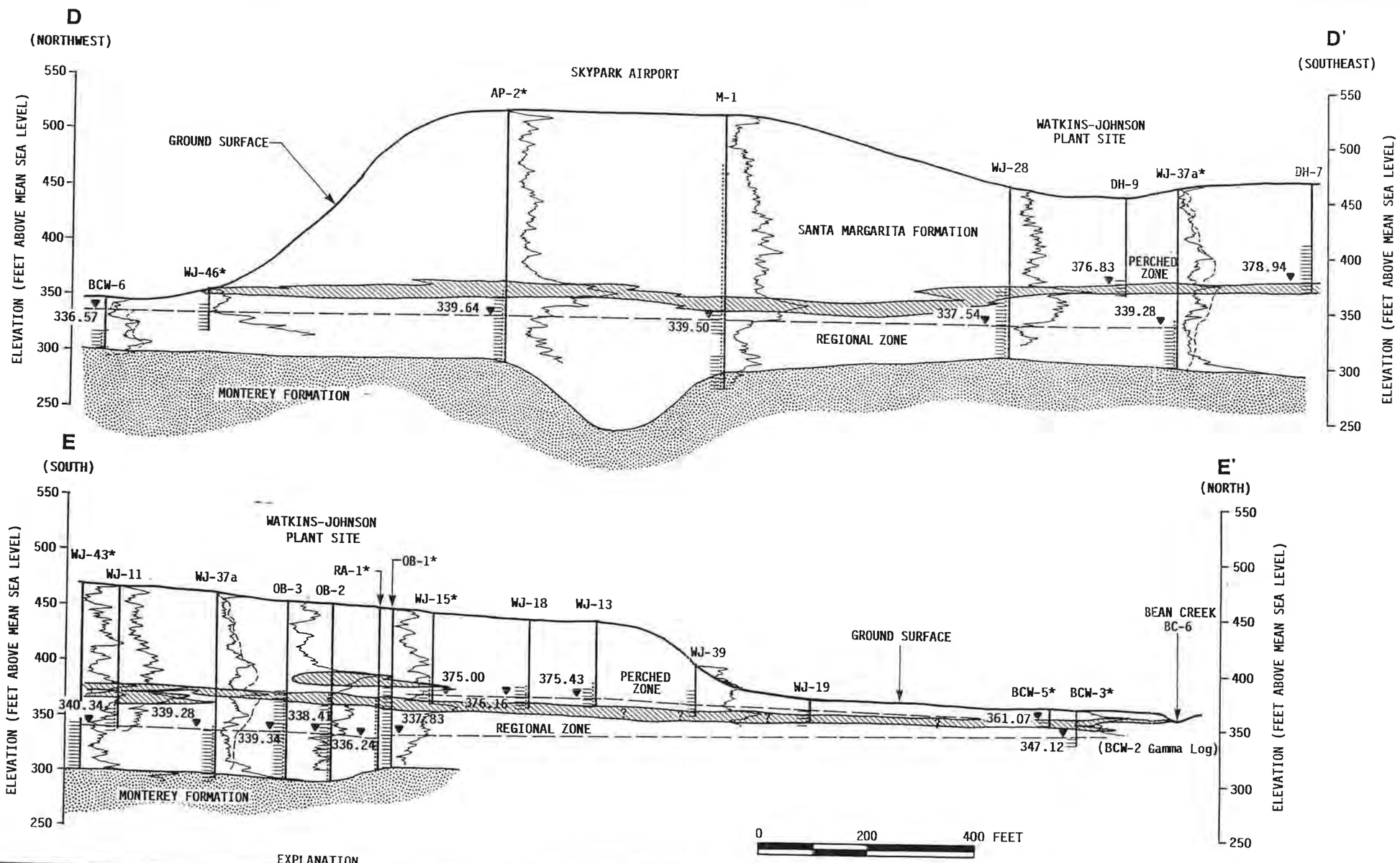
Ground-Water Consultants
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA
PROJECT NO.: 87200-27
DATE: SEPTEMBER 16, 1988
STRUCTURE CONTOUR MAP-
TOP OF AQUITARD SUPPORTING THE PERCHED ZONE
FIGURE 4.4

WJ007778



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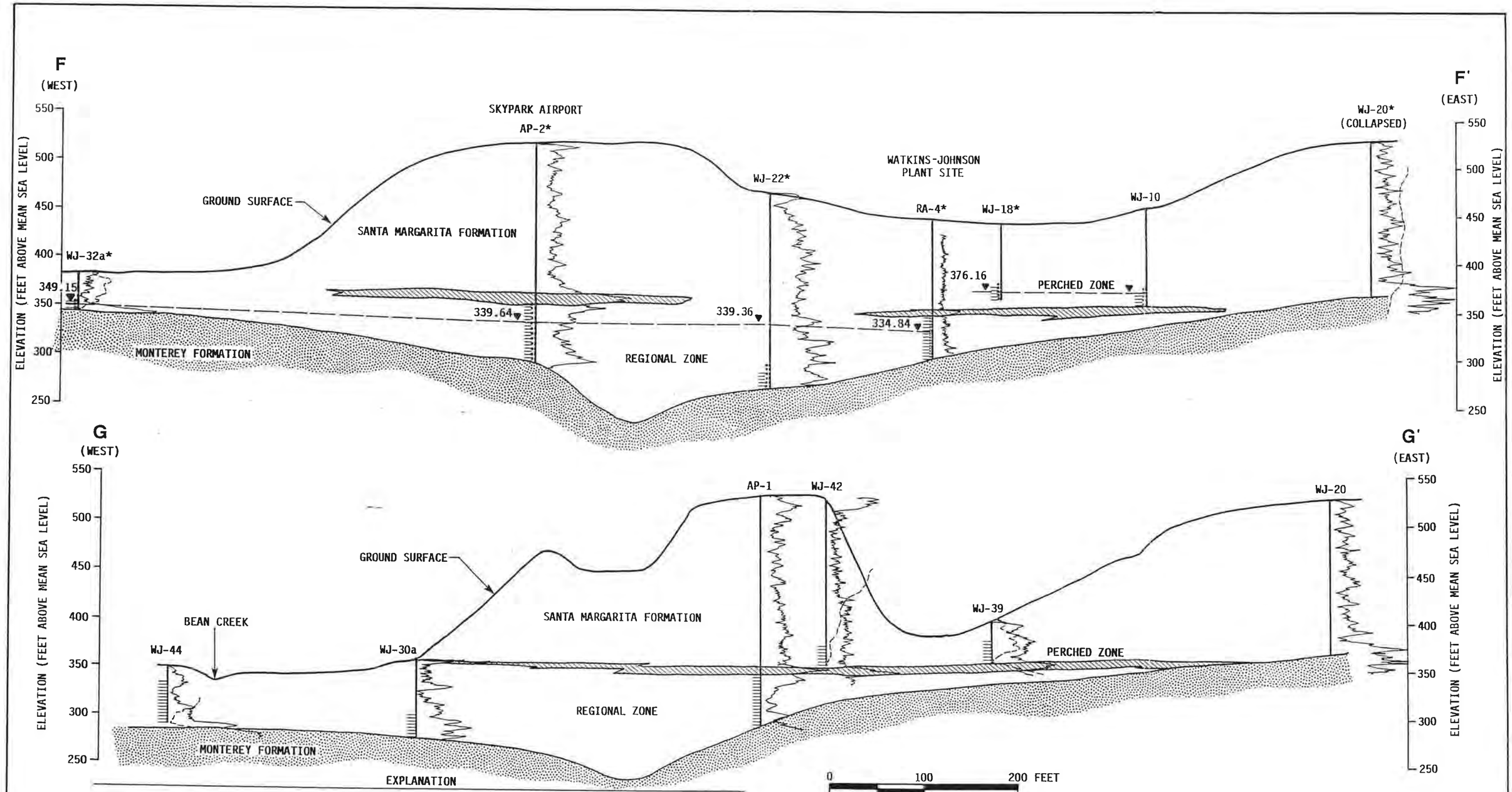
HYDROGEOLOGIC CROSS-SECTION D-D'
AND E-E'

FIGURE 4.5

WJ007770



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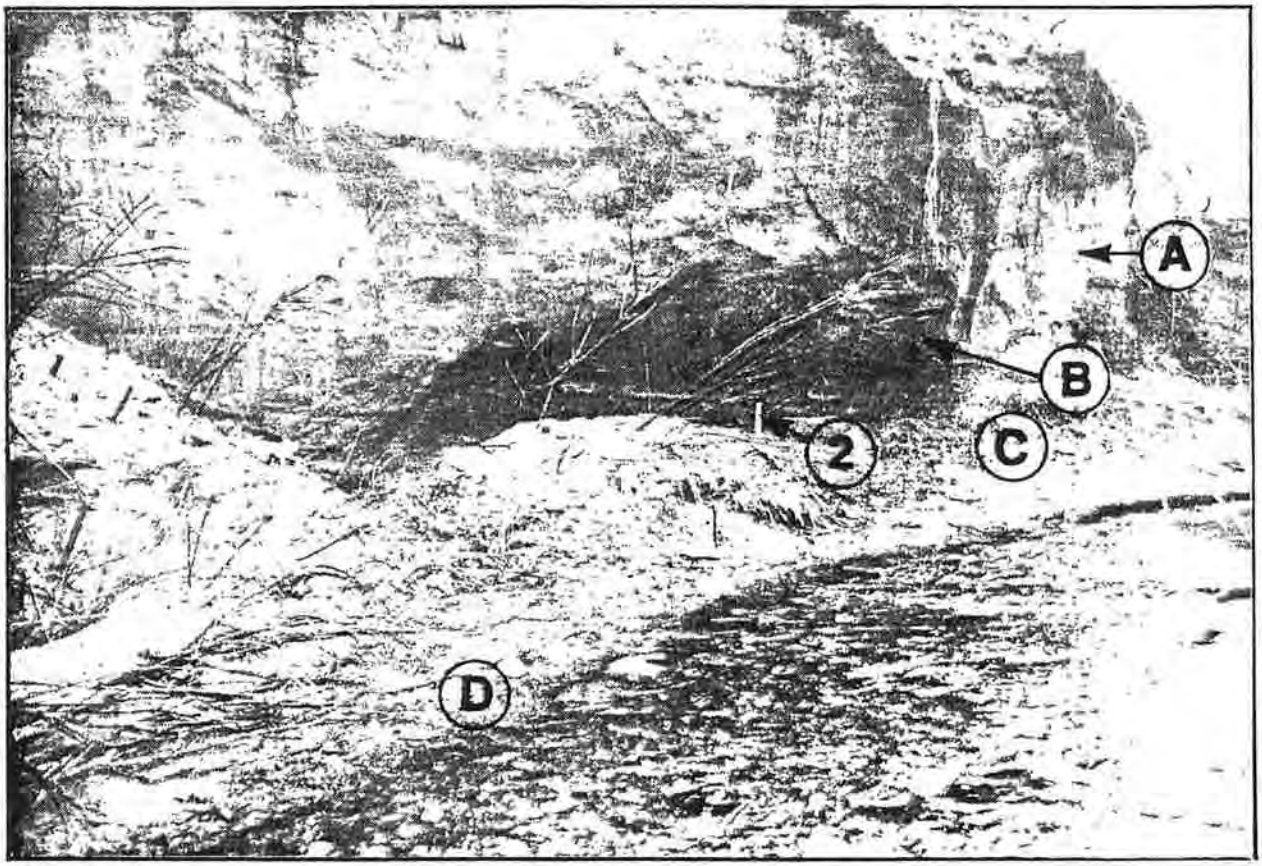
HYDROGEOLOGIC CROSS-SECTION F-F' AND G-G'

FIGURE 4.6

WJ007780



OUTCROP OF SANTA MARGARITA FORMATION ALONG CUT-BANK ON SOUTH SIDE OF BEAN CREEK[1]
SHOWN ARE:

A) MASSIVELY BEDDED, FINE TO MEDIUM GRAINED SAND OF THE SANTA MARGARITA FORMATION.

B) THE PERCHED AQUIFER INDICATED BY DARK SATURATED SANDS, 1 TO 1.5 FEET THICK

C) POOLED WATER PERCHED BY AQUITARD.

D) AQUITARD OF DENSE, POORLY SORTED CONGLOMERATE SUPPORTING THE PERCHED AQUIFER.

NOTES:

1) PICTURE LOCATION IS INDICATED AS PERCHED ZONE CONTACT ON FIGURE 3.8

2) HAMMER IS 1 FOOT IN HEIGHT.

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OUTCROP OF PERCHED AQUITARD ALONG BEAN CREEK

FIGURE 4.7

WI007781

material. The conglomerate elicits a high gamma response on geophysical logs probably due to a high igneous rock composition of the gravels and high resistivity due to a high silica content.

Cross-sections D-D', E-E', F-F' and G-G' illustrate the position of the perched and regional aquifers in relation to the geological environment (Figures 4.5 and 4.6). The perched water table is approximately 30 to 40 feet above the regional water table in the vicinity of the Watkins-Johnson plant site. The location of the perched aquifer is identified by water levels in shallow wells and by geophysical methods. As exhibited in cross-sections D-D' and E-E', the perched zone occurs above a stratigraphic unit with relatively high gamma and resistivity signatures. This unit, from just a few feet to up to 10 feet in thickness, appears to act as the aquitard and lower limit of the perched water body.

The contour map of the top of the aquitard (Figure 4.4), illustrates the known and inferred lateral extent of the surface of the geologic stratum or aquitard which supports the perched zone. The structure contour map exhibits an irregularly shaped depression centered at the northwest corner of the site. The unit is thought to terminate as it intersects surface topography to the north, at an exposure in a cut-bank along the south side of Bean Creek, and to the northwest along Lockhart Gulch Road. Subsurface elevations of the Monterey Formation (Figure 2.8 and 4.4) east of the plant in the Montevalle Subdivision area and southwest of the plant at Sky Park Airport indicate the aquitard terminates against the Monterey highlands in these areas.

The aquitard is not continuous over a broad area and contains at least one stratigraphic "hole" through which perched ground-water may leak down into the regional zone. Coarse gravelly material, such as that comprising most of the perched aquitard, is deposited under high-energy hydrologic conditions. Transport of coarse material, such as gravels is most likely to occur in the high-energy flow regimes of channels which are cut by water moving at high velocities. Gravels are transported as bed-load sediments of the channels. With aggradation and lateral migration of channels, gravel beds are deposited over areas which are much larger in areal extent than the area covered at any one time by the original channels. However, blanket coverage of a very large area by such a deposit in the Santa Margarita Formation is unlikely for a number of reasons. Primarily, the near-shore shallow marine environment, in which sediments in the Santa Margarita Formation

WJ007782

were deposited, is a highly erosive one. Not only may gravels not be deposited in all areas, but channel migration cuts through existing sediments and severe storms commonly disrupt large sections of previously deposited sediments. Such erosion results in discontinuous deposits. In addition, large variations in permeability of the gravelly deposits can be expected to provide holes in the aquiclude, depending on the availability of fine-grained materials contemporaneous with deposition and the ability of the fines to accumulate in the pore space of the gravels. Where such holes exist, the rate of leakage is faster than the normally occurring rate of vertical recharge from the perched zone to the regional zone of the Santa Margarita aquifer. Well WJ-38 completed during the Spring 1988 field program has had water-levels a few feet lower than would be expected of a perched zone well at its location. Examination of the construction and geophysical logs (Appendix A, Figure A.47) indicate that the well bottom was completed in the aquitard as called for in the SAP Specifications (RLSA, March 1988). Since the water-level is depressed and an aquitard exists the evidence gives indication that the aquitard is thin or for some reason more permeable in this location. This location may be an area of increased vertical flow and therefore an area of greater recharge to the regional zone.

Hydrographs and geophysical logs for wells north of the plant provide evidence that Bean Creek is connected to the perched zone east of its confluence with Ruins Creek. This evidence is presented and discussed in Section 5.7 on stream-aquifer interactions.

During the Spring 1988 RI/FS field program data were collected to aid in determining hydraulic characteristics of the perched zone using data from a recharge test and soil sample hydraulic tests. A recharge test, where 150 gallons per minute (gpm) were injected into the perched zone through the Building 8 leach field, is described in Section 4.5 and also in the draft report Remedial Investigation Watkins-Johnson, Scotts Valley, Perched Zone Recharge Study (RLSA, May 1988c). A hydraulic conductivity of 400 to 600 gallons per day per foot squared (gpd/ft^2) was calculated from the test data. Soil samples collected in the perched zone at depths of 85 feet (WJ-43) and 98 feet (WJ-38) were tested for hydraulic factors including effective porosity and vertical hydraulic. A bromide breakthrough analysis was used for the program test according to State Water Resources Control Board, and EPA Method 9100 for hydraulic conductivity. Samples analyzed for effective porosity will help in fine-tuning the ground-water model and in calculating the ground-water flow rate. Porosity, in a hydrogeologic context, is the ratio of the volume of void spaces in a rock or soil to the total volume of the rock or soil. It is that

amount of interconnected pore space through which ground water can pass and is expressed as a percent bulk volume. A portion of the total porosity will be occupied by static fluid being held to the grain surface by surface tension, therefore effective porosity will be less than the total porosity. Knowledge of the effective porosity of the perched zone, aquiclude and regional zone will aid in determning hydrogeologic characteristics of these zones. The results of the effective porosity test were 0.33 for the soil sample from 98 feet and 0.46 from the sample at 85 feet. These results show that compaction is greater at depth when compared with the regional zone sample at 150 feet which had an effective porosity of 0.18. Vertical hydraulic conductivity values were extremely low which was probably due to compaction of the sample during sampling.

4.5 Perched Zone Ground-Water Flow System

The perched aquifer is characterized on the plant site by water levels from 70 to 90 feet below land surface (Figures 4.5 and 4.6). The thickest saturated section occurs beneath the leach field on the northern part of the plant site. Here, the saturated thickness of the perched zone may be 15 or more feet. Elsewhere on the plant site, the saturated thickness of the perched zone is generally less than ten feet. The perched ground-water body is apparently reduced to the north and south of the Watkins-Johnson site to thicknesses of a few feet or less. A ground-water mound occurs in the perched zone west of Building No. 8 and displays a radial flow pattern. Except in the area of the mound, the apparent flow direction is toward the north. The mound is caused by the recharge of water into the dry-well disposal system which operates at the north end of the parking lot near wells WJ-13 and DH-1. In January 1988, recharge to the perched zone was terminated as the water was discharged to the Scotts Valley municipal sewer system. After the recharge test in April, (discussed below) it was decided to attempt to keep the perched zone flow configuration similar to historical patterns. Therefore, water from the treatment system was the again recharged to the perched zone through the Building 8 Leach field at a rate of 21,600 gallons per day (gpd). This was initiated in June, 1988.

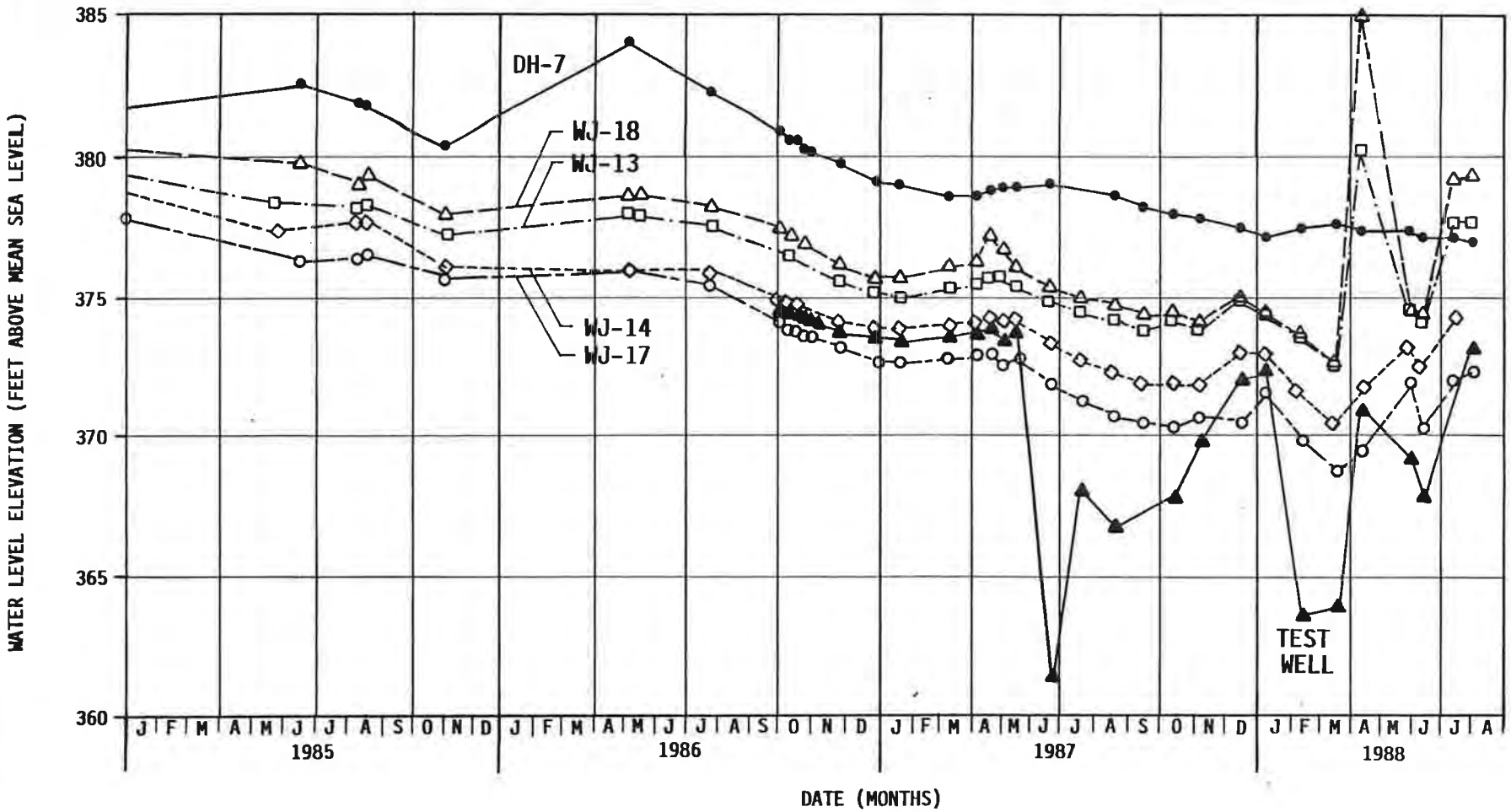
The hydrographs of select perch zone wells (Figure 4.8) indicates that water levels in the perched zone were generally declining before remedial pumping began in October 1986. The decline may have been due to a regional reduction in natural recharge, or to changes in the rate at which water was being recharged into the perched zone at the plant site.

For example in 1984, it was reported that about 25,000 (gpd) were being recharged to the perched zone. After initiation of the remedial action program, it estimated that the amount of injected recharge had been reduced from 25,000 to 13,000 gpd. It also indicates that the pumpage from the regional zone is not having a measurable impact on water levels.

The zone was characterized in October 1986 in the central plant area by a water table about 23 feet higher than the regional water table. Figure 4.2 shows perched zone water levels one year after remedial action pumping collected on October 22, 1987. Due to drawdown caused by pumping from the regional aquifer, there had been an additional 12 feet or about 35 feet of separation between the regional and perched water tables beneath the plant area. This indicates that leakage between the two zones is not governed by head differences.

The configuration of the perched zone October 22, 1987 (Figure 4.2), is fairly representative of the general configuration of zone during the first year of remedial action activities. The general ground-water flow gradient is northward and somewhat diverges to the northwest and northeast depending on the extent of the ground-water mound beneath the parking lot. The Test Well began pumping from the zone in April 1987 and created a small cone-of-depression. The perched zone water-table configuration mapped before the Test Well pumping started is similar except for the small cone-of-depression. The hydrographs on Figure 4.8 show that water levels in the perched zone generally declined during 1987. Although RA-5 and the Test Well were pumping less than 5 gpm they had some affect as did reduced recharge.

Figure 4.9 shows the perched zone water table on January 20, 1988. The cone-of-depression around the Test Well on the western side of the north parking lot has disappeared. Clogging of the discharge pipe in the Test Well had greatly reduced withdrawal rates and caused the pump motor to burn out, the pump was pulled from the casing and the well serviced. Following water-level measurements on January 20, 1988, a new pump was installed in the Test Well and pumping commenced. Simultaneously, in January 1988, water formerly injected into the perched zone was diverted to the Scotts Valley municipal sewer system. The accelerated ground-water mound decay can be seen on the hydrograph of WJ-14 (Figure 4.8) and in the perched zone map for March 28, 1988, which shows a greatly diminished mound, (Figure 4.10).



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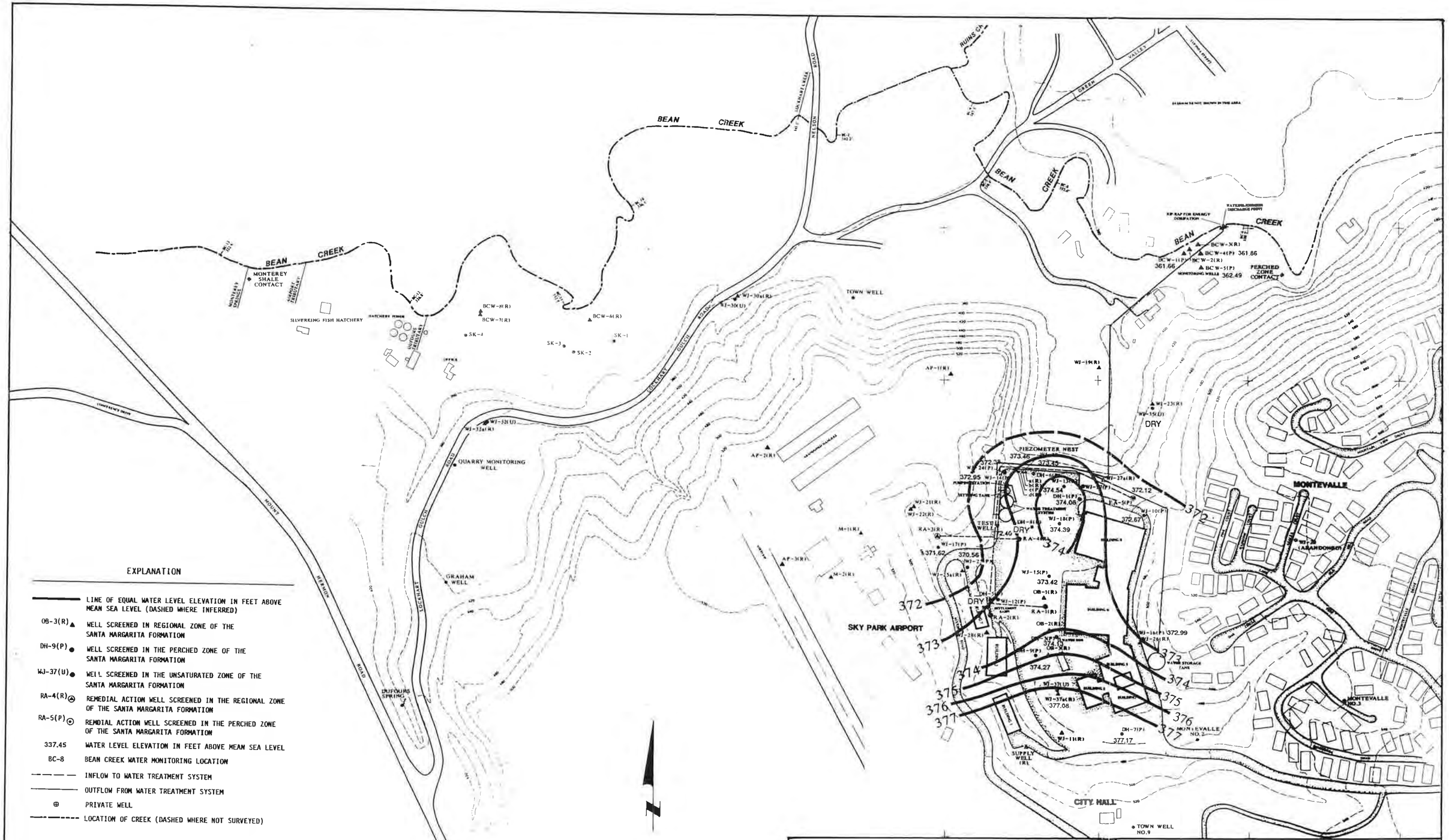
WATER-LEVEL CHANGES IN PERCHED ZONE-HYDROGRAPHS FOR WELLS DH-7, TEST WELL, WJ-14, WJ-17 AND WJ-18

FIGURE 4.8

WJ007786



EXPLANATION

- LINE OF EQUAL WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

NOTE: WELLS WJ-12, WJ-24 AND WJ-27 WERE NOT USED TO CONSTRUCT THIS MAP.

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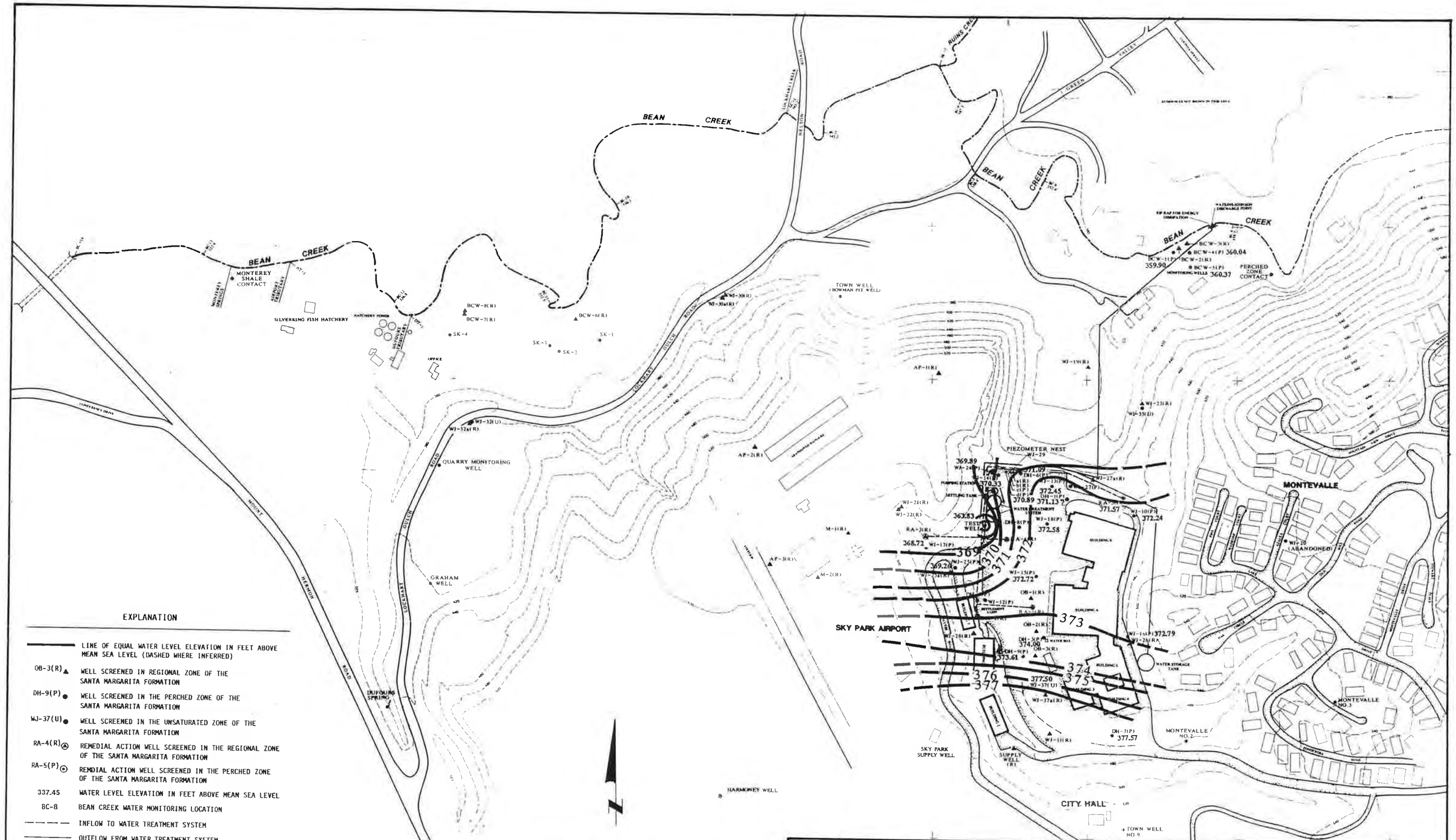
PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF PERCHED WATER TABLE
JANUARY 20, 1988

FIGURE 4.9



EXPLANATION

- LINE OF EQUAL WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

Note: WJ-24 and WJ-27 not used to construct this map

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PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF PERCHED WATER TABLE
MARCH 28, 1988

FIGURE 4.10

A perched zone recharge study was conducted during April and May, 1988, to determine perched zone aquifer coefficients and to evaluate the capacity of the perched zone in receiving large volumes of water from the treatment system. This was done to aid in determining water reuse options which will be implemented later in the RI/FS. The recharge test was also run to re-establish the ground water mound beneath the north parking lot. The presence of the mound inhibits flow of the contaminant plume to the north and helps push contaminants toward the pumping Test Well. Results and procedures of the study are described in the draft report Remedial Investigation Watkins-Johnson, Scotts Valley, California, Perched Zone Recharge Study (RLSA, May 1988c). Up to 150 gpm were injected into the Building 8 Leach field from April 8 to 20, 1988. Water levels were recorded in a number of wells during recharge and then a recovery period during the following week. A hydraulic conductivity range of 400 to 600 gallons per day per square foot (gpd/ft^2) was calculated for the perched aquifer from the test data. Examination of the hydrographs on Figure 4.8 show the steep water level increase in wells near the leach field. Well DH-7 to the south shows no visible affect. Upon preliminary approval the stepwise recharge plan to the perched zone was implemented starting at 15 gpm in June, 1988. The injection of 15 gpm is readily seen by the configuration of the perched water table based on August 8, 1988, water levels. An enlarged mound exists under the Building 8 leach field in the north parking lot (Figure 4.11) as compared to no mound as shown by the configuration of the water table mapped with no recharge (Figure 4.10). Besides preventing flow of contaminants to the north toward Bean Creek a potential positive effect of the recharge will be to drive contaminants toward the Test Well.

Additional perched zone water-table configurations and hydrographs are shown in Appendix E. Water-level measurements are also contained in Appendix E.

4.6 Perched Zone Plume Definition

Contamination was first detected in water samples from the perched zone wells in June, 1984. Sampling, which has been done on a quarterly basis since before the startup of remedial action pumping at Watkins-Johnson in October, 1986, has enabled definition of contaminant plumes in the perched zone. TCE, as the major constituent, has been mapped and used to determine changes in the distribution of contaminants in the perched zone.

WJ007789

EXPLANATION

- LINE OF EQUAL WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- BC-8 BEAM CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

0 300 600 FEET

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PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF PERCHED WATER TABLE
AUGUST 8, 1988

FIGURE 4.11

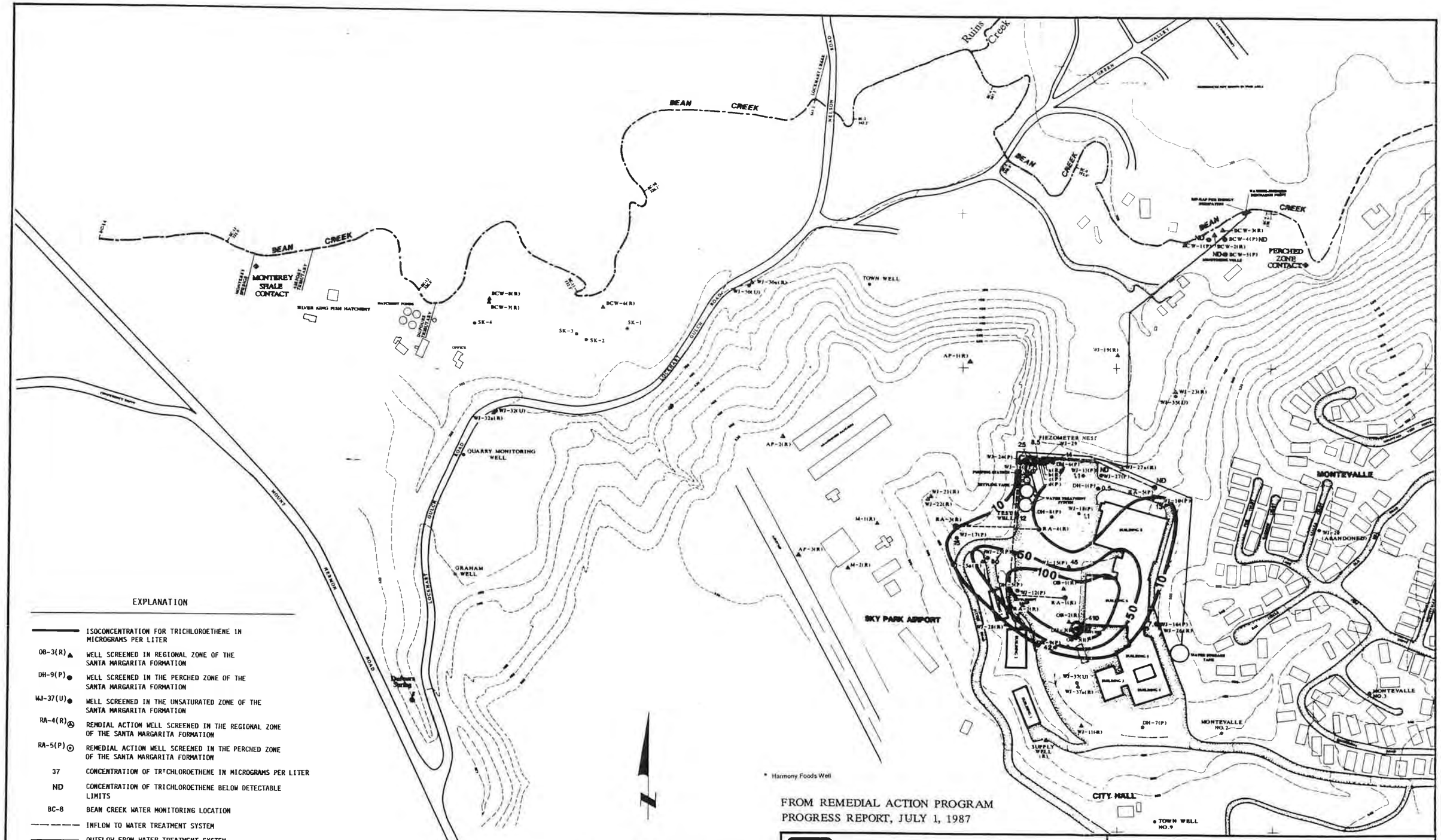
WJ007790

The overall extent of the TCE plume has changed little as it has generally been confined to the vicinity of the Watkins-Johnson plant. The TCE plume map for May 1987 is shown in Figure 4.12. The shape of the contaminant plume generally follows the flow system as depicted in Figure 4.2 and 4.9. Two TCE lobes are apparent in the May 1987 TCE distribution on either side of the mound. In March and June, 1988 the first two rounds of the EPA RI/FS sampling was completed. TCE plumes for these sampling events are shown in Figures 4.13 and 4.14. As with all previous TCE distribution maps the center of mass of the TCE plume is around DH-3. This area of high TCE concentration includes the area between Buildings 6 and 8 for June, 1988 as this was the first time WJ-38 was sampled. High concentrations at DH-3 appear to be directly related to contamination problems originating at or near the former Building 6 dilution tank (removed on March 27, 1987) and the reported soil contamination at this point as discussed in Sections 3.2.2.1 and 3.4.5. The level of TCE contamination detected in the DH-3 water sample for June, 1988 was 460 ug/l. A graph of TCE versus time in DH-3 the Test Well and WJ-15 is shown on Figure 4.15. Figure 4.15 shows that DH-3 has generally had high TCE levels, whereas the other two wells have been low and remained low a pattern found throughout the perched zone well.

Building a high ground-water mound beneath the Building 8 Leach field is important is stopping the TCE plume from migrating north in the perched zone, and eventually to Bean Creek. If the mound is large enough the lobe of the plume heading to the northeast will be blocked and flow in the perched zone beneath the plant will be to the northwest.

Contamination in the perched zone that moves toward the northwest and is not captured by the pumping Test Well will move toward an area where the aquitard was not found (see Figure 4.4). If the contaminants reach this area and move vertically down into the regional zone they will be captured by the remedial action pumping system in the regional zone.

The existence of a ground-water mound has an affect on plume definition. In March, 1988, the configuration of the perched zone showed a greatly diminished mound under the north parking lot. The March TCE plume map (Figure 4.13) shows that the usual northeast and northwest tending lobes of the contaminant plume, are not well defined After the recharge test and subsequent constant recharge which commenced in June, 1988, the lobes are more obvious. As shown on the June, 1988 TCE plume map (Figure 4.14).



EXPLANATION

- ISOCONCENTRATION FOR TRICHLOROETHENE IN MICROGRAMS PER LITER
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) REMDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) REMEDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 37 CONCENTRATION OF TRICHLOROETHENE IN MICROGRAMS PER LITER
- ND CONCENTRATION OF TRICHLOROETHENE BELOW DETECTABLE LIMITS
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

FROM REMEDIAL ACTION PROGRAM PROGRESS REPORT, JULY 1, 1987

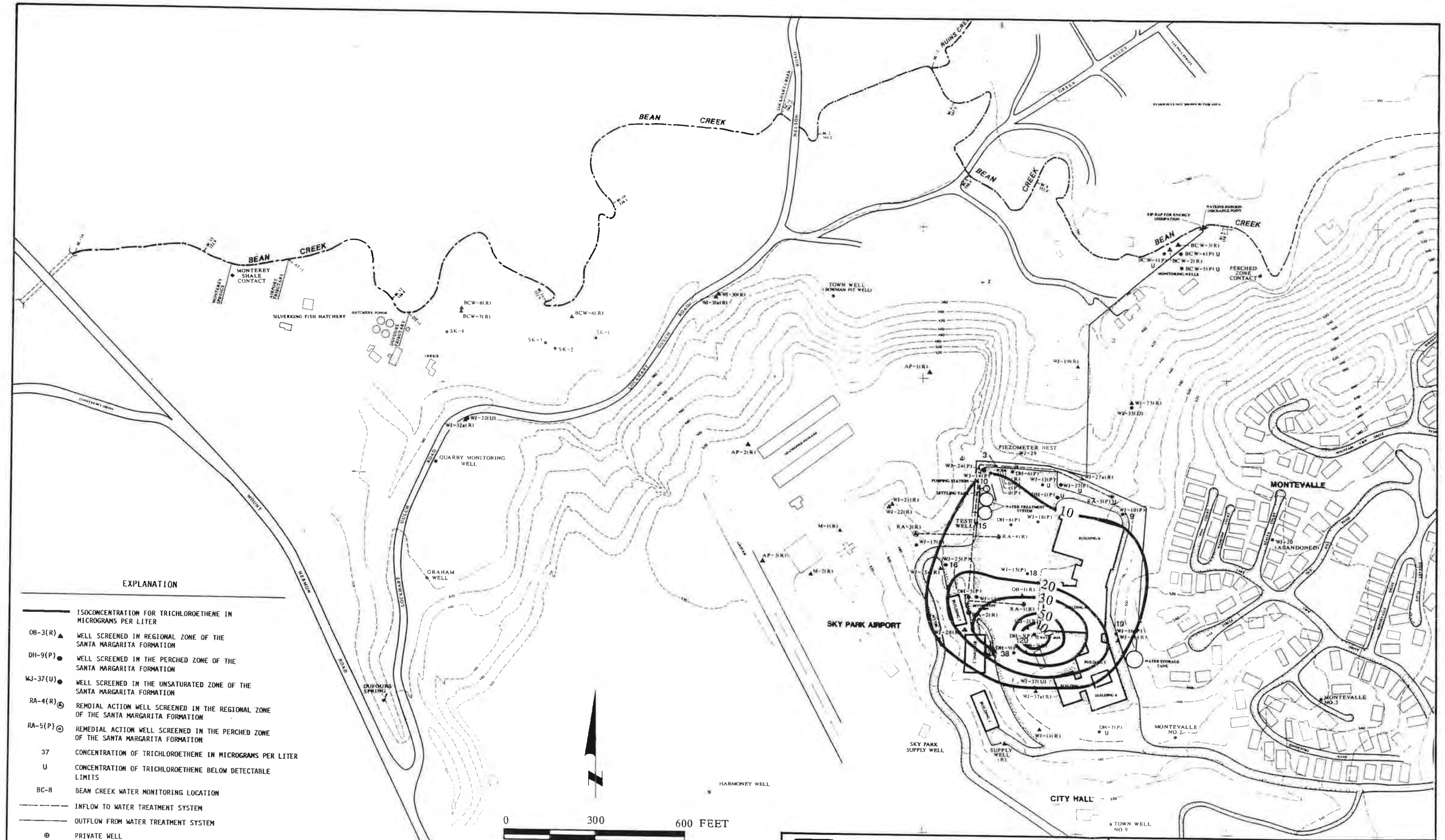
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

DISTRIBUTION OF TRICHLOROETHENE IN PERCHED ZONE, MAY 22 TO 26, 1987

FIGURE 4.12



EXPLANATION

———	ISOCONCENTRATION FOR TRICHLOROETHENE IN MICROGRAMS PER LITER
OB-3(R) ▲	WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
DH-9(P) ●	WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
WJ-37(U) ●	WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
RA-4(R) Ⓐ	REMDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
RA-5(P) ⊙	REMEDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
37	CONCENTRATION OF TRICHLOROETHENE IN MICROGRAMS PER LITER
U	CONCENTRATION OF TRICHLOROETHENE BELOW DETECTABLE LIMITS
BC-8	BEAN CREEK WATER MONITORING LOCATION
- - - - - -	INFLOW TO WATER TREATMENT SYSTEM
———	OUTFLOW FROM WATER TREATMENT SYSTEM
⊕	PRIVATE WELL
—·—·—	LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

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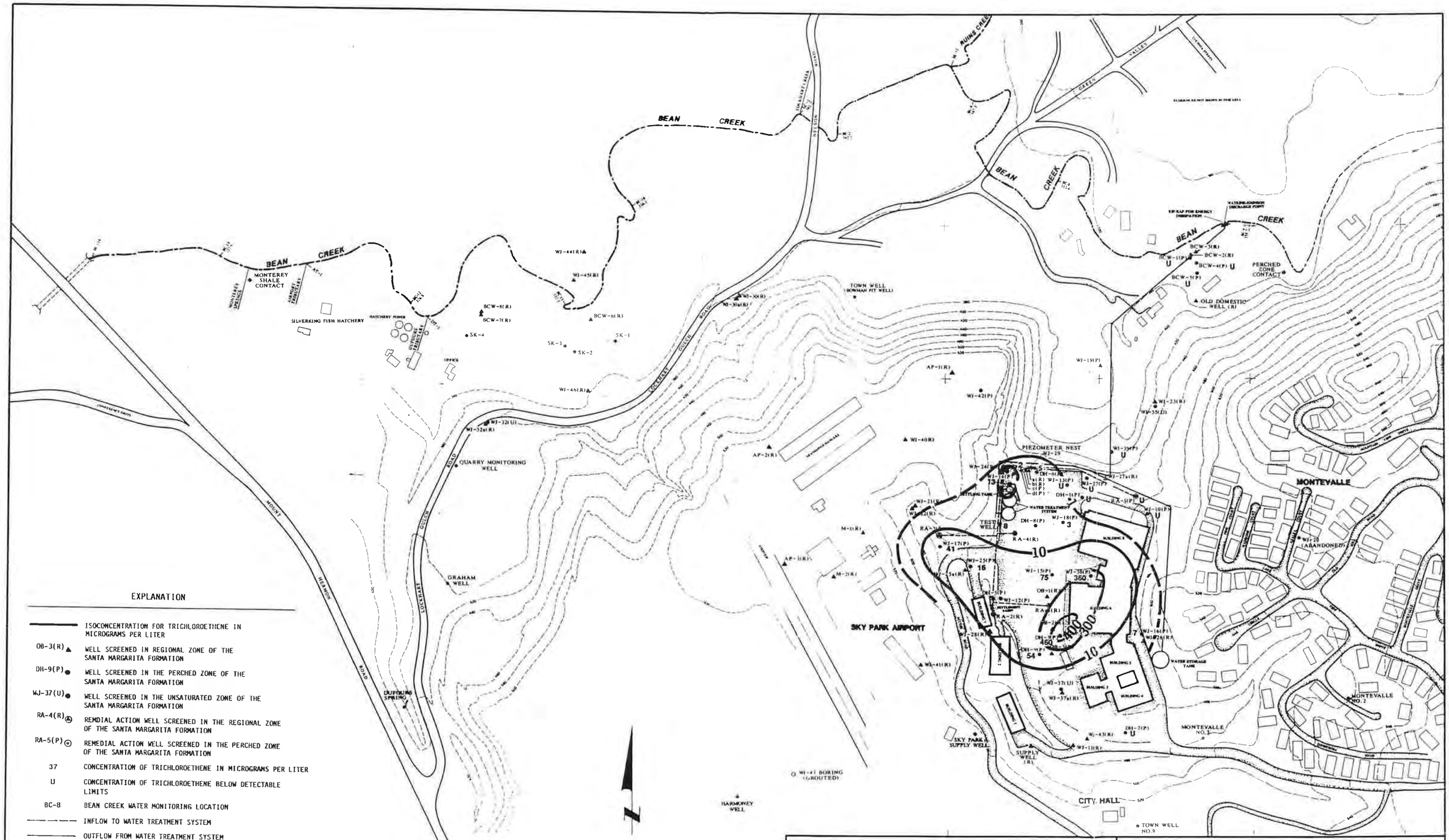
PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

DISTRIBUTION OF TRICHLOROETHENE IN PERCHED ZONE, MARCH 8 TO 17, 1988

FIGURE 4.13



EXPLANATION

———	ISOCONCENTRATION FOR TRICHLOROETHENE IN MICROGRAMS PER LITER
OB-3(R) ▲	WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
DH-9(P) ●	WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
WJ-37(U) ●	WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
RA-4(R) Ⓐ	REMDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
RA-5(P) ⊙	REMEDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
37	CONCENTRATION OF TRICHLOROETHENE IN MICROGRAMS PER LITER
U	CONCENTRATION OF TRICHLOROETHENE BELOW DETECTABLE LIMITS
BC-8	BEAN CREEK WATER MONITORING LOCATION
— — — —	INFLOW TO WATER TREATMENT SYSTEM
———	OUTFLOW FROM WATER TREATMENT SYSTEM
⊕	PRIVATE WELL
—·—·—	LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

R.L. STOLLAR & ASSOCIATES INC.
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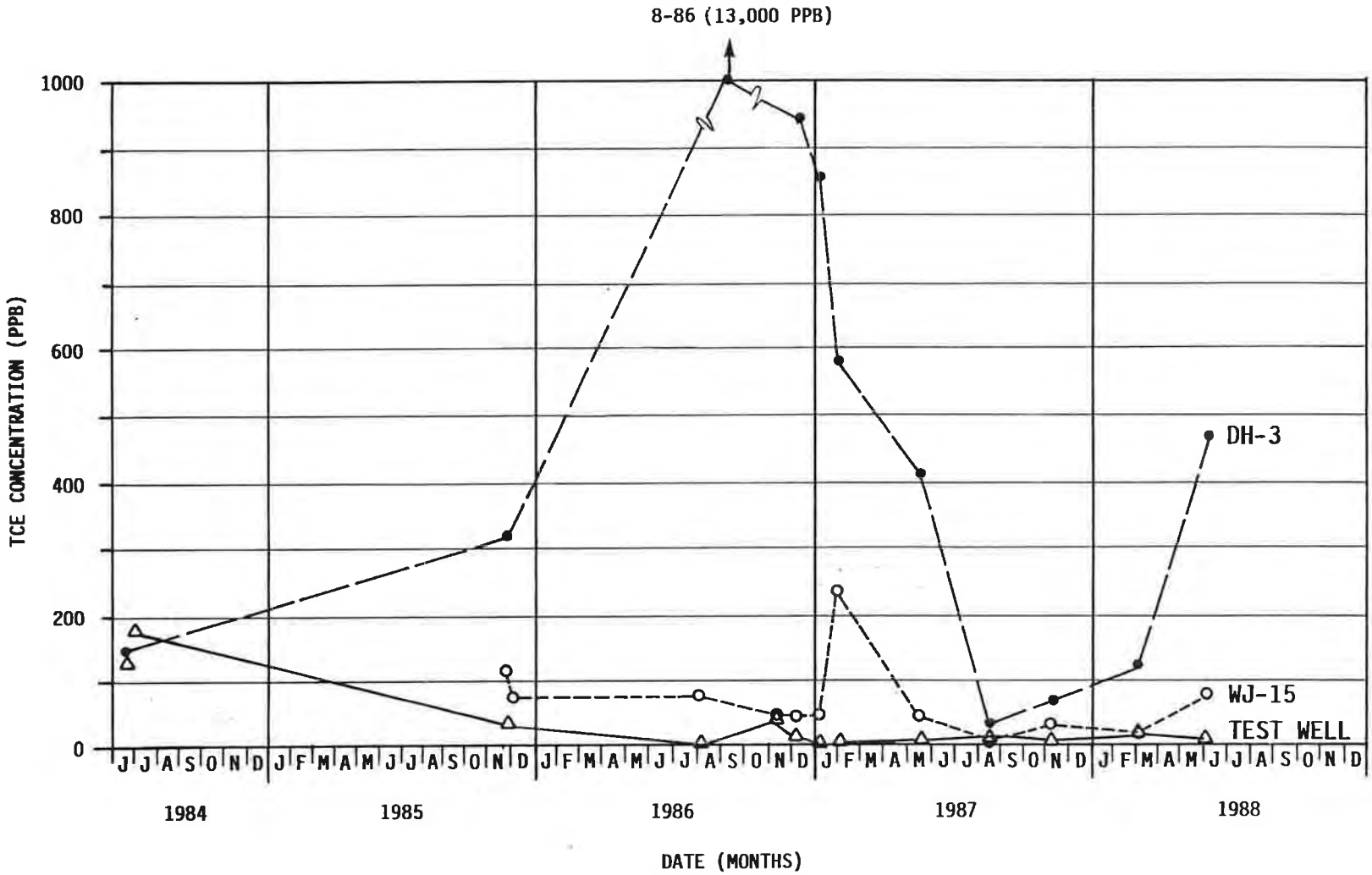
PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

DISTRIBUTION OF TRICHLOROETHENE IN PERCHED ZONE
JUNE 13 TO 20, 1988

FIGURE 4.14

W100770



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PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONCENTRATION OF TRICHLOROETHENE VERSUS TIME IN WELLS DH-3, TEST WELL AND WJ-15

FIGURE 4.15

WJ007795

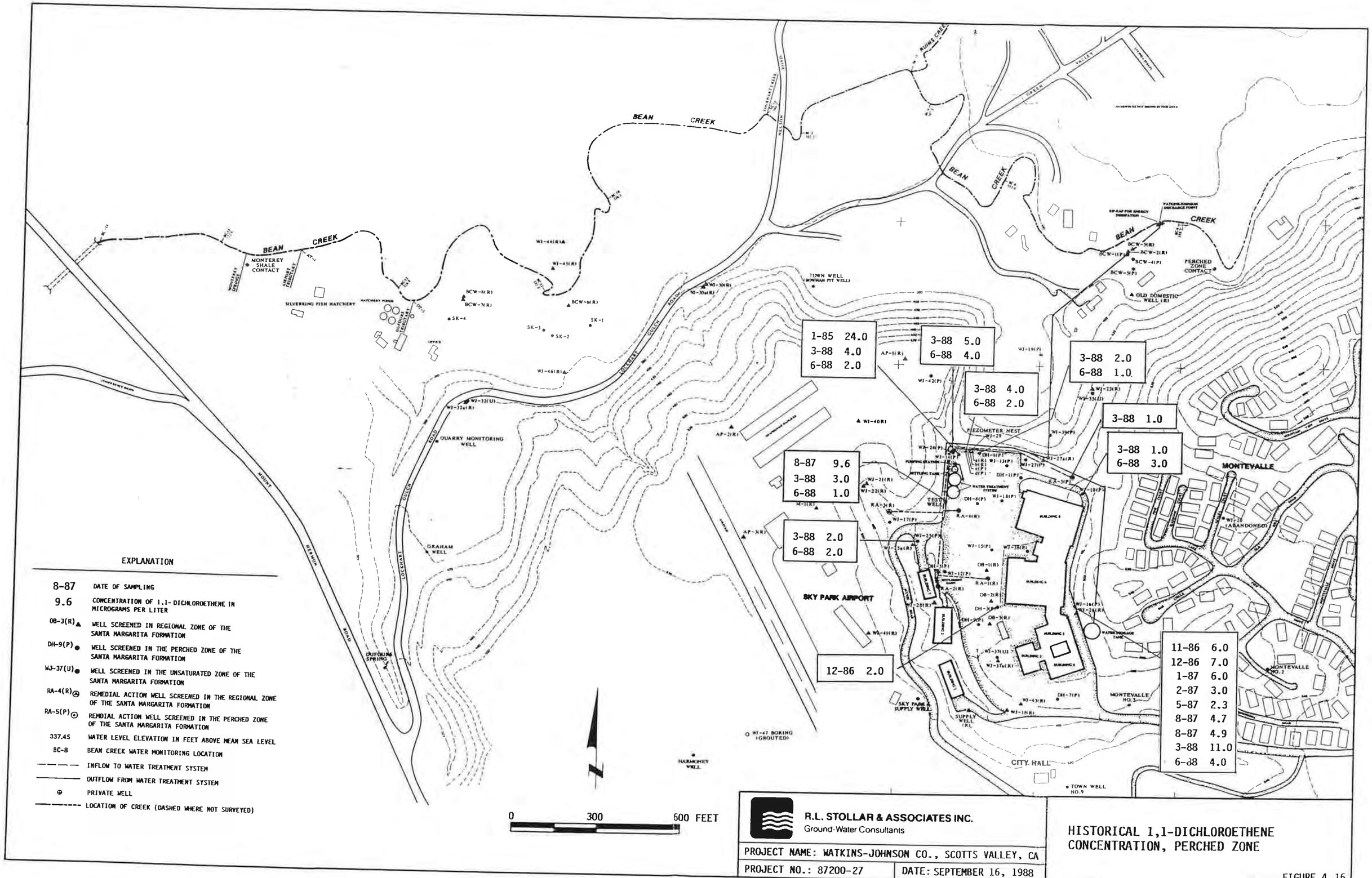
Presently, only the Test Well is pumping. Well RA-5 is used only as an observation well. In the past neither had been capable of producing more than 5 gpm on a sustained basis so that their individual influence on plume movement was probably small due to other factors, such as the mound.

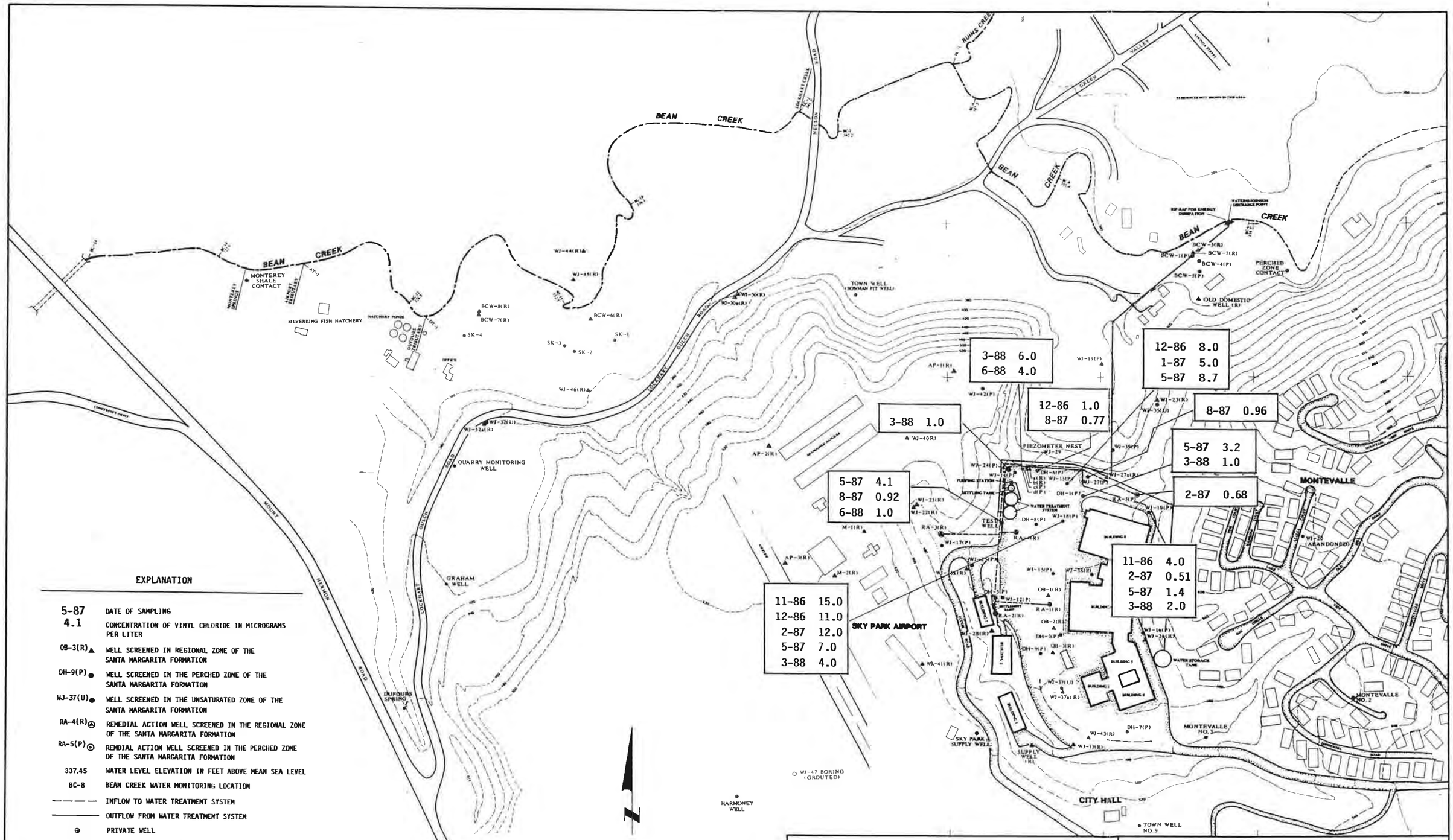
As discussed in Section 4.3, there appears to be an area of increased vertical movement of ground water from the perched zone to the regional zone in the vicinity of WJ-38 near Building 6. This is also an area between the mound and the higher perched water levels beneath the south parking lot where the higher TCE concentrations have been detected (Figure 4.14). Not only will contaminants probably migrate from the DH-3 toward and past WJ-38 but may be migrating down to the regional zone.

Besides TCE, other constituents of concern in the ground water beneath Watkins-Johnson have been 1,1-DCE and VC. Figure 4.16 and 4.17 show concentrations of 1,1-DCE and VC from validated samples for the RI/FS sampling rounds. Detection of significant amounts of 1,1-DCE was limited to DH-6, DH-7, Test Well, WJ-14, WJ-16, WJ-25, and WJ-29D. These wells are on the edge of the TCE plume (Figure 4.14). VC was detected in 5 perched zone wells in March but only in two wells in June. These occurrences were in the Test Well and WJ-29D.

Additional maps showing the distribution of TCE during previous quarterly sampling rounds done under RWQCB remedial action program are shown in Appendix F. The following section on Analysis of Results discusses the chemicals detected, concentration levels under the RI/FS program and probable origins and transformations.

As the contaminants detected in the soil have been identified as the probable source for contamination in the perched zone; a similar relationship exists between the perched and regional zones of the Santa Margarita aquifer. Since the perching aquitard is a semi-permeable barrier, contaminated ground water is migrating vertically downward into the regional zone. This migration is probably accelerated by flow through holes or thin spots in the aquitard and potentially through gravel packs surrounding cross-connecting wells. Possible cross-connecting wells were identified in the report Well Survey and Potential Conduits Evaluation (RLSA, May 1988a). An example of a thin area or area of higher flow through the aquitard may be near WJ-38 as discussed in Section 4.3 on the Perched Zone Ground-Water System.


BEAN CREEK
MONTEREY SHALE CONTACT
SILVERBERG FISH HATCHERY
QUARRY MONITORING WELL
GRAHAM WELL
DUFOURNE SPRING
HARMONEY WELL
TOWN WELL (NEWMAN PIT WELL)
SKY PARK AIRPORT
PIEZOMETER NEST WJ-29
TEST WELL
SKY PARK SUPPLY WELL
SUPPLY WELL (R)
WJ-47 BORING (GROUTED)
CITY HALL
TOWN WELL NO.9
MONTEVALLE
MONTEVALLE NO.2
MONTEVALLE NO.3
OLD DOMESTIC WELL (R)
PERCHED ZONE CONTACT
WATKINS-JOHNSON DISCHARGE POINT
RIP-RAP FOR ENERGY DISSIPATION
1-85 24.0
3-88 4.0
6-88 2.0
3-88 5.0
6-88 4.0
3-88 4.0
6-88 2.0
3-88 2.0
6-88 1.0
3-88 1.0
3-88 1.0
6-88 3.0
8-87 9.6
3-88 3.0
6-88 1.0
3-88 2.0
6-88 2.0
12-86 2.0
11-86 6.0
12-86 7.0
1-87 6.0
2-87 3.0
5-87 2.3
8-87 4.7
8-87 4.9
3-88 11.0
6-88 4.0
EXPLANATION
8-87 DATE OF SAMPLING
9.6 CONCENTRATION OF 1,1-DICHLOROETHENE IN MICROGRAMS PER LITER
08-3(R) WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
DH-9(P) WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
WJ-37(U) WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
BC-8 BEAN CREEK WATER MONITORING LOCATION
INFLOW TO WATER TREATMENT SYSTEM
OUTFLOW FROM WATER TREATMENT SYSTEM
PRIVATE WELL
LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)
0 300 600 FEET
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA
PROJECT NO.: 87200-27
DATE: SEPTEMBER 16, 1988
HISTORICAL 1,1-DICHLOROETHENE CONCENTRATION, PERCHED ZONE
FIGURE 4.16



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PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

HISTORICAL VINYL CHLORIDE CONCENTRATION S, PERCHED ZONE

FIGURE 4.17

4.7 Analysis of Perched Zone Ground-Water Quality Results

The ground-water monitoring program at Watkins-Johnson has included water quality analysis from the perched and regional zone wells during both the RWQCB and EPA phases. During the RWQCB program the primary analysis was for EPA 601 compounds since these were the major constituents of the contaminant plumes; particularly TCE. The first two quarterly rounds of ground-water sampling for the EPA RI/FS took place during March 8 - 17, 1988 and June 13 - 20, 1988. Sampling and analysis procedures for the RI/FS ground-water sampling program are outlined in the QAPP (RLSA, February 1988) and SAP (RLSA, March 1988).

The first quarter sampling under the RI/FS included the complete suite of chemical parameters on the Toxic Compound List (TCL). Sufficient sample volume, as specified in the SAP were collected and sent to Acurex, an EPA approved laboratory, for the following analytical suites:

Purgeable halocarbons - EPA Method 601
Volatile organics - EPA Method 624
Organochlorine pesticides and PCB - EPA Method 608
BNA extractables - EPA Method 625
Dissolved metals analysis - EPA Methods 06010, 7000, 7060 and 7470
Total cyanides analysis - EPA Method 9010

Additional soil samples were collected in the saturated perched zone for TOC analysis. The results are described in Chapter 3 of the soil investigation. During the second quarter RI/FS round, samples were collected and analyzed for purgeable halocarbons (EPA Method 601) only. The following sections discuss the analysis results for the TCL suites; purgeable halocarbons, volatile organics, semivolatile organics, and inorganics. A summary section of contaminant pathways follows these sections.

4.7.1 Purgeable Halocarbon Analyses - Perched Zone

Table 4.1 summarizes the results of purgeable halocarbon analysis using EPA Method 601 on ground-water samples from the perched zone. Of the 31 analytes the purgeable halocarbon analysis 13 were found in concentrations at or above the SQL. At least one purgeable halocarbon appeared in 20 of 24 perched zone wells sampled.

WJ007799

Table 4.1

Results of Purgeable Halocarbon Analysis (EPA Method 601) in Perched Zone (in micrograms per liter)[1] March 8-17, 1988[2] and June 13-20, 1988[3]

Wells	VC		Freon II		1,1-DCE		Freon-113		1,1-DCA		C-DCE		CF		1,1,1-TCA		TCE		1,1,2-TCA		PCE		1,4-DCB		1,2-DCB	
RA-5						J1					4	6			1										2	
DH-1	1/U		3/U						1/1		4/2												2/2			
DH-3												18/17					120/110	J460/J440			7/U	16/U				
DH-6				1	2	1			0,J5	3	2	5					5	5						4		3
DH-7						1	4	3																		
DH-9											1	2/2			1	U/2	J38	J37/J54	1		J25	J6/J10				
TEST WELL		1		2	3	1			5	4	12	6	7				15	8			.6			1		3
WJ-10	J2		14		1	3			1	5	2	6					11						1	3	7	4
WJ-13										1		3						1						3		
WJ-14			2/2		4/4	2			1/1	3	4/4	7					8/10	13								
WJ-15										3		4				1	18	75		2						3
WJ-16					11	4	8	3	1						10	3	22	7	3			20				
WJ-17			U/1				1/U		U/5	4							J43 J44	41								
WJ-18	4										41/49	42														
WJ-24	1		2		5	4			1	2	3	3					4	6				1				2
WJ-25				1	2	2			6	5	15	8					16	16				3			J1	3
WJ-27										U/1		3														
WJ-29D	6	4	3	2	4	2			2	3	4	6					3	2						3	4	8
WJ-38																		360/300								
WJ-39																						6				

[1] J indicates estimated: 1/1 indicates sample/duplicate

[2] March 1988 results in first column

[3] June, 1988 results in second column

Blank means below detection limit

WJ007800

As shown on Table 4.2, 6 of the 13 measured chlorinated aliphatic compounds have been reported to have been used by Watkins-Johnson based on the list shown in Appendix B. These six are: Freon 11, Freon 113, 1,1,1-TCA, TCE, PCE, and 1,2-DCB. Four compounds VC, 1,1-DCE, 1,1-DCA and, C-DCA, are potential breakdown products of the first group of 5 compounds detected which are reported to be used at the site. As described in Section 3.4.1, which discussed purgeable halocarbon analysis of the soil samples, the degradation pathway may be through a combination abiotic and biotic steps. There are four possible degradation pathways of chlorinated ethene and ethane compounds which may explain the occurrence of certain compounds in the ground-water at Watkins-Johnson:

1. PCE -> TCE -> 1,1 DCE or T-DCE or C-DCE -> VC
2. 1,1,1-TCA -> 1,1 DCE -> VC
3. 1,1,1-TCA -> 1,1 DCA -> Chloroethane (CA)
4. 1,1,2-TCA -> 1,2 DCA -> CA

Although 1,2-DCA was initially detected during the RI/FS sampling rounds its frequent occurrence has been traced to contamination of the laboratory acid used to preserve the samples. The QC procedure used to qualify this problem is described in Section 6.1.1.3.

Three other compounds not reported to be used at the site were found in the perched zone ground-water samples. These are CF which only appeared in the Test Well, 1,1,2-TCA, and 1,4-DCB. The concentrations of 1,1,2-TCA are at or near the detection limit, the source of 1,1,2-TCA could be as a contaminant in compounds known to be used on site. CF and PCE were found in the soil samples as reported in Section 3.0. Their presence in the soil and as a source for the contamination found in the perched zone is discussed more fully in the pathways discussion in Section 4.7.5. Although not reported to be used onsite 1,3-DCB was found in 5 out of 6 samples with 1,2-DCB which was used onsite. Concentrations of 1,4-DCB are generally lower than 1,2-DCB and at or near the detection limit. As an aid for the endangerment assessment (RI/FS Task 8) a staticial table of positive detects for RI/FS purgeable organics analysis showing the mean, max, and standard deviation is provided (Table 4.3). The mean is weighted by considering all nondetects as equal to half the detection limit and also by considering all estimated values and duplicates as valid concentrations.

Table 4.2

Measured Chlorinated Aliphatic Compounds
in Ground Water Samples Collected during March 8 to 17, 1988
and June 13 to 20, 1988

Compound	Group	Used On-site[1]	Potential Degradation Product of Other Detected Compounds[2]
VC	2	No	Yes
Freon 11	1	Yes	No
1,1-DCE	2	No	Yes
Freon 113	1	Yes	No
1,1-DCA	2	No	Yes
t-DCE	2	No	Yes
c-DCE	2	No	Yes
CF	3	No[3]	No
1,1,1-TCA	1	Yes	No
TCE	1	Yes	Yes
1,1,2-TCA	3	No[4]	No
PCE	1	Yes	No
Benzyl Chloride	3	No[3]	No
1,2-DCB	3	No[3]	No
1,4-DCB	1	Yes	No

1 - Appears in General List of Chemicals Reportedly used by Watkins-Johnson Appendix B.
2 - Potential degradation product of compound used or found on site.
3 - Source not identified.
4 - Source not identified, may be due to impurity of a purchased solvent.

180.5

WJ007802

Table 4.3

Statistics on Compounds Found in Perched Zone Samples for Purgeable Halocarbon and Semivolatile Organics Analyses

Organics (601)	Detects/Samples	Mean[2]	Max	(S)[3]
Vinyl Chloride	7/52	1.48	6	2.71
Trichlorofluoromethane	11/52	1.71	14	3.12
1,1-Dichloroethene	19/52	2.09	11	2.97
Freon-113[1]	5/48	1.04	8	1.42
1,1-Dichloroethane	24/52	2.07	6	2.76
Cis-1,2-Dichloroethene	30/52	6.32	49	10.47
Chloroform	1/52	1.33	7	2.70
1,1,1-Trichloroethane	6/52	1.47	10	2.86
Trichloroethene	33/52	44.36	460	105.54
1,1,2-DTrichloroethane	3/52	1.26	3	2.60
Tetrachloroethene	10/52	2.93	25	5.45
1,4-Dichlorebenzene	9/52	1.48	4	2.63
1,2-Dichloroebenzene	12/52	1.87	8	2.88
Semivolatiles (625)				
DI-N-Butylphthalate	2/24	4.70	2	1.05
BIS-(2-ethylhexyl)phthalate	2/24	10.33	140	27.69
1,2-Dichlorobenzene	3/24	4.75	3	0.68

(1) Data rejected on 4 analyses
(2) Non detects counted as deptection limit/2, estimated concentration and duplicate counted
(3) Standard deviation

WJ141/9

4.7.2 Volatile Organic Analyses - Perched Zone

Ground-water samples collected during March 8 to 17, 1988 were analyzed for volatile organic compounds (EPA Method 624). Seven (7) of 34 analytes that were analyzed for by this method were found (Table 4.4). Five (5) of the 7; VC, 1,1-DCA, CF, 1,1,1-TCA and 1,1,2-TCA were all estimated values with low concentrations at or near detectable limits. Eleven perched zone wells had TCE; the highest being DH-3 at 130 ug/l. All of these wells also had TCE in the purgeable halocarbon analysis discussed in Section 4.7.1. PCE was found in 5 perched zone well samples (4 wells, 1 dup). Two (2) were at very low concentrations. Two (2) samples from DH-3 and one of DH-9 had PCE. As discussed in the preceding section on purgeable halocarbon analysis, TCE was used at the site. PCE has been identified in the vicinity of DH-3 around the former Building 6 dilution tank, as reported in the soils investigation report.

4.7.3 Semivolatile Organic Analyses - Perched Zone

Twenty three (23) samples from 20 wells were analyzed for semivolatile organics (EPA Method 625). The samples were collected during March 8 to 17, 1988. Of the 69 analytes 3 were found in the perched zone samples from 3 wells. These compounds were 1,2-DCB in WJ-25, DNBP in WJ-27 and the Test Well and dielhylhexylphthalate in WJ-27. All the concentrations were estimates and were at or near the detection limit except the diethyhexylphthalate at an estimated value of 140 ug/l. As described in Section 4.7.1, Table 4.4 shows statistical data on compounds detected. Semivolatile organic detection statistics are shown on Table 4.3.

4.7.4 Inorganic Analylses - Perched Zone

Twenty-four ground-water samples from the first quarterly round of sampling were collected from wells completed in the perched zone of the Santa Margarita aquifer and were analyzed for dissolved organics. Water samples for dissolved organics analyses are filtered in the field through a 0.45 um membrane filter and preserved with concentrated nitric acid (HNO_3) to pH less than 2. One sample from DH-3 was also analyzed for total inorganics. The concentrations of total inorganics are determined from unfiltered, acidified water samples. The second quarterly round of sampling did not include analyses for inorganics. The results of the first quarter analyses indicated that it was not

WJ007804

Table 4.4

Measured Volatile Organic Compounds (EPA Method 624) in Perched Zone, March 8 to 17, 1988

	Concentration in microgram/liter[1]						
Well	VC	1,1-DCA	CF	1,1,1-TCA	TCE	1,1,2-TCA	PCE
DH-3					130		10
DH-3DUP					120		10
DH-9					35		J.09
TEST WELL		J4	J4	J1	12		
WJ-10	J3	J2					
WJ-13		J2			J1		
WJ-14		J2			10		
WJ-14		J2			9		
WJ-15		J1			J77		
WJ-16		J1			17	J2	
WJ-17		J4		J10	J33		
WJ-17DUP	J3	5			J42		J0.7
WJ-18	J1	J1	J2		J2		
WJ-24		J2			8		
WJ-25					28		

NOTES:
1 - J indicates estimated concentration

necessary. A summary of the results is presented on Table 4.5 and Appendix F contains the complete analyses.

As shown on Table 4.4, cyanide was not detected in any of the samples. Lead and selenium were only detected one time, and at concentrations below the SQL.

Barium, iron, and manganese were detected most frequently. Manganese was detected in all the collected samples. It is an abundant element which is widely distributed in the earth's curst (Merck, 1983). Iron was detected in 83 percent of the samples, however, only 33 percent were reported above the SQL. Barium is detected at levels below the SQL in 92 percent of the samples. In many geologic and ground-water environments, there is a relationship between the occurrence of manganese and the occurrence of iron. Therefore, it is not unexpected that they occur in similar patterns. Additionally, it has been reported that elevated levels of iron and manganese, along with some other metals, are commonly related to septic systems (Canta and Knox, 1985).

Of the 25 analytes tested for in the inorganics analyses (Appendix F), 7 showed greater than 60 percent difference between the results for dissolved (filtered) versus total (unfiltered) inorganics. The seven analytes are aluminum, barium, chromium, manganese, nickel, vanadium, and zinc. However, only one sample from the perched zone was analyzed for total inorganics, versus the results of 24 analyses for dissolved organics.

None of the concentrations of inorganics present any concern. The inorganics results appear to verify the emphasis that the primary contaminants of interest at the Watkins-Johnson site are organics.

4.7.5 Perched Zone Contamination Pathways

The major contamination identified in the perched zone is due to purgeable halocarbons particularly TCE, 1,1-DCE, and VC. Figures 4.12 and 4.13 show the distribution of TCE based on the March and June, 1988 sampling rounds. The highest concentrations of TCE, c-DCE and PCE in the perched zone are found in DH-3. DH-3 is located next to the site of the former Building 6 Dilution tank. Soil samples from the former Building 6 dilution tank location and vicinity contained TCE and MC with lesser amounts of PCE, 1,1,1-TCA, CF and t-DCE (See Section 3.4.5.3). As movement of water and contaminants in the

WJ007806

Table 4.5

Summary of Inorganic Analyses from Perched Zone, March 8-17, 1988

Inorganic Compound	Perched Aquifer		
	Concentration Range[1]	Number of Samples with Concentrations Above Sample Quantitation Limit[2]	Number of Samples with Concentrations Below Sample Quantitation Limit[3]
Arsenic	ND[4](3.3)-17.3	0	2
Barium	ND(1.0)-142	0	22
Cadmium	ND(2.0)-4.8	0	5
Chromium	ND(3.0)-23.4	9	14
Copper	ND(11.0)-26.6	1	2
Cyanide	ND(5.0)	0	0
Iron	ND(4.0)-12,300	8	12
Lead	ND(1.0)-1.0	0	1
Manganese	1.1-26,100	16	8
Mercury	ND(0.2)-0.2	2	0
Selenium	ND(2.4)-3.7	0	1
Silver	ND(4.0)-12.3	2	11
Zinc	ND(4.0)-1670	5	4

1 - Values in ug/L
2 - Number of samples in which concentrations were reported at or above sample quantitation limit.
3 - Number of samples in which concentrations were detected below the sample quantitation limit but which did meet the identification criteria. The concentrations are estimates only.
4 - ND = Not Detected (detection limit).

unsaturated zone is generally vertical, unless layers of low permeability interfere with that movement, the center of the perched TCE plume appears directly related to the soil contamination detected near the former Building 6 dilution tank.

Other contaminant pathways are not as clear. Figure 4.10 show the configuration of the perched zone water table on August 8, 1988. Flow under the central plant area can be either to the northwest or east northeast depending on the presence and size of the ground-water mound. TCE contamination was also high in WJ-38. As no analytes were found above the SQL around Building 6 it is probable that contamination in the perched ground-water near DH-3 has migrated east and northeast where WJ-38 is located. A ground-water mound has existed under the Building 8 leach field. The water table configuration due to the mound has created a depression in the water table between the mound and the higher water levels beneath the south parking lot beneath Building 6 where the plume has been identified.

Ground-water movement is also northwestward from the plant area. Well samples from WJ-17 and WJ-25 had shown consistent TCE contamination. The source of this contamination could be not only the DH-3 area near the former Building 6 Dilution tank but also from the Building 2 Dilution tank and vicinity. Soil samples from the Building 2 Dilution tank and vicinity showed a number of purgeable halocarbons including TCE (See Section 3.4.5.1). Contamination from this area moving vertically down to the perched water table would then have moved northwest toward WJ-25 and WJ-17.

Purgeable halocarbon contamination in the perched zone has also been found beneath the Building 8 Leach field and vicinity. TCE was found in soil borings around the leach field as described in Section 3.4.5.5. Analysis for 1,1-DCE has been found to somewhat ring the Building 8 Leach field as shown in Figure 4.15. This may be due to migration of TCE degradation products away the major TCE plume.

Contamination found in the soil beneath Watkins-Johnson during the soil investigation show similar patterns as those found in the perched zone ground water. Therefore it is assumed that a vertical migration from the unsaturated zone to the perched zone exists. A similar pattern can be seen in pathways to the regional Santa Margarita aquifer discussed in Section 5.9.6.

WJ007808

5.0 CHARACTERIZATION OF THE REGIONAL ZONE OF THE SANTA MARGARITA AQUIFER

The Santa Margarita aquifer is a major domestic source of ground-water for the Camp Evers, Scotts Valley, and Mission Springs areas (Ellis, 1980; Todd, May 1984). Many private and municipal wells derive water from the aquifer, estimated to contain 43,460 acre-feet of water in available storage (Todd, 1987). A map constructed by Todd in 1983, indicates that the depth of the water table in Scotts Valley ranges from 15 to 165 feet below land surface. In the Scotts Valley area the aquifer is unconfined, and the Santa Margarita Formation crops out over much of the land surface (Figure 2.3). The aquifer is accessible for development of water supplies for consumptive use, and for contamination by chemicals migrating from the ground surface.

Presently 42 wells screened in the regional zone of the Santa Margarita aquifer are used in the monitoring program. Thirty-five of these were drilled by Watkins-Johnson. Wells have been completed in the regional zone under programs initiated by the RWQCB and later with the EPA.

The following sections describe the monitoring and remedial action well construction history in the regional zone of the Santa Margarita aquifer, and regional zone geometry and hydraulic characteristics, changes in the water-table configuration, plume definition, discussion of the results of the chemical analyses, stream-aquifer interaction and potential for contaminants to migrate to other formations.

5.1 Review of Previous Studies to Characterize the Regional Zone in the Santa Margarita Aquifer

The Santa Margarita sandstone is the major unconfined aquifer in the Scotts Valley area. Prior to remedial action pumping, depth to the regional ground-water was over 100 feet beneath the Watkins-Johnson plant. The average saturated thickness beneath the plant was about 45 feet. Bedrock topography of the Monterey Formation largely influenced the saturated thickness of the Santa Margarita. Because of steep surface topography immediately to the east at the Montevalle subdivision and to the southwest, near Mount Herman Road (Figure 4.1), the regional aquifer is unsaturated and therefore considered to be limited in areal extent. Ground-water flow directions near Watkins-Johnson was

northwest toward Bean Creek. Ground-water was assumed to be discharging to the creek which flowed westward and out of the topographic basin. Well information northwest of the Watkins-Johnson plant, near Silverking Oceanic Farms (Figure 4.1), showed that the saturated thickness was only about 60 percent of the saturated thickness near the plant. However, after remedial action pumping began, a large cone-of-depression formed beneath Watkins-Johnson and the saturated thickness decreased over 12 feet around the plant site and over 20 feet near the center of the cone. A summary of the drilling and well completion in the regional zone is described below. Results from the previous work done under order of the RWQCB and the EPA RI/FS program are described in more detail in the following sections.

A remedial action pumping system has operated at Watkins-Johnson since October, 1986. Four remedial action wells in the regional Santa Margarita were initially pumped at a rate of 350 gpm (504,000 gpd) and then reduced to 240 gpm (345,600 gpd). The wells are pumping almost continually. The pumpage has changed the ground-water flow patterns by creating a noticeable cone-of-depression. In 1987, a second cone-of-depression was created near the Watkins-Johnson site at Silverking Oceanic Farms which has affected the ground-water flow patterns and the remedial action program.

Silverking Oceanic Farms is a commercial fish hatchery located on the south side of Bean Creek and 1200 feet northwest of Watkins-Johnson. Pumpage at the hatchery is variable depending upon need and the amount of suspended and dissolved material in surface-water supplies.

Water-table configurations were originally based on the data from the DH wells and wells WJ-10 through 18. The water-table configuration indicated that some flow was moving away from the presently accepted regional flow paths.

Well RA-1 was to be a remedial action extraction well and therefore, the pilot borehole and well was to be used to determine aquifer characteristics and geometry. The well was completed to fully penetrate the aquifer in order to determine the maximum saturated thickness. The RA-1 exploratory boring was drilled through the Santa Margarita Formation to the confining Monterey Formation beneath. Three observation wells, OB-1, OB-2 and OB-3 were drilled in a line between 29 and 155 feet from the either side of RA-1. After development of the test/production well, it had become apparent that a

perched water table existed. However, the extent to which the regional and perched zones were related, and any affects of the ground-water mound built up beneath the Building No. 8 leach fields has on the regional zone were unknown at the time.

In order to further define the ground-water system and to be able to monitor effects from the planned remedial action pumping, five wells were completed north of the Watkins-Johnson plant near Bean Creek. In July 1986, two regional wells, BCW-2 and 3 and three perched zone wells BCW 1, 4, and 5, were completed north of the plant at the Creek near the treatment system discharge point. At the start of remedial action pumping in October 1986, these regional zone wells had water levels approximately seven (7) feet below the perched zone water levels and about four feet below the stream.

Additional production wells to extract water from the regional zone were constructed by August 1988. The location of these wells was based upon plume definition, ground-water flow patterns and results of ground-water modeling. On August 30 to 31, 1986, all of the remedial action wells (RA 1 through 4) in the regional zone were pumped in a progressive sequence to evaluate the system's response (see Section 5.4). These wells, along with RA-1, began continuous pumping on October 15, 1986 to extract the contaminated ground water from the regional zone.

To further define the extent of the plume and flow patterns, three additional wells, AP-1, 2 and 3, were installed on the former Sky Park Airport property in February 1987. The Sky Park property is located to the west and northwest of the Watkins-Johnson Plant site. The general ground-water flow direction in the regional aquifer is to the northwest. In addition along with a concurrent soils program, these wells were also drilled to help determine whether past practices at the airport may have contributed to the contamination problem.

In May 1987, six additional wells were completed in the regional aquifer. Five of the regional wells, WJ-32A, WJ-30A, BCW-6, BCW-7, and BCW-8 were installed off-site to better determine the characteristics of the aquifer and the extent of the plume in areas beyond previous investigations. All of the regional wells, except BCW-8, were drilled to the contact of the Santa Margarita and Monterey Formations. BCW-8 was completed near BCW-7 but 27.5 feet shallower to detect any possible vertical flow conditions near the creek due to the creek/aquifer interaction. Water-levels measured in BCW-8 and BCW-7

WJ007811

indicate that, at present, during pumping conditions, vertical components of flow do not exist near Bean Creek at the site of these wells (Figure 4.1). Prior to the completion of BCW 7 and 8, in March 1987, two private wells, SK-1, and SK-2, were installed and pumping was initiated before the completion of the monitoring wells. Prior to this pumping, ground water was probably discharging form the aquifer to the creek near these private wells. BCW-7 and BCW-8 were to be used to determine the gradient near the creek in order to calculate the ground-water flow to or from the creek. However, the pumping of the private wells altered the gradient from the aquifer to the creek.

An additional well, well 27A, was completed on the northeast section of the parking lot during this program. The purpose of this well was to further define the ground-water flow system and contamination migration patterns on site.

Data collected at the Scotts Valley site from monitoring wells installed prior to and for RLSA's July 1, 1987 remedial action progress report generally defined the ground-water flow and contaminant migration patterns in the regional aquifer south of Bean Creek. The monitoring network south of Bean Creek includes wells BCW-6 and BCW-7 and BCW-8 located near Bean Creek at the Silverking Oceanic Farms fish hatchery. These wells were installed prior to the beginning of heavy pumpage at the hatchery at the end of May 1987. During the first six months of weekly water-quality sampling in Bean Creek, TCE had been detected in water samples from stream stations BC-11, BC-12 and BC-13. Only twice during this time was any TCE detected in an upstream station. Therefore, it appeared that TCE was entering Bean Creek from the regional aquifer between BC-10 and BC-11.

5.2 RI/FS Regional Zone Well Construction

A total of ten additional monitoring wells were planned for installation during the RI/FS program at the Watkins-Johnson site in the Spring of 1988. Five monitoring wells were to completed in the regional zone to aid in defining the ground-water flow and contaminant migration patterns in the area. Six regional wells were completed as two of the planned perched zone wells were completed in the regional zone. One of the original regional wells was not completed. The rational and well drilling activities for the RI/FS regional zone field program are summarized below.

WJ007812

Procedures and guidelines were presented in Sections 4.1 through 4.3 of the SAP (RLSA, March 1988) for drilling specifications, construction details, and geophysical log interpretation. As the boreholes for the regional wells were also to be used to collect soil samples, the methodology followed in the well drilling is described in Section 3.3.2 on the soil investigation.

Well WJ-43 located on the southern end of the parking lot was completed to replace WJ-11. Extraction of ground water during the remedial action program has lowered water levels below the screen in Well WJ-11. As this is considered to be the location for measuring background flow and water-quality data, WJ-11 was replaced by WJ-43.

Two wells were also completed in the regional aquifer near surface-water station BC-11, on the north side of Bean Creek. This is approximately northwest of where the plume apparently first intercepts Bean Creek. These monitoring wells, numbered WJ-44 and WJ-45 (Figure 4.1), define flow conditions north of the creek and determine if the contaminant plume moved north of Bean Creek. Wells WJ-44 and WJ-45 were drilled 100 feet apart in a line running north from Bean Creek. This configuration was chosen to establish the gradient of the flow system in that area and to determine if Bean Creek acts as a flow divide.

Well WJ-46, located near Lockhart Gulch Road, was installed to measure water levels near Silverking Oceanic Farms between the intersecting cones of depression created by pumpage at Watkins-Johnson and Silverking Oceanic Farms. The well is south of Silverking, west of Sky Park Airport, and east of well WJ-32A. The moderate change in water-level elevation observed in well WJ-32A does not reflect the expected influence of withdrawals from SK-1, which is 500 feet to the northeast. Installation of well WJ-46 improved the definition of the hydrogeologic boundary of the regional aquifer. WJ-46 was used in an aquifer test to confirm that the hydrogeologic properties of the regional zone in the Silverking-Bean Creek area are similar to those found from the aquifer test near the Watkins-Johnson site.

Well WJ-47 was to be drilled near the Harmony Foods well, which is screened in both the Santa Margarita and the Monterey Formations. Because the Harmony Foods well is screened in two aquifers and is frequently pumped, the water level in the well is not considered representative of the regional Santa Margarita. Data obtained from WJ-47,

which was to be screened only in the Santa Margarita, would aid in better defining the regional water table southwest of the Watkins-Johnson site. Because of the high area in the surface of the Monterey Formation, the Santa Margarita aquifer was dry at Well WJ-47. Information from the WJ-47 borehole was useful in redefining the top of the Monterey and the boundary of the saturated Santa Margarita.

5.3 Hydrogeology of the Regional Zone of the Santa Margarita Aquifer

The Santa Margarita aquifer consists of medium to coarse sand with some gravel and is highly variable in thickness. The Santa Margarita Formation is prevalent over most of the central and southern portions of the Scotts Valley syncline, but areas where the saturated thickness exceed 40 feet are limited. As mapped by Todd in 1986, regions of "significant saturation" extend from approximately 0.75 miles north of Mission Springs to one mile south of Camp Evers, and from 1.25 miles west of Mission Springs to 0.75 miles east of Scotts Valley. The extent of the aquifer is largely bound by the outcrop pattern of the Santa Margarita Formation to the east and to the west of the study area. To the south and north the formation is apparently drained, though substantial thicknesses of the formation may exist in those areas.

The saturated thickness of the Santa Margarita Formation ranges from zero to 200 feet locally. The thicker portions of the Santa Margarita aquifer occur in filled paleo-valleys, carved by stream erosion on the surface of the Monterey Formation during the hiatus in deposition between middle and upper Miocene sediments. The regional paleotopographic relief of the unconformable surface of the Monterey is highly irregular, varying as much as a few hundred feet (Todd, 1987, Plate 1).

To further define the surface and the saturated thickness of the Santa Margarita aquifer in the Study area, seven borings were drilled during the May-June, 1988 field investigation. The surface of the Monterey varies in relief by a few tens of feet under the Sky Park Airport and Watkins-Johnson site (Figure 2.8). Relief of the unconformable Monterey surface under the site is characterized by a northerly-trending paleo-valley, the axis of which is located along the western boundary of the Watkins-Johnson property underlying Sky Park Airport. A smaller branch of the northerly-trending paleo-valley trends to the northwest under the entire diagonal length of the plant parking lot. The smaller paleo-valley gradually slopes from the bordering subsurface high of the Monterey

WJ007814

Formation west of the plant in the Montevalle subdivision area to under the southern portion of Sky Park Airport. The resulting thickness of the regional aquifer varies from about 40 to 60 feet beneath the Watkins-Johnson site while Santa Margarita sands which overlie the bordering subsurface highs of the Monterey Formation are unsaturated.

The water table of the Santa Margarita aquifer is characterized by an uneven surface which slopes in the northwest direction toward Bean Creek. Drawdown in the vicinity of pumping wells creates depressions in the surface of the water table. The configuration of the water table changes seasonally between wet and dry periods, and with changes in ground-water pumping. A more detailed discussion of variations in the water table of the study area will follow.

The aquifer is recharged by two primary sources: recharge of precipitation and runoff over the large outcrop areas of the Santa Margarita Formation to the south (Figure 2.3), and leakage from the overlying Santa Cruz and Purisima sandstones. Recharge entering the Santa Margarita Sandstone is reported to account for nearly two-thirds of the total surface recharge to the ground-water basin. This amounts to about one foot per year across the basin attributable to rainfall on the Santa Margarita Sandstone (Todd, 1987). Recharge by direct infiltration of precipitation is thought to be highest in the relatively low and flat areas near Camp Evers where soils are permeable and vegetation is less dense. Runoff into surface streams is reported to contribute 436 acre-feet/year to ground water by percolation through stream beds which overlie permeable Santa Margarita Sandstone (Todd, 1987). Reaches of Bean Creek, Mackenzie Creek, Lockhart Gulch, and Carbonera Creek are commonly dry during late summer months which is indicative of potential recharge sites (Jacobvitz, 1987; Todd, May 1987). It has been reported that recharge also may occur by percolation through the thin alluvial deposits in the valley and by upward leakage from the Lompico Formation (Todd, May 1984). Based on available water-level data and aquifer position, recharge by upward leakage probably occurs through the Monterey Formation.

5.4 Characteristics of Regional Zone of the Santa Margarita Aquifer

Three aquifer tests have been performed on the regional Santa Margarita as part of the remedial action program at Watkins-Johnson. Two tests were performed using the remedial action wells. One was performed on August 31 to September 2, 1985 using RA-1

WJ007815

as the production well and a second test was performed on August 30 to 31, 1986 using all the remedial action wells. The third test was carried out as part of the EPA RI/FS study and was performed on SK-1 on June 20 to 22, 1988.

The August 31 to September 2, 1985 test was a controlled 52 hour aquifer test. It was carried out to determine the aquifer characteristics of the Santa Margarita Formation beneath the Watkins-Johnson plant. Well RA-1 was pumped and the key observation wells were OB-1, OB-2, and OB-3. The results of the test are summarized in Table 5.1. The analysis of the test is described in the September 30, 1985 Interim Report, Remedial Action Program Aquifer Test, Test/Production Well RA-1 (RLSA, September 1985a).

The interpretation included the Jacob, Boulton and distance-drawdown methods analyses. The key methods of interpretation used the late-time data analyzed with the Boulton method and distance-drawdown methods. Using these interpretations, the following aquifer properties were computed for the Santa Margarita aquifer, underlying the Watkins-Johnson plant in Scotts Valley, California:

Transmissivity (T): 34,600 gallons per day per foot (gpd/ft)
Storage coefficient(s): 0.18 (dimensionless)
Average saturated thickness: 44 feet
Hydraulic conductivity: 790 gallons per day per square foot (gpd/ft^2)

Although the results obtained using the Jacob Method were not included in the above average, the values are similar. Employing this method, the average T is 44,700 gpd/ft. In all, the aquifer test results are consistent and are representative of water-table conditions.

A second aquifer test was conducted prior to startup of the remedial action pumping system. This test was described in the report Remedial Action System Pumping Test, August 30-31, (1986 Watkins-Johnson RLSA, 1986). This test was conducted in order to evaluate the effectiveness of the regional recovery system and to examine the interaction of the remedial action wells RA-1, RA-2, RA-3 and RA-4. During the test, the wells were turned on sequentially and adjusted so that each discharged an amount equal to that indicated by a ground-water model (RLSA, March 1986) as necessary for producing the desired drawdown patterns.

WJ007816

TABLE 5.1

RESULTS OF AUGUST 31 TO SEPTEMBER 2, 1985 AQUIFER TEST
AT TEST/PRODUCTION WELL, RA-1

Jacob Method (Late Time Data)			Boulton Method									Distance Drawdown Method (4) (Time = 2880 Minutes After Start of Test					
			Early Time Data (Adjusted Data Not Used For Early Time Calculations)			Late Time Data						Semi-Log Method				Log-Log Method	
Initial Saturated Thickness (ft)	Observed Drawdown T(1)	Adjusted Drawdown(3) T(1)	r/B	T(1)	S(2)	r/B	Observed Drawdown T(1)	S(2)	r/B	Adjusted Drawdown(3) T(1)	S(2)	Observed Drawdown T(1)	S(2)	Adjusted Drawdown(3) T(1)	S(2)	Observed and Adjusted(3) Drawdown T(1)	S(2)
40.10	24,700	62,900	Not applicable				Not applicable			Not applicable							
37.12	35,700	41,300	--	--	--	0.4	24,400	0.32	0.4	27,300	0.33	30,200	0.14	31,400	0.16	30,200	0.19
49.82	41,300	44,000	0.8	44,100	0.002	0.8	38,200	0.08	0.8	32,900	0.14						
48.72	53,700	53,700	2.0	47,700	0.0029	1.5	48,600	0.12	1.5	48,600	0.12						

Based on late time Boulton type curves and distance-drawdown computations, the following aquifer properties have been computed:

Average transmissivity by (T): 34,600 gallons per day per foot (gpd/ft)
Average storage coefficient (S): 0.18
Average saturated thickness: 44 feet
Average hydraulic conductivity (K): 790 gallons per day per square foot (gpd/ft^2)

Footnotes

(1) T = transmissivity in gallons per day/ft
(2) S = storage coefficient, dimensionless
(3) Drawdown adjusted for aquifer dewatering
$S^1 = S - S2/2D$
S^1 = Adjusted drawdown
S = Observed drawdown
D = Saturated thickness of aquifer prior to pumping
(4) Distance drawdown method uses all wells in calculations
(See Figures 16 and 17)
(5) No significant difference between observed and adjusted drawdown

WJ007817

Drawdown data from the regional observation wells monitored during the August 30 to 31, 1986 test, were used in an analytical program based on a deconvolution theory (Butt and McElwee, 1984). Such an analytical program estimates aquifer coefficients for the case were more than one well is pumping. Normally aquifer tests are performed using one pumping well. The analysis of the test is not ideal since the surface of the Monterey is irregular (Figure 2.8) and therefore the saturated thickness of the Santa Margarita varied considerably. The following aquifer properties for the regional Santa Margarita were obtained from the analytical procedures described above:

Transmissivity (T):	58,000 gpd/ft
Storage coefficient (S):	0.06 dimensionless
Saturated thickness:	60 feet (from RA-3 dominant pumping well)
Hydraulic Conductivity:	960 gpd/ft^2

Although these results cannot be used with the same degree of confidence as the September 1985 aquifer test on RA-1, they do have a great deal of similarity and confirm the previous test and the June 1988 test described below.

As part of the RI/FS program a third aquifer test was conducted in June 1988, utilizing production Well SK-1 to estimate hydraulic characteristics in another part of the regional Santa Margarita aquifer for comparison with the original test on RA-1. The well is a water-supply well for Silverking Oceanic Farms located northwest of the Watkins-Johnson plant near Bean Creek. In addition, the test was used to evaluate the extent of any recharge boundary effects from Bean Creek since two of the new wells, WJ-44 and WJ-45, were constructed on the north side of the creek opposite from SK-1 and BCW-6. The evaluation of the creek as a recharge boundary will be discussed in Section 5.7 on Stream-Aquifer interactions.

A full description of procedures and results of the aquifer test conducted on well SK-1 from June 20-22, 1988 is contained in Appendix D. The analyses used for the test included the Jacob, Boulton and Distance-Drawdown Methods.

The key method of interpretation was the Boulton method. Based on the method, the following aquifer properties have been computed for the Santa Margarita aquifer, which underlies the Silverking Oceanic Farms:

Transmissivity (T):	38,200 gallons per day per foot (gpd/ft)
Storage coefficient:	0.02 (dimensionless)
Saturated thickness:	40 feet
Hydraulic conductivity:	960 gallons per day per feet squared (gpd/ft^2)

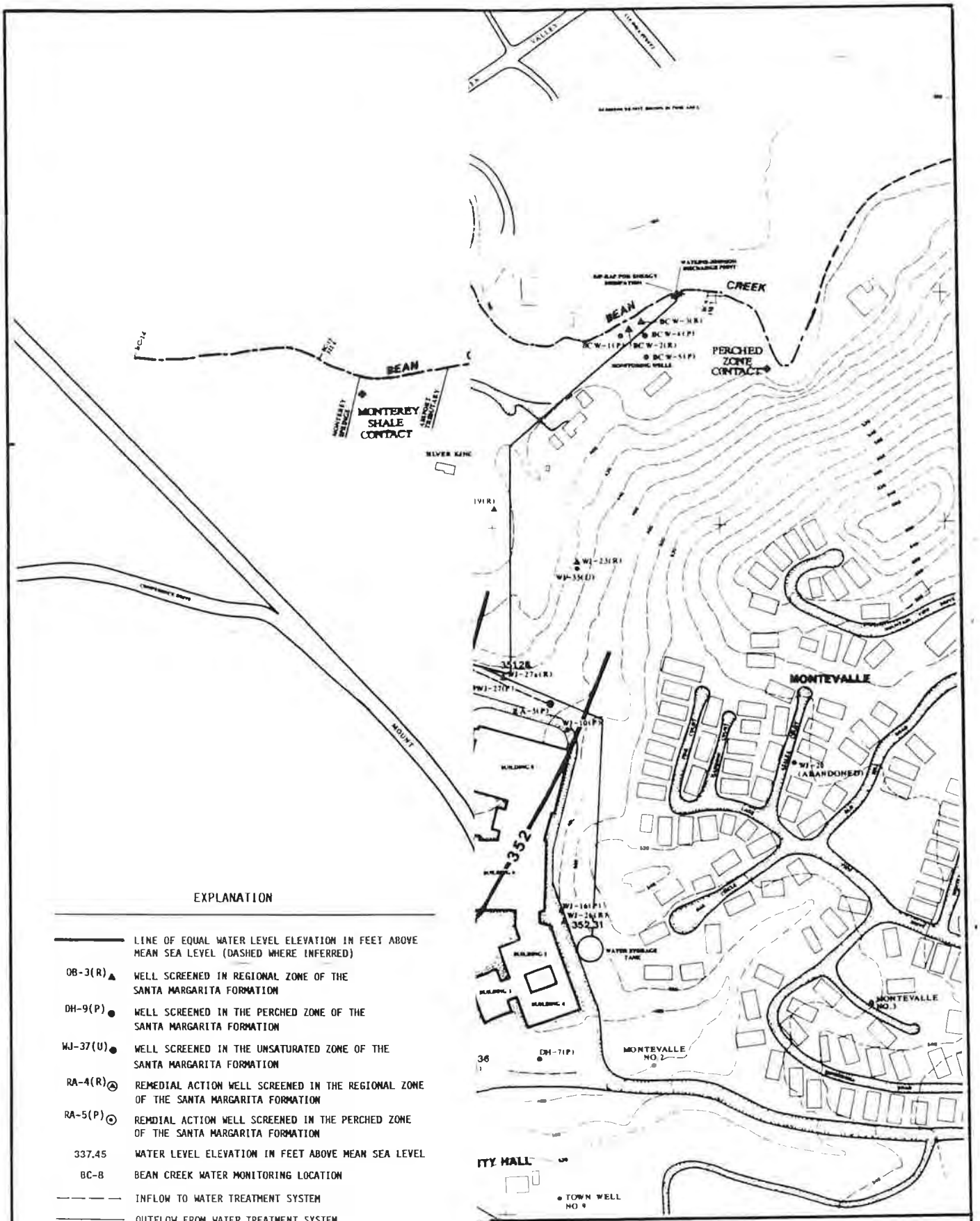
Although the results obtained using the Jacob and Distance-Drawdown methods were not included in the above average, the values are similar.

Hydraulic conductivity is equal to the transmissivity divided by the saturated thickness of the aquifer. In the vicinity of well SK-1, the saturated thickness is about 40 feet and the average transmissivity is 38,200 gpd/ft; thus, the hydraulic conductivity is about 960 gallons per day per square foot (gpd/ft^2).

During the drilling of WJ-43 one of the regional aquifer samples recovered was sent to a soil laboratory to determine the effective porosity. The laboratory used the bromide breakthrough and constant head vertical hydraulic conductivity tests. Effective porosity is described in Section 4.4 on the perched zone. Effective porosity from this sample (060388-03) was determined to be 0.18. This value is low when compared to the effective porosity values derived from perched zone samples of 0.33 and 0.46. This would be expected as the lower depth at which this sample was taken (150 feet versus the 85 and 98 foot depths of the other perched zone samples) reflects the greater compaction of the aquifer at depth. The effective porosity of 0.18 is also equal to the storativity value calculated from the aquifer test data from RA-1. The fact that these are equal confirms the aquifer test data because storage can be directly related to porosity. The vertical hydraulic conductivity was smaller than in the perched zone samples. However, all the samples had extremely low values and may have been affected by pressure from the drive sampling method described in Section 3.3.

5.5 Ground-Water Flow System: Regional Zone of Santa Margarita Aquifer

The configuration of the water table prior to pumping of the remedial action wells is shown in Figure 5.1. The ground-water flow direction in the regional aquifer beneath the plant site was west-northwest. The remediation program at Watkins-Johnson started on October 13, 1986. A cone-of-depression began to form in the regional aquifer as water was withdrawn from pumping Wells RA-1, RA-2, RA-3 and RA-4. A hydrograph from a continuous recorder placed on Well M-1 demonstrates the changes in water levels since



CONFIGURATION OF REGIONAL WATER TABLE PRIOR TO INITIATION OF REMEDIAL ACTION PROGRAM, OCTOBER 13, 1986

FIGURE 5.1

WJ007820

the start of remedial pumping and is shown in Figure 5.2. Figure 5.2 also shows the amount of pumpage from each regional remedial action well, total pumpage from these wells, and pumpage from the wells at Silverking Oceanic Farms.

The total pumping rate of the four wells was reduced from about 325 gpm (468,000 gpd) to about 250 gpm (360,000 gpd) on April 27, 1987. Pumping has continued at a relatively constant rate since April, 1987. Figure 5.3 shows the regional water configuration on May 22, 1987 and Figure 5.4 show the water-level changes between start of remedial action on October 13, 1986 (Figure 5.1) and May 22, 1987. To increase the efficiency of producing more contaminated water to treat, production from Well RA-4 was eliminated on July 24, 1987 and the extraction of 250 gpm was from just three wells (RA-1, RA-2 and RA-3). Although the cone-of-depression was still increasing in size the rate of drawdown has slowed considerably by this time as seen by the hydrographs of RA-1, OB-1 and WJ-26 on Figure 5.5. These are wells in or near the major cone-of-depression. Also of note on Figure 5.5 is the Sky Park Supply Well. This well is located southwest of the plant within the major cone-of-depression. The hydrograph indicates the water levels are not affected by the pumping. This indicates that the well is screened in another aquifer, the Monterey. Details of this are discussed in Section 5.8.1.

Around March 17, 1987, Silverking Oceanic Farms ceased pumping from two older wells, SK-3 and SK-4, which tapped the Monterey below the Santa Margarita and began pumping from the SK-2, which taps the Santa Margarita. The two new wells, SK-2 and SK-1, were completed in 1987. Pumping commenced at 75 gpm (108,000 gpd). On May 26, 1987, SK-2, which is a lower capacity well, was shut down and the new higher capacity pumping well, SK-1, began pumping at an estimated rate between 250 and 350 gpm (360,000 to 504,000 gpd). Pumpage from the new higher capacity well at Silverking Oceanic Farms was generally about 270 gpm (430 acre feet/year) between May, 1987 and January, 1988. Pumping at Silverking has since been on an intermittent basis.

The configuration of the regional water table, Figure 5.6, one year after start of remediation, October 22, 1987, illustrates cones-of-depression around both Watkins-Johnson and Silverking Oceanic Farms. At that time, Watkins-Johnson and Silverking Oceanic Farms had been pumping at steady and equivalent rates for over five months and little change in the water-level elevations around their pumping wells occurred between July,

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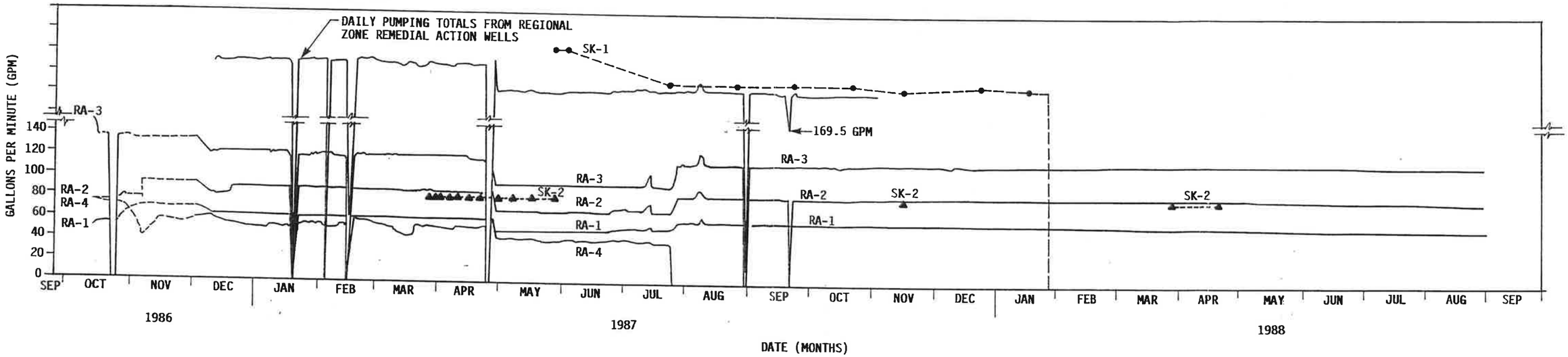
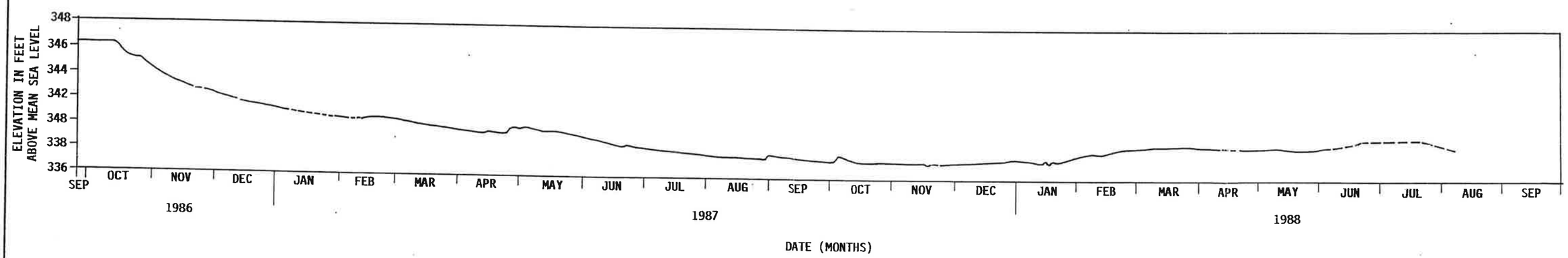
DAILY PUMPING RATES OF REMEDIAL ACTION AND SILVERKING WELLS AND DAILY PUMPING TOTALS FROM REGIONAL ZONE REMEDIATION ACTION WELLS SINCE OCTOBER, 1986



CONTINOUS WATER-LEVEL RECORD FOR WELL M-1 SINCE SEPTEMBER, 1986



EXPLANATION

----- INFERRED DATA

● DATA POINT WELL SK-1

▲ DATA POINT WELL SK-2

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

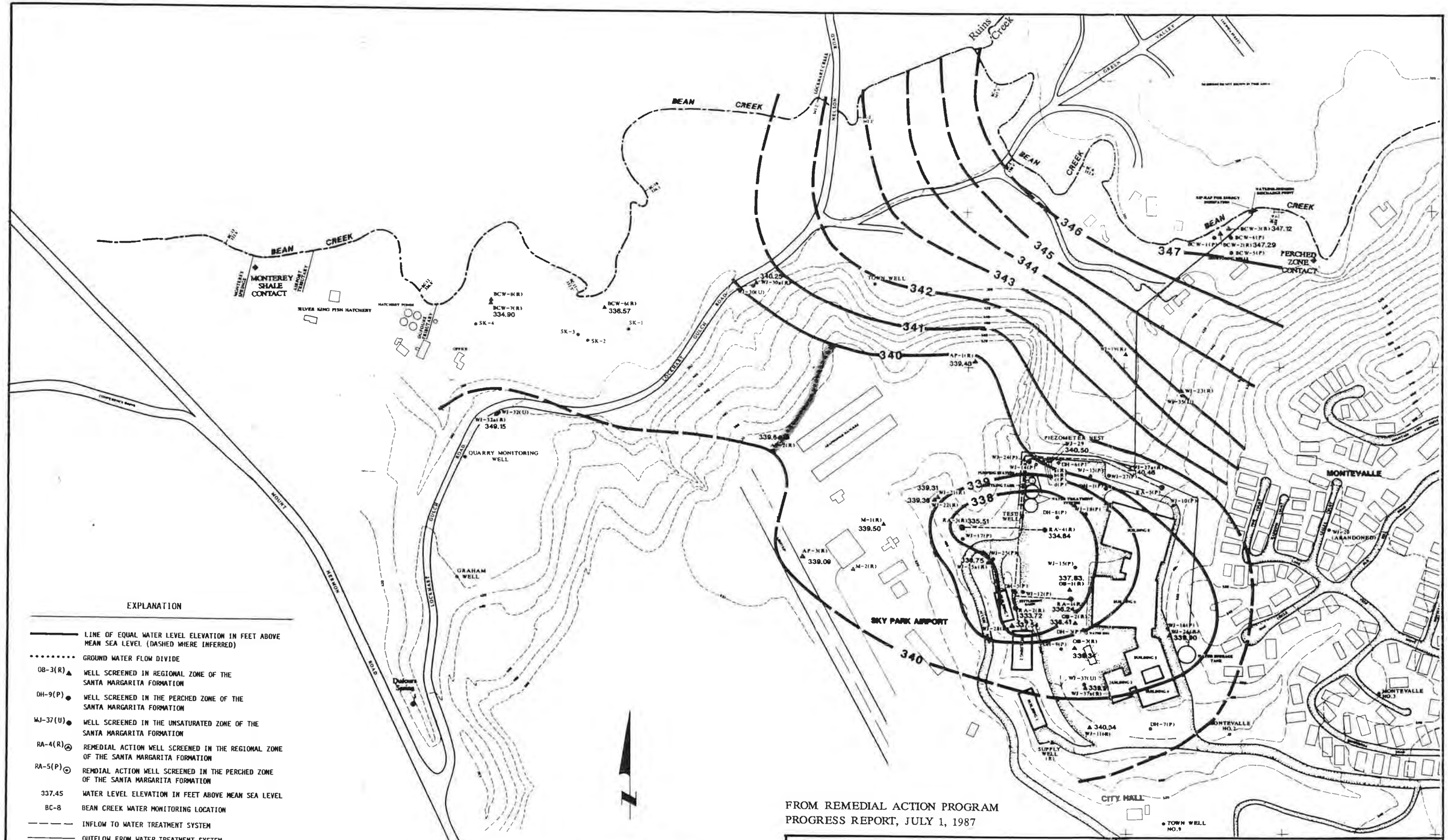
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

HYDROGRAPH OF WELL M-1 BASED ON CONTINUOUS RECORDER AND RATES IN PUMPING WELLS

FIGURE 5.2

WJ007822



EXPLANATION

- LINE OF EQUAL WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE INFERRED)
- GROUND WATER FLOW DIVIDE
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) ⊗ REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) ⊙ REMEDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

FROM REMEDIAL ACTION PROGRAM PROGRESS REPORT, JULY 1, 1987

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

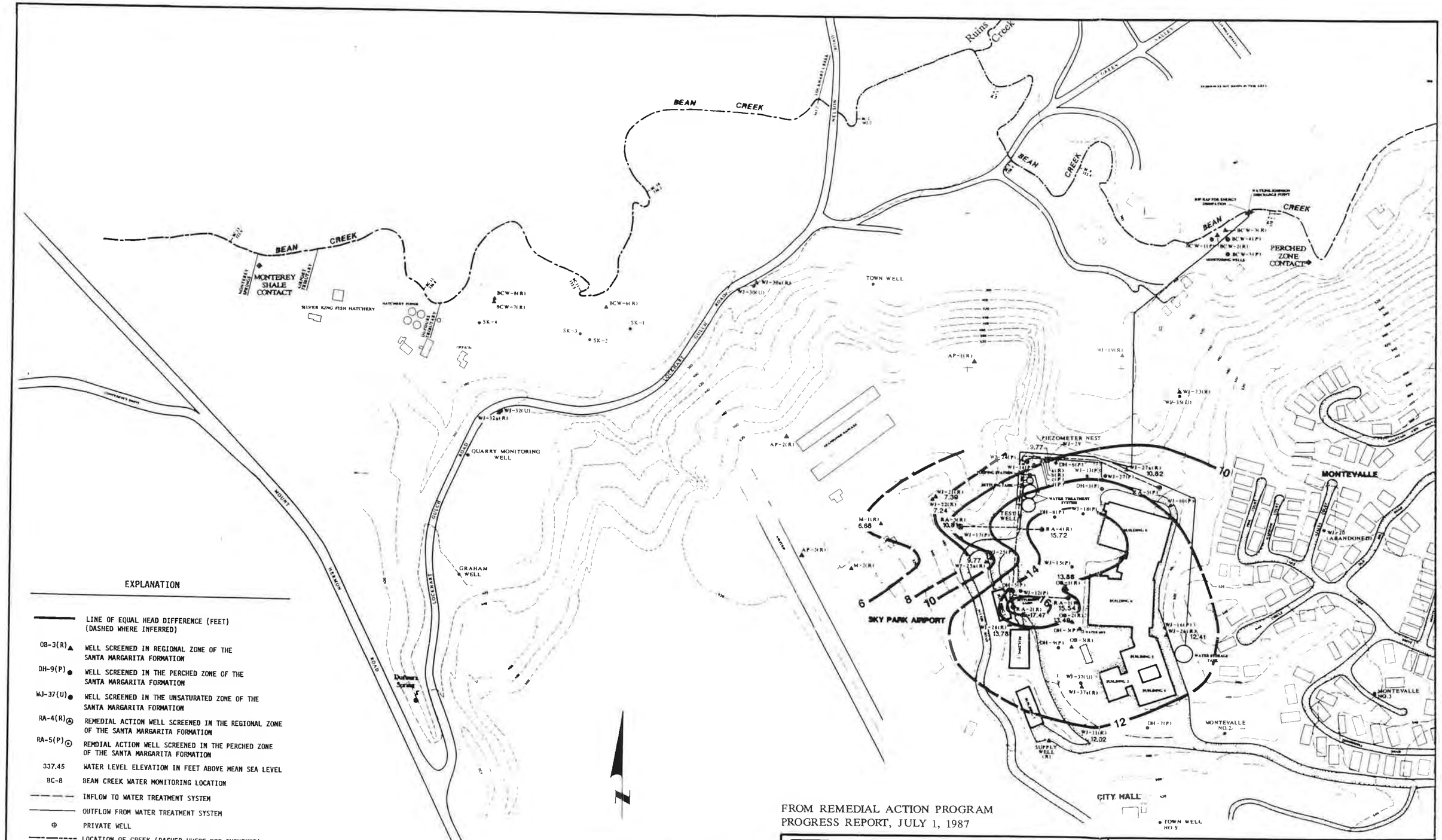
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF REGIONAL WATER TABLE
MAY 22, 1987

FIGURE 5.3

WJ007823



EXPLANATION

- LINE OF EQUAL HEAD DIFFERENCE (FEET) (DASHED WHERE INFERRED)
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)
- LOCATION OF HYDROGEOLOGIC CROSS-SECTION

FROM REMEDIAL ACTION PROGRAM PROGRESS REPORT, JULY 1, 1987

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

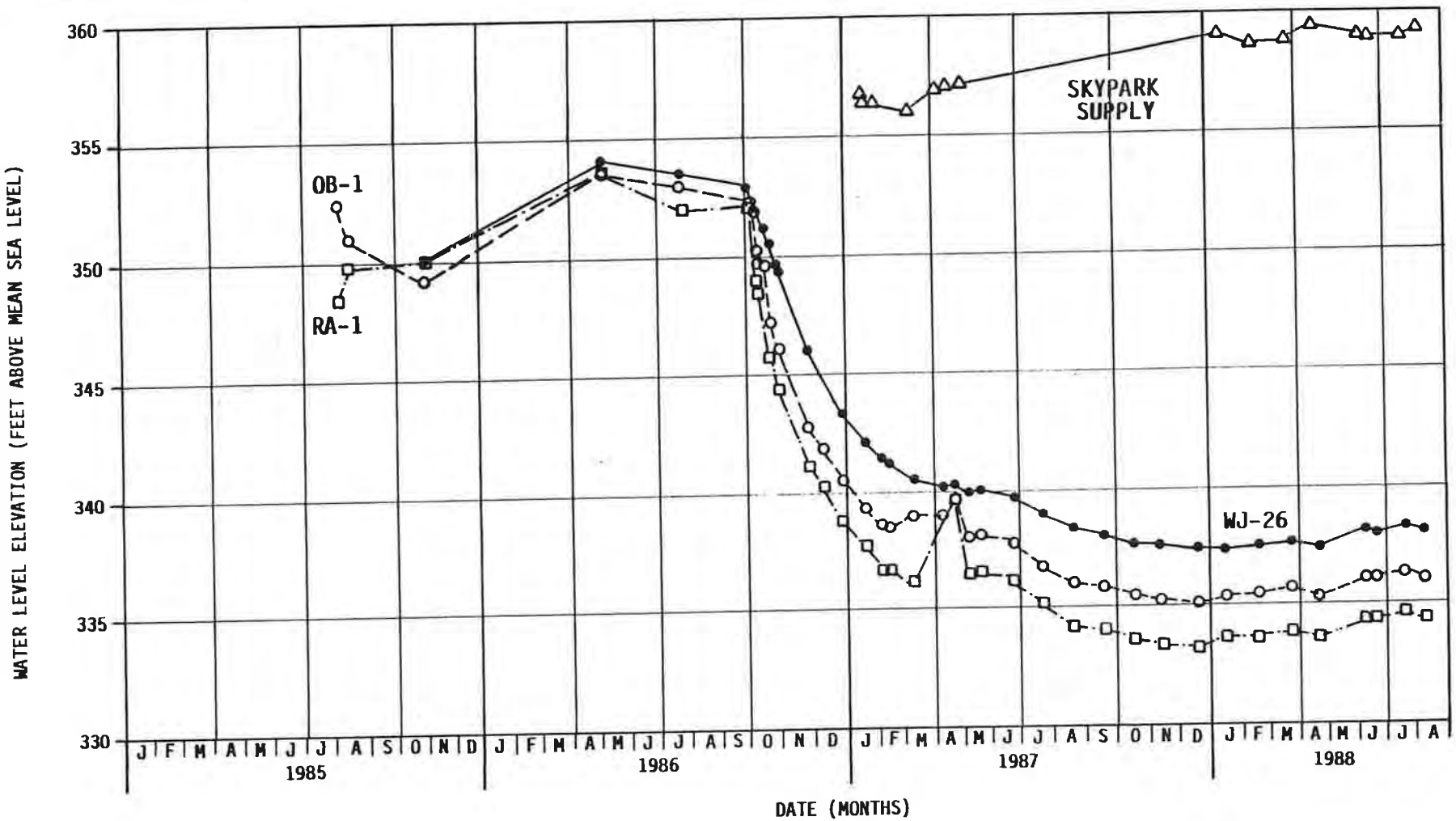
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WATER LEVEL CHANGES IN REGIONAL ZONE BETWEEN OCTOBER 13, 1986 AND MAY 22, 1987

FIGURE 5.4

WJ007824



R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

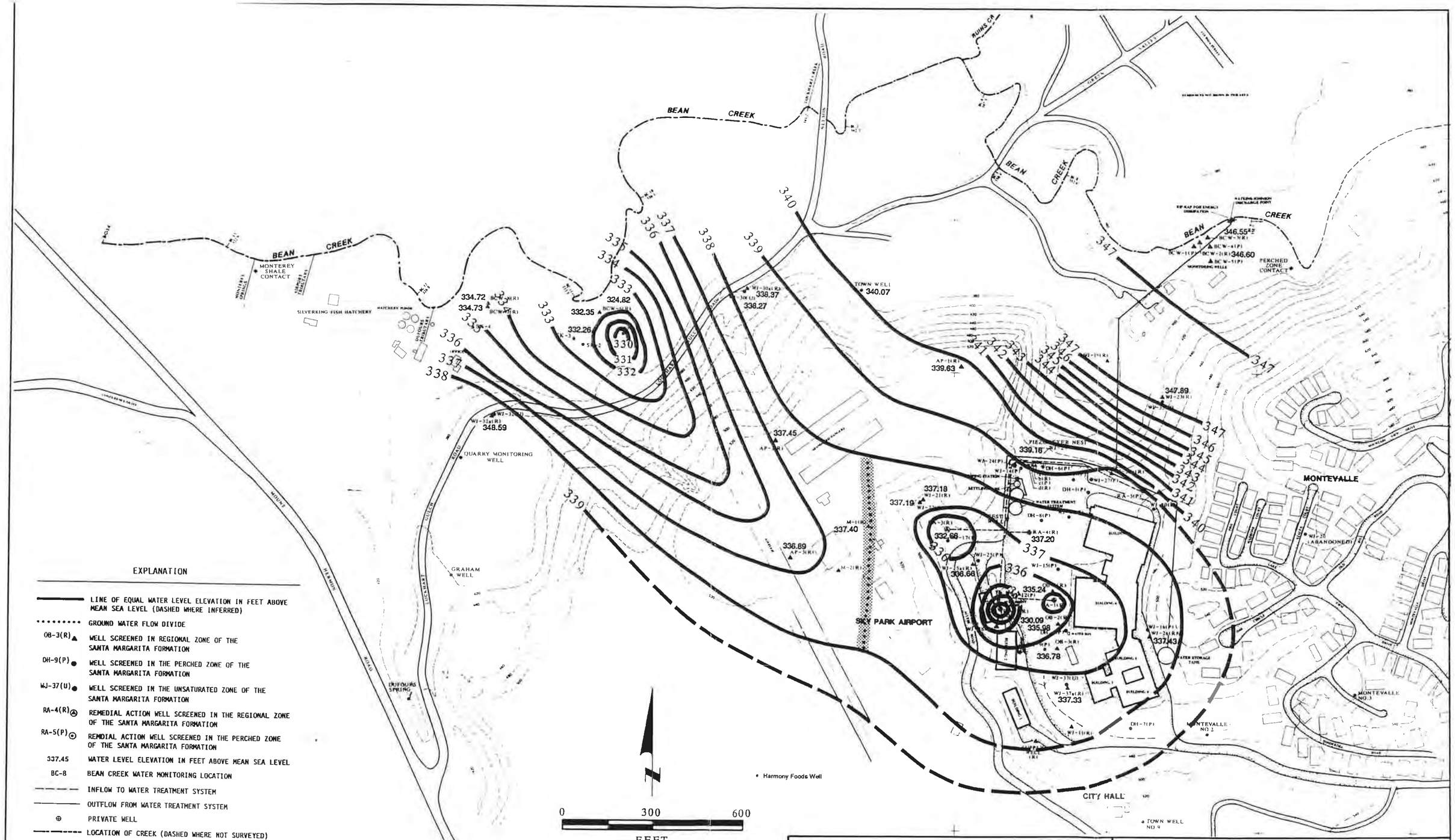
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

HYDROGRAPH OF WELLS OB-1, RA-1, WJ-26 AND SKYPARK SUPPLY

FIGURE 5.5

WJ007825



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Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF REGIONAL WATER TABLE, OCTOBER 22, 1987

FIGURE 5.6

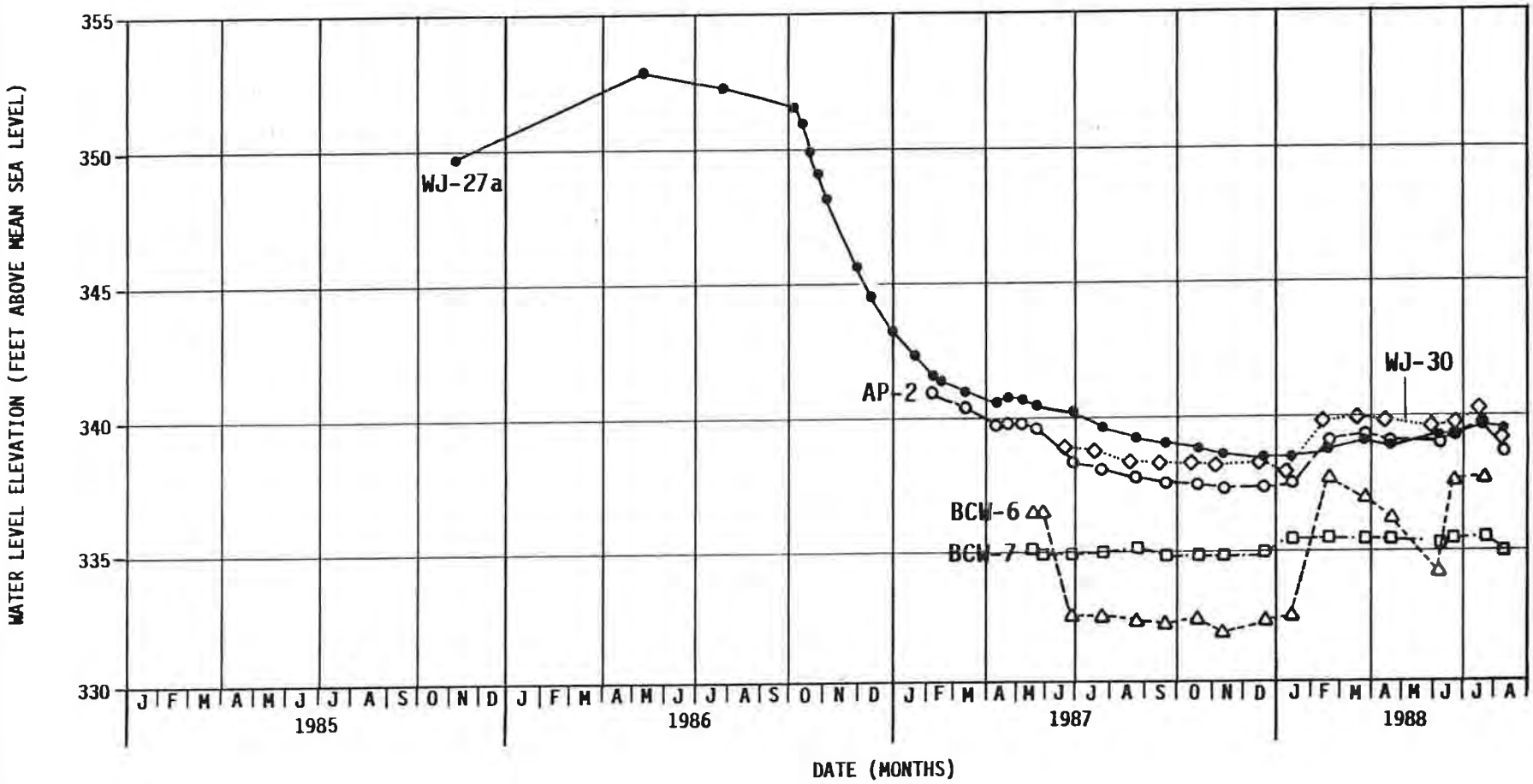
WJ007826

1987 and January, 1988. In late January, 1988 Silverking ceased constant pumping. Monitoring Well BCW-6 is located 100 feet northwest of SK-1, the higher capacity well, and 50 feet south of Bean Creek. Water levels in Well BCW-6 dropped almost four feet in the first month after pumping of SK-1 began on May 26, 1987. Subsequent declines were minimal, totaling about 0.3 feet over the three month period of July through September, 1987. Water levels on October 22, 1987 actually indicate a slight rise. As shown on the hydrographs in Figure 5.7, water-level declines had leveled off as the ground-water system was apparently reaching a steady state. On Figure 5.7, Well BCW-7, to the west of the Silverking pumping wells and close to Bean Creek showed little change in water levels due to pumping. This may reflect the dominance of ground-water underflow moving west out of the basin beneath Bean Creek. WJ-30 and AP-2 show that the affects of pumping at Silverking are noticeable to the southeast where the cone-of-depressions from Silverking and Watkins-Johnson overlap. Therefore, changes in pumping rates at Silverking have a direct affect on already depressed water-levels from the remedial action pumping. The hydrograph for WJ-27a, located on the northern part of the parking lot, shows the affect of the pumping on site.

The original saturated thickness of the regional aquifer was estimated to have been about 40 feet. As a result of pumping, the saturated thickness underlying the major portion of the plant site has been reduced by 12 or more feet, with the greatest reduction near the pumping wells. Figure 5.8 shows the total water-level change or drawdown for the regional aquifer on October 22, 1987, one year since the start of remedial action pumping (October 13, 1986).

As mentioned the ground-water flow prior to pumping was northwest toward Bean Creek. As the cone-of-depression grew from the remedial action pumping at Watkins-Johnson the gradient was reversed near the pumping wells and flow toward Bean Creek diminished (Figure 5.6).

Based on the water levels measured in wells constructed at Sky Park Airport (AP-1, AP-2, and AP-3), Sky Park Well, M-1, and the wells along Lockhart Gulch Road, the water table in the vicinity of the airport is relatively flat, and the ground-water divide one year after remediation was initially east of the abandoned airport near Wells M-1 and M-2 as shown on Figure 5.6. The ground-water divide is essentially an approximate line or zone



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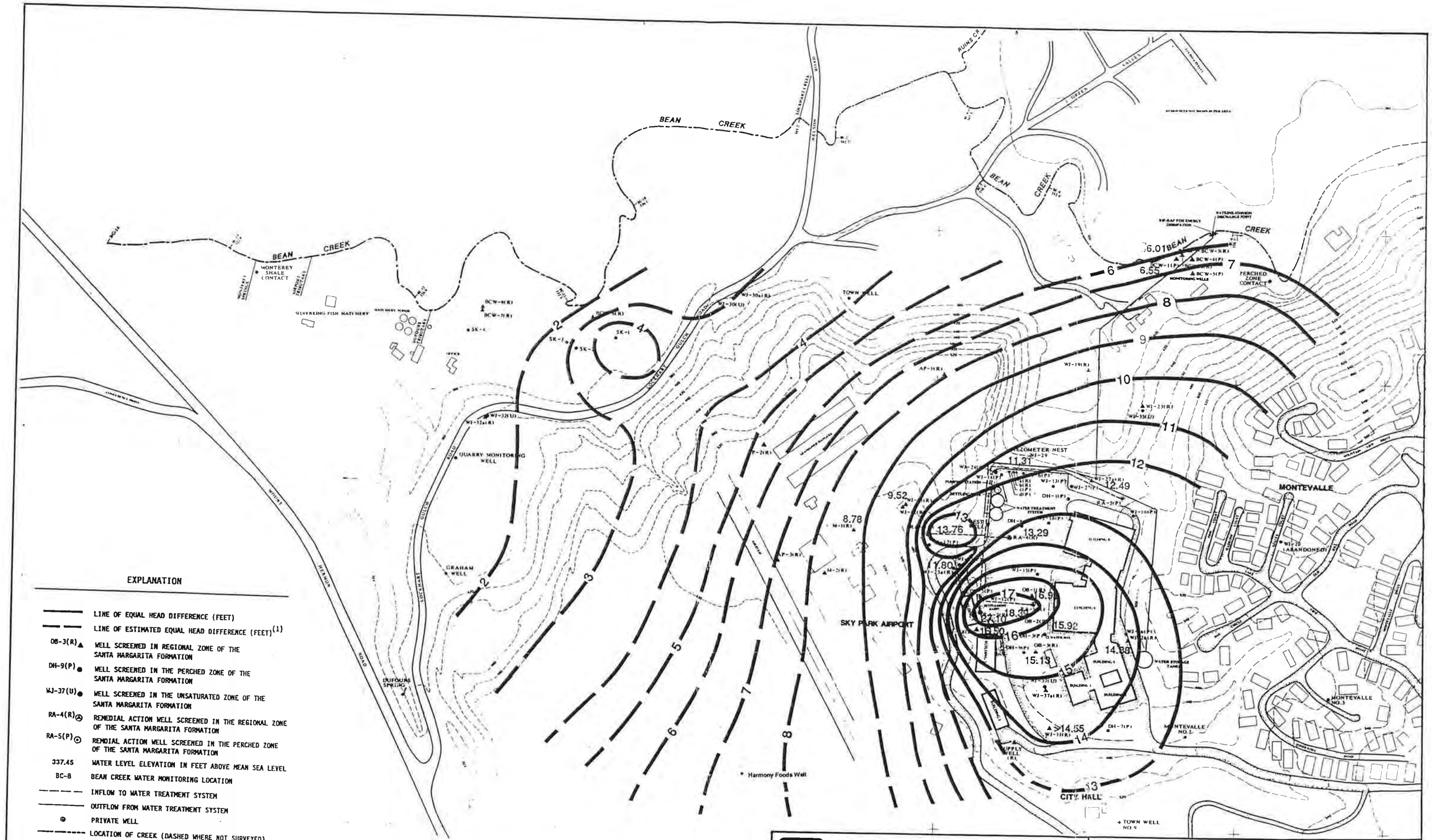
PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

HYDROGRAPH OF WELLS WJ-27a, BCW-6, BCW-7, AP-2 AND WJ-30

FIGURE 5.7

WJ007828



NOTE: WJ-23 NOT USED IN THE PREPARATION OF THIS MAP

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WATER-LEVEL CHANGES IN THE REGIONAL ZONE BETWEEN OCTOBER 13, 1986 AND OCTOBER 22, 1987

FIGURE 5.8

WJ007829

that divides the section of the regional aquifer which contributes water to the Watkins-Johnson remedial action well field from the section that contributes water to Bean Creek and the Silverking wells. In the Spring of 1987 the ground-water divide was probably under the airport area. Subsequent reduction of pumpage at Watkins-Johnson and increased pumpage at Silverking Oceanic Farms had caused the divide to move somewhat closer to the plant property. When both Watkins-Johnson and Silverking are pumping the region between the two cones-of-depression probably have very low ground-water flow velocities. This is important in the overall design of remediation as contaminants in this area will move very slowly and could prolong cleanup.

As seen on the hydrographs on Figure 5.5 and 5.7, ground-water levels were slowly recovering by the end of 1987. On or around January 20, 1988, Silverking Oceanic Farms ceased pumping from the regional zone of the Santa Margarita aquifer. The fish hatchery had been pumping from SK-1 at approximately 265 gpm since May, 1987. Although pumping water levels in the Remedial Action Wells RA-1, RA-2, and RA-3 changed little after Silverking ceased pumping, the overall recovery in the regional zone has been substantial. The configuration of the water table for February 22, 1988 (Figure 5.9) shows that the cone-of-depression around SK-1 has disappeared as the well recovered over 13 feet. The ground-water divide due to the pumping at Watkins-Johnson had shifted over 450 feet to the northwest and was located near AP-2.

Since February, 1988, Silverking has pumped intermittently and small cones of depression have been measured around the pumping wells at Silverking. However, during the spring, the ground-water divide did not shift from its location near AP-2. During the summer, while water levels fluctuated slightly, the ground-water divide retreated toward Watkins-Johnson as pumping a Watkins-Johnson dominated ground-water flow patterns. During this time total pumpage at Watkins-Johnson did not change (Figure 5.2). The configuration of the regional water table for August 8, 1988 is shown on Figure 5.10. The ground-water divide has been located again near Well M-1.

As can be shown, the two factors that affect the ground-water flow patterns in this area are pumpage from the Watkins-Johnson wells and the Silverking wells regional zone. Silverking Oceanic Farms plans to commence pumping on a sustained basis as the hatchery no longer plans to use any water from the Dufours Spring. This will once again create a

WJ007830

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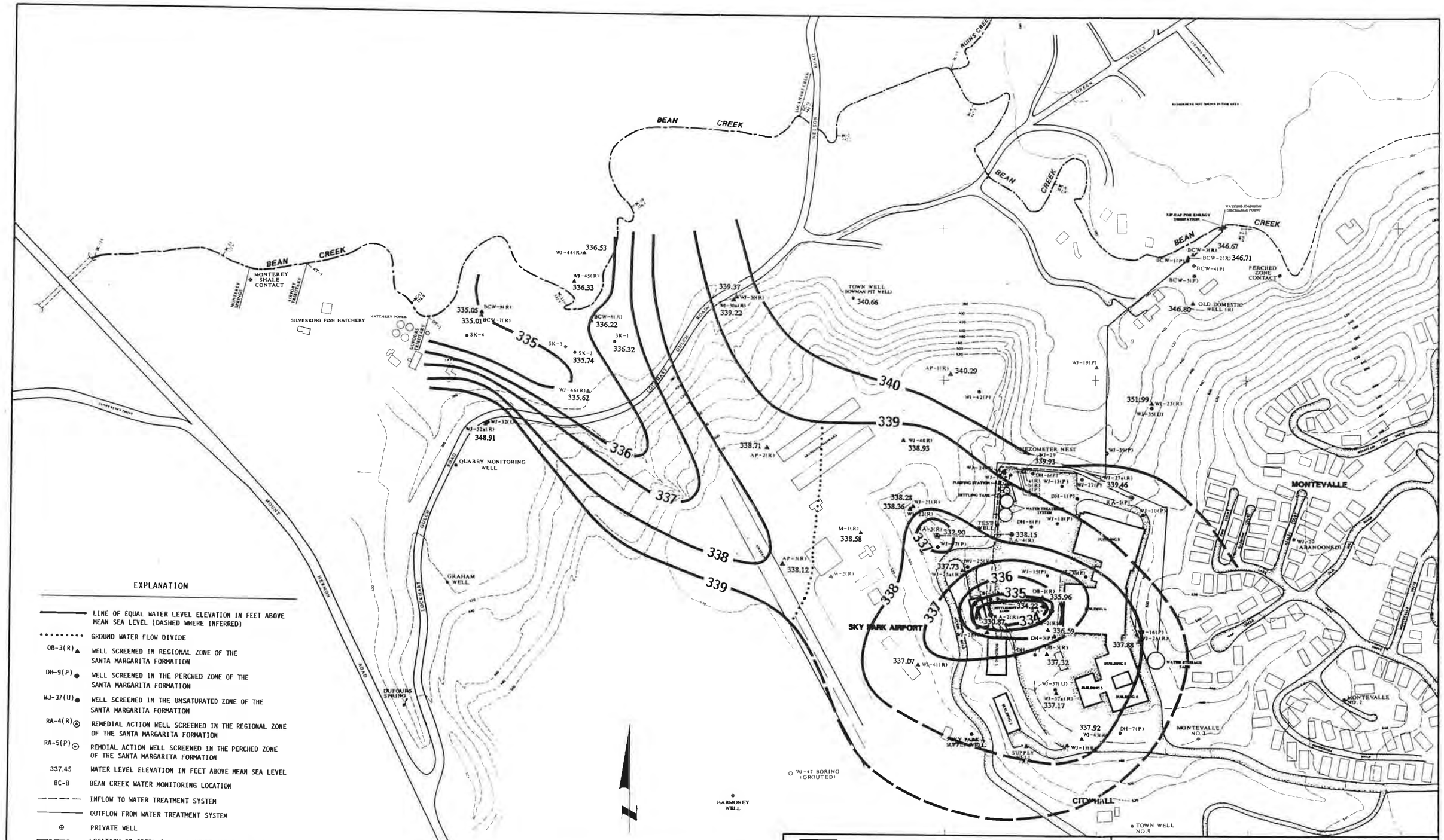
CONFIGURATION OF REGIONAL WATER TABLE, FEBRUARY 22, 1988

FIGURE 5.9

WJ007831



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PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONFIGURATION OF REGIONAL WATER TABLE
AUGUST 8, 1988

FIGURE 5.10

WJ007832

sizable cone-of-depression around Silverking and control the position of the ground-water divide. In addition, artificial recharge may also have an affect on the regional system. Recharge to the perched zone beneath the Watkins-Johnson plant commenced in June 1988 at a rate of about 15 gpm. The recharge plans called for stepwise increases in recharge volume. Buildup of a mound in the perched zone will potentially drive more water vertically downward into the regional zone. This may affect the ground-water flow system near the injection area.

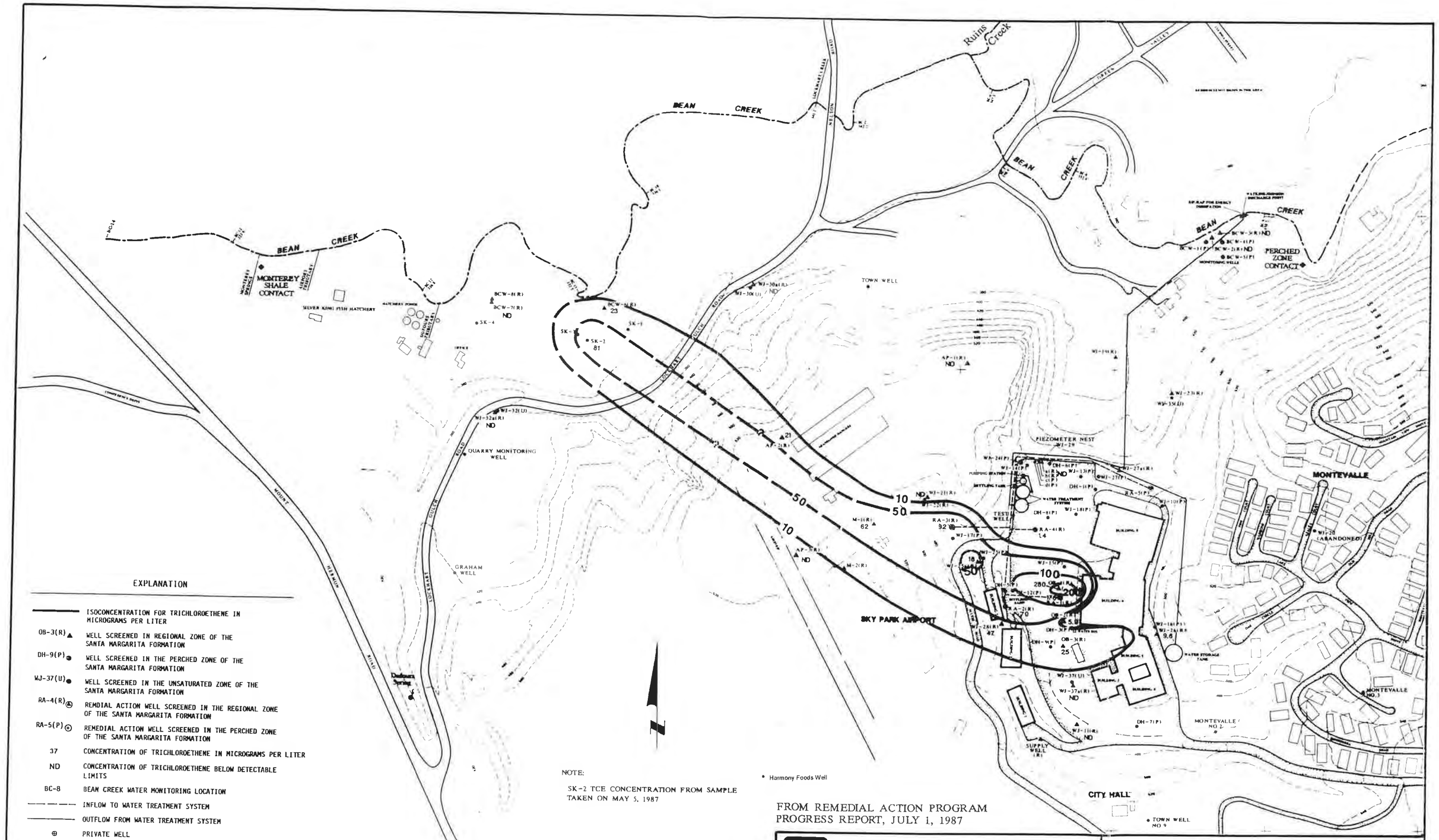
The water-level measurement database for regional wells is contained in Appendix D. Additional hydrographs and regional water-table configuration maps are also contained in Appendix D.

5.6 Regional Zone Plume Definition

Contamination has been detected in water samples from wells that are screened in the regional zone. Since TCE is the major identified constituent, it has been used to delineate the plume of contamination in the regional aquifer. Even though other volatile organics such as 1,1,1-TCA, T-DCE and 1,1-DCE were also detected in the regional aquifer, they had relatively low concentrations. Therefore, TCE has been used as the tracer for this study because it is found at generally higher concentrations. Based on the results of chemical analyses of water samples collected May 22 to 26, 1987, the TCE plume in the regional aquifer near the Watkins-Johnson facility is depicted in Figure 5.11. The plume shown for May was more extensive than earlier maps due to the availability of additional data from Wells BCW-6 and SK-2. Figure 5.11 shows that the TCE concentrations form a narrow cigar-shaped plume. The concentrations are greatest below Building No. 6 dilution tank area where concentrations are as high as 5,200 ppb in RA-1. The 50 ppb contour for May, 1987 extends to Well SK-2. Prior to March 1987, when Well SK-2 started pumping, the plume probably extended all the way to Bean Creek. The occurrence of contaminants in Bean Creek is discussed in the next section.

The generally elongated shape of the regional TCE plume did not change between May, 1987 (Figure 5.11) and August, 1987 (Figure 5.12) but relative concentrations changed considerably. Concentrations of TCE detected in samples from Wells BCW-6, SK-1, and SK-2 indicate that the plume is being captured by pumping from the Santa Margarita

WJ007833



FROM REMEDIAL ACTION PROGRAM PROGRESS REPORT, JULY 1, 1987

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Ground-Water Consultants

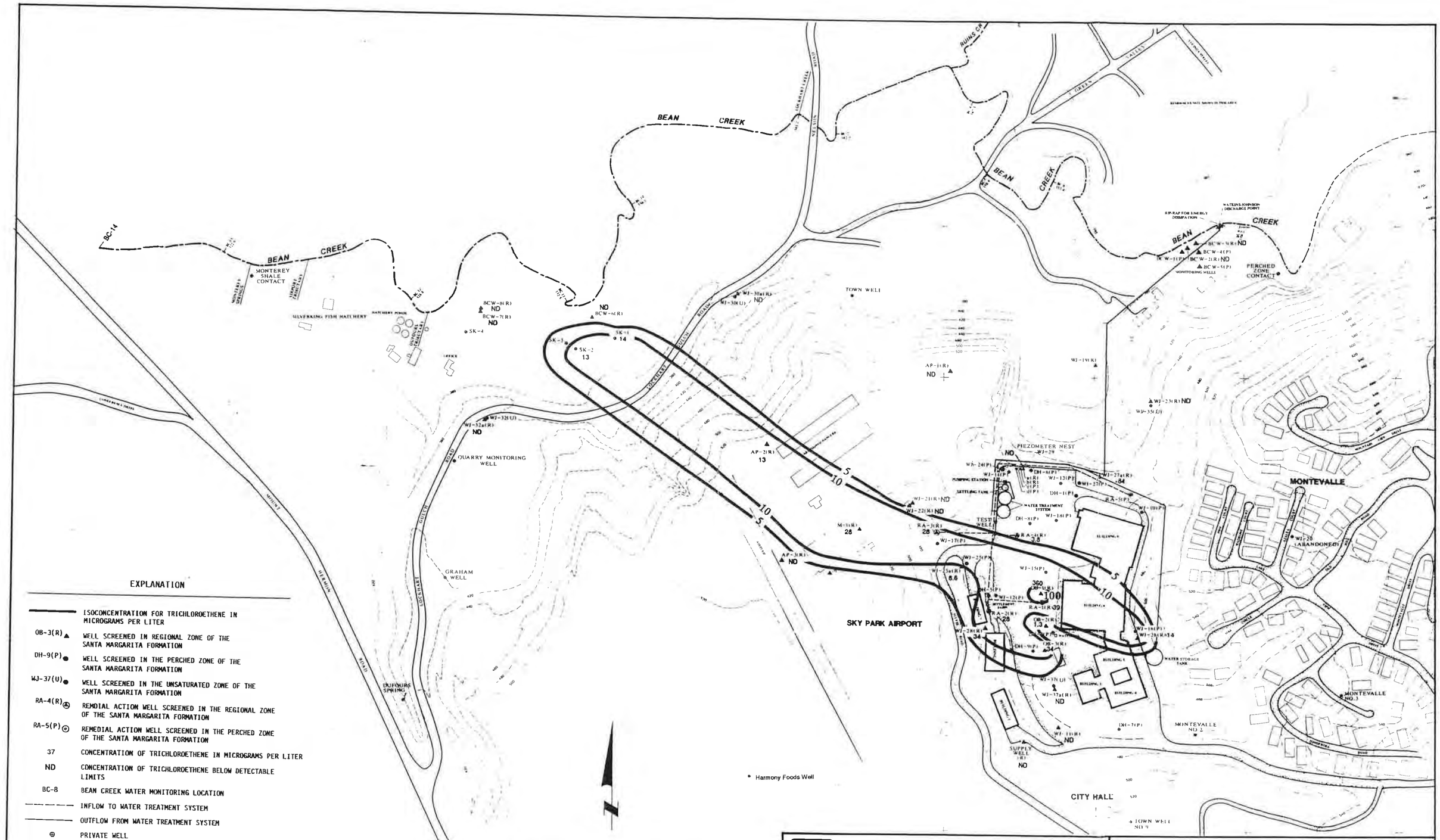
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

DISTRIBUTION OF TRICHLOROETHENE IN THE REGIONAL ZONE, MAY 22 TO 26, 1987

FIGURE 5.11

WJ007834



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DISTRIBUTION OF TRICHLOROETHENE IN THE REGIONAL ZONE, AUGUST 24 TO 28, 1987

FIGURE 5.12

WJ007835

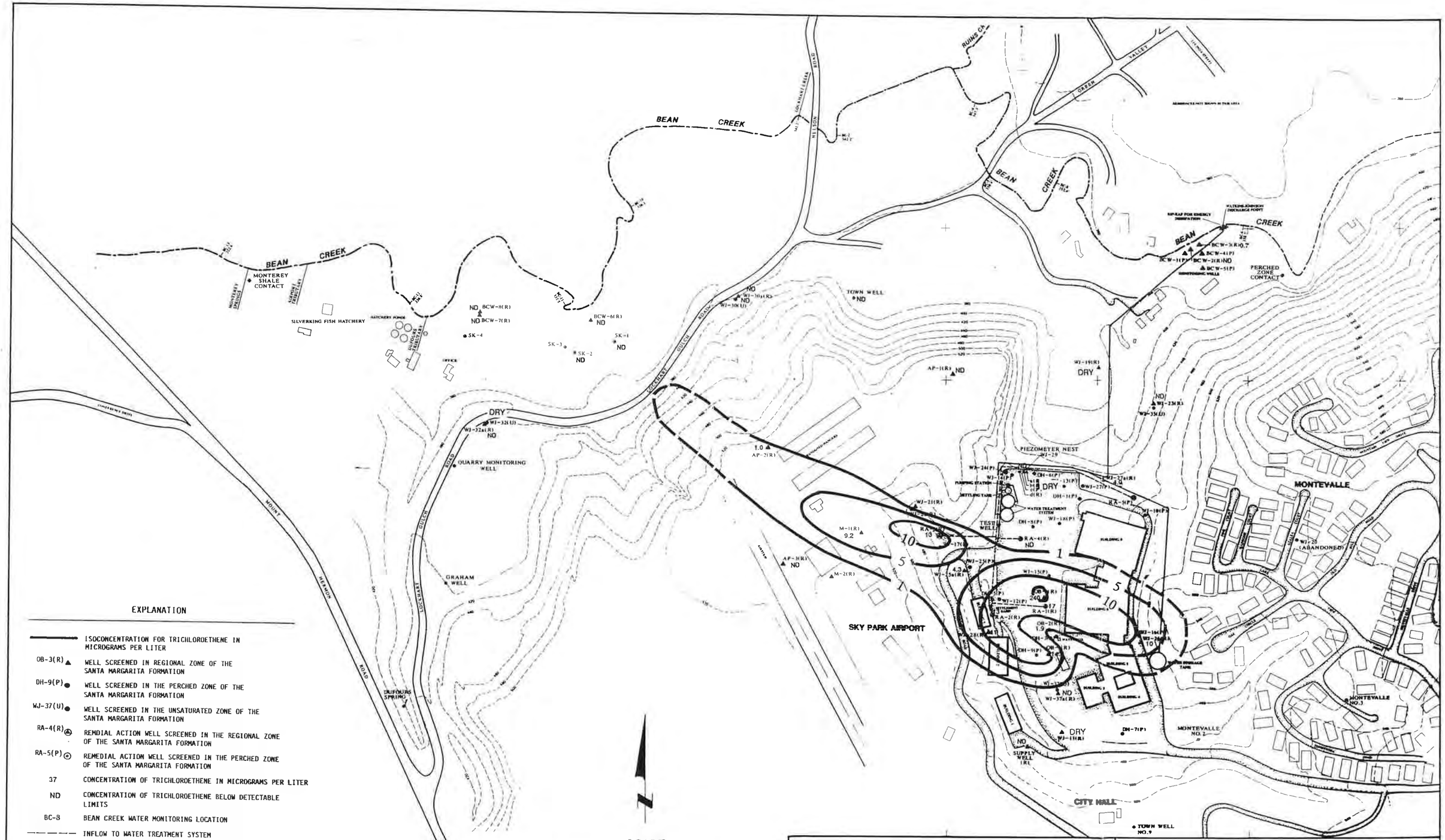
Aquifer at Silverking. In August 1987, the TCE plume probably no longer reached Bean Creek. This is consistent with the weekly Bean Creek sampling analyses which continue to report concentrations below the detection limit. Examination of concentrations of TCE measured from water samples within individual wells and the TCE distribution shown in Figures 5.11 and 5.12, illustrate that TCE concentrations were much lower in August 1987 than in May 1987. The only remaining location illustrating higher TCE concentrations within the regional aquifer is just west of Building 6, near the potential source.

As the remedial action program has continued, the extent of the plume of contamination has steadily diminished. Figures 5.13, 5.14, and 5.15 show the regional TCE plumes for November 16 to 20, 1987, March 8 to 17, 1988, and June 13 to 20, 1988, respectively. The March and June sampling rounds were done under the EPA directed program and will be described in more detail in the following section on analysis of results. Results of the analyses show that TCE plume has been greatly reduced by the remediation program. In fact, the northwest extent of the plume in June 1988 (Figure 5.15) is now closer to M-1 than AP-2 which is shown in Figure 5.14. This also indicates that the plume, as measured with present data, at concentrations greater than the detectable limits may no longer extends to the area northwest of M-1. Although June, 1988 (Figure 5.15) TCE levels were generally higher in the central core of the plume than in March 1988 (Figure 5.14), the extent of the plume has been reduced to within the major cone-of-depression (see Figure 5.10).

The intermittent pumping at Silverking has apparently drawn TCE back towards the Silverking wells. This may indicate that a residual plume may exist between Watkins-Johnson and Silverking due to the almost flat gradients between the two pumping centers.

Figures 5.16, 5.17 and 5.18 show graphs of changes in TCE concentration over time in select regional wells and show the positive affects of the remedial action pumping in removing TCE from the ground-water system. Additional plume maps for TCE from the first six months of remediation are shown in Appendix F along with the ground-water quality databases. While TCE has greatly diminished in most wells, the central core of the plume remains near Well OB-3 which is near the Building 6 dilution tank.

WJ007836



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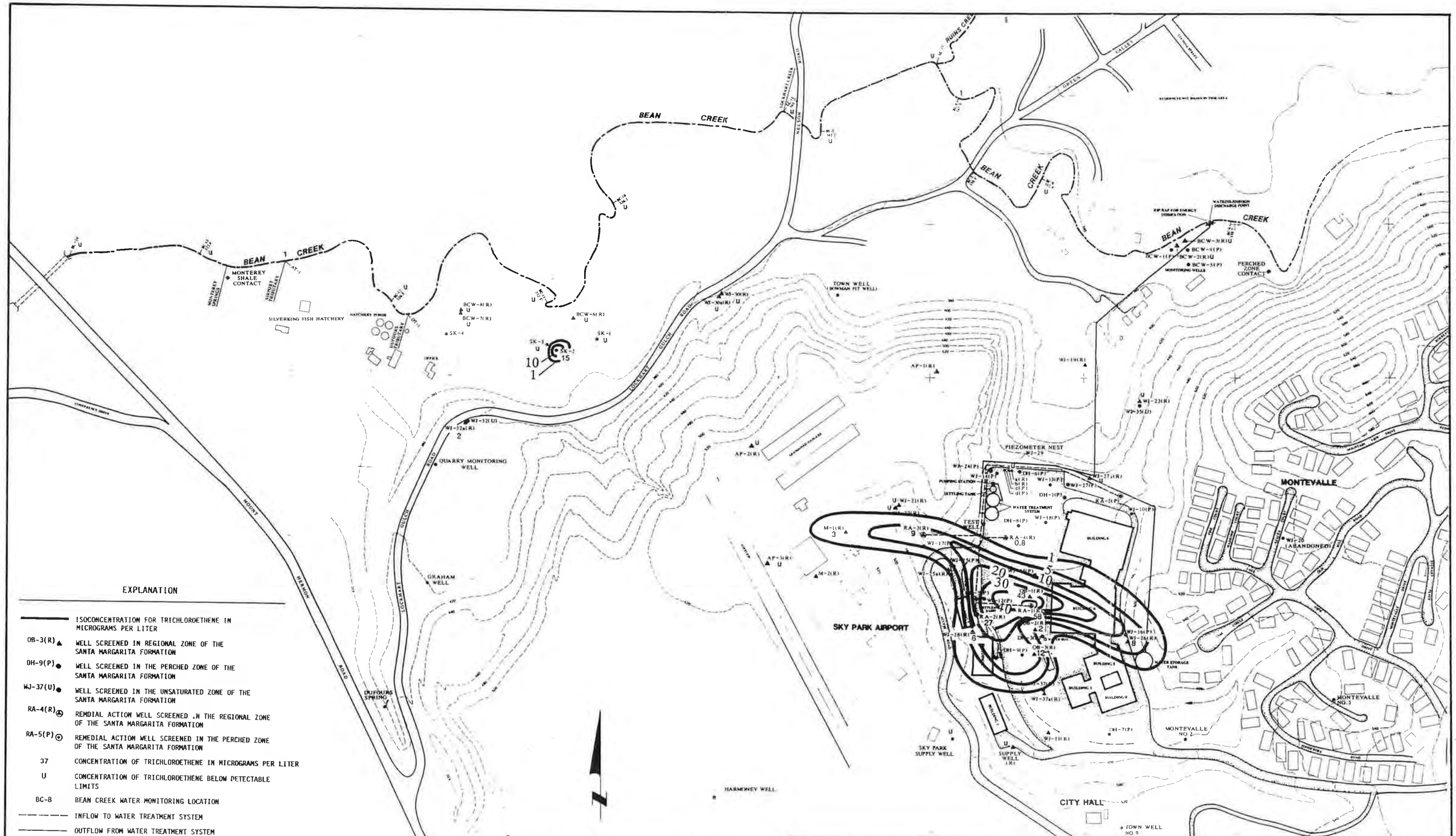
DISTRIBUTION OF TRICHLOROETHENE IN THE REGIONAL ZONE, NOVEMBER 16 TO 20, 1987

FIGURE 5.13

WJ007837



EXPLANATION

- ISOCONCENTRATION FOR TRICHLOROETHENE IN MICROGRAMS PER LITER
- OB-3(R) ▲ WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- DH-9(P) ● WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- WJ-37(U) ● WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
- RA-4(R) ⊕ REMDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
- RA-5(P) ⊙ REMEDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
- 37 CONCENTRATION OF TRICHLOROETHENE IN MICROGRAMS PER LITER
- U CONCENTRATION OF TRICHLOROETHENE BELOW DETECTABLE LIMITS
- BC-8 BEAN CREEK WATER MONITORING LOCATION
- INFLOW TO WATER TREATMENT SYSTEM
- OUTFLOW FROM WATER TREATMENT SYSTEM
- ⊕ PRIVATE WELL
- LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)

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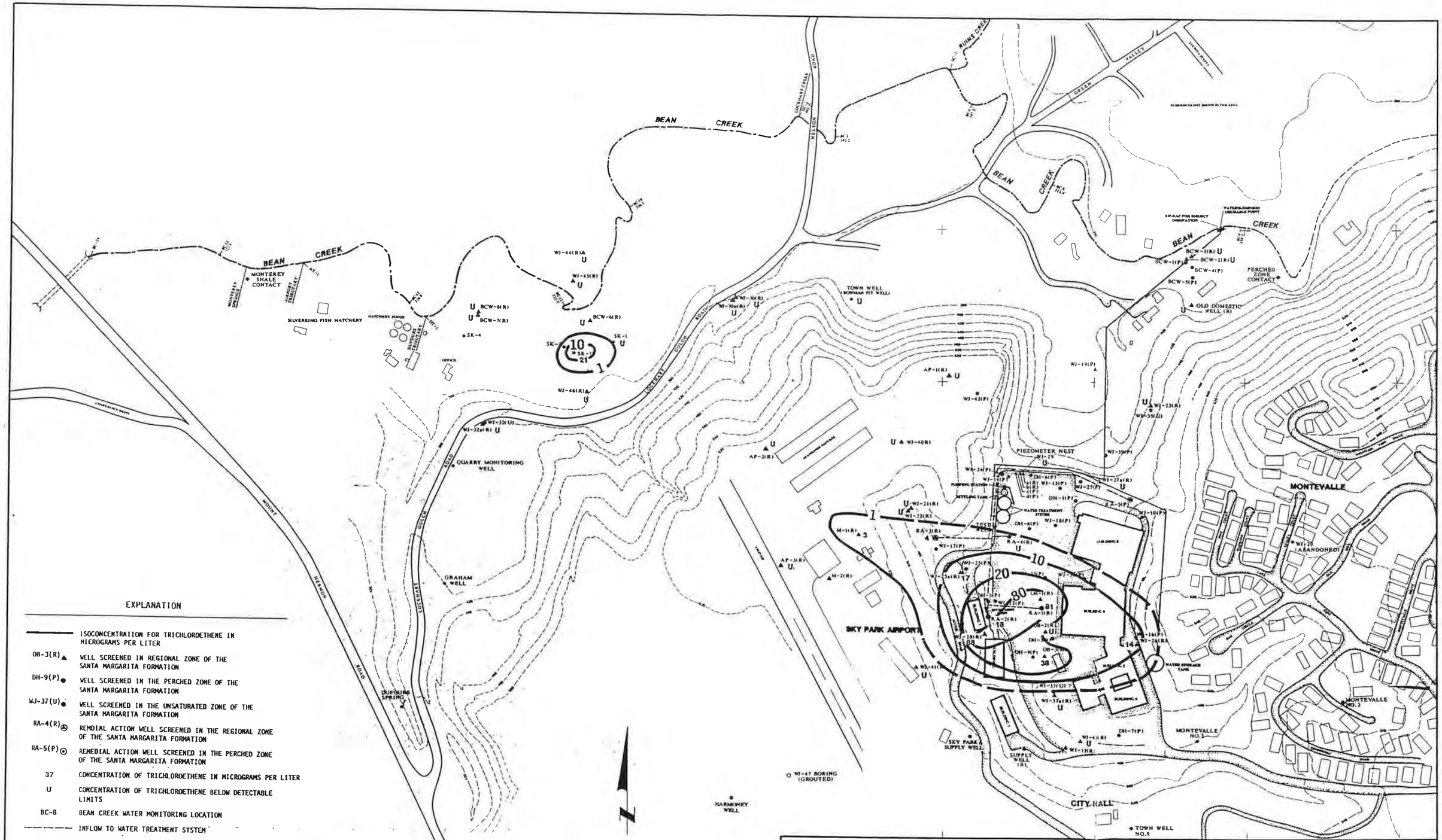
DISTRIBUTION OF TRICHLOROETHENE IN THE REGIONAL ZONE, MARCH 8 TO 17, 1988

FIGURE 5.14

WJ007838



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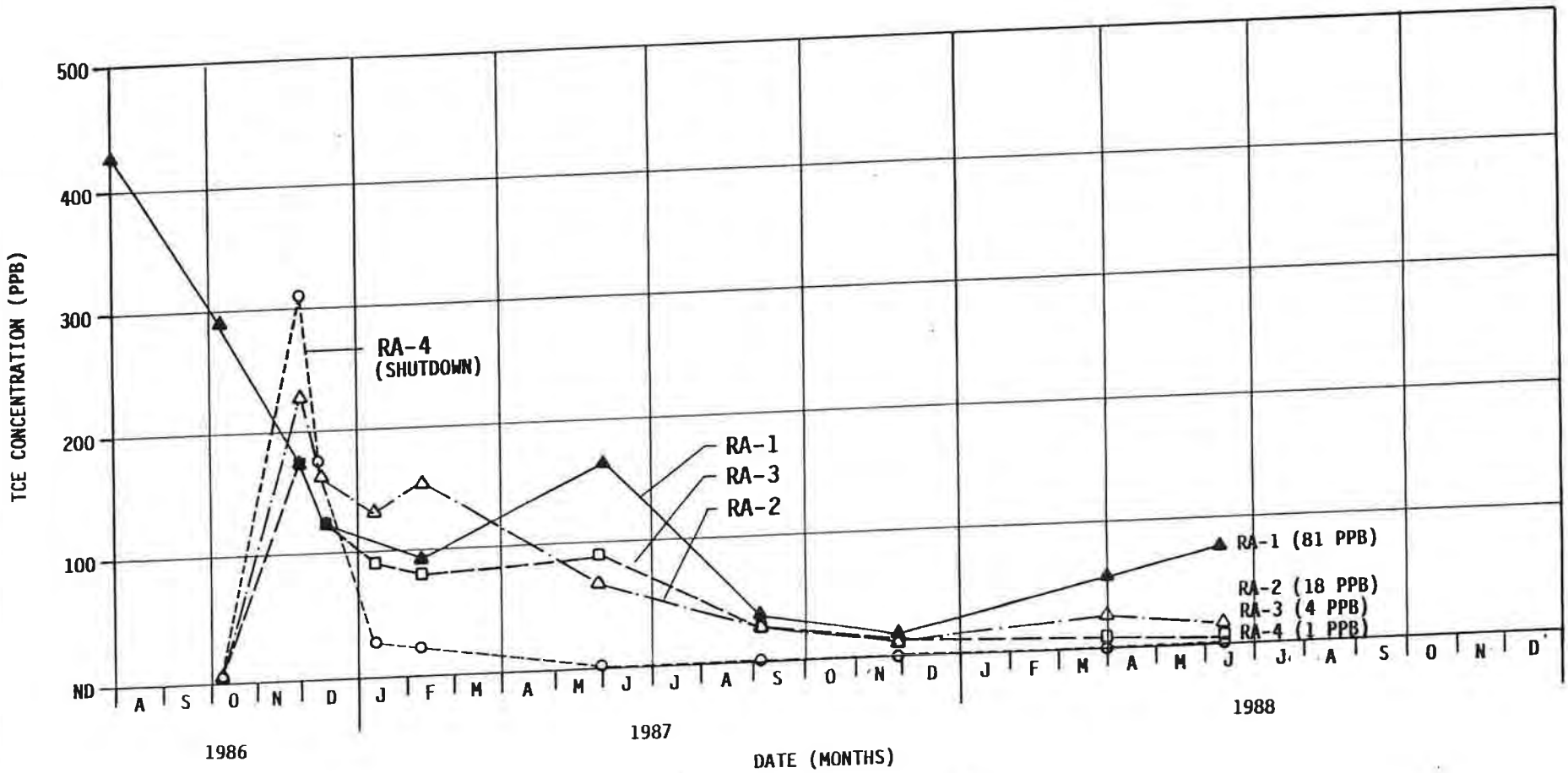
DISTRIBUTION OF TRICHLOROETHENE IN REGIONAL ZONE, JUNE 13 TO 20, 1988

FIGURE 5.15

WJ007839



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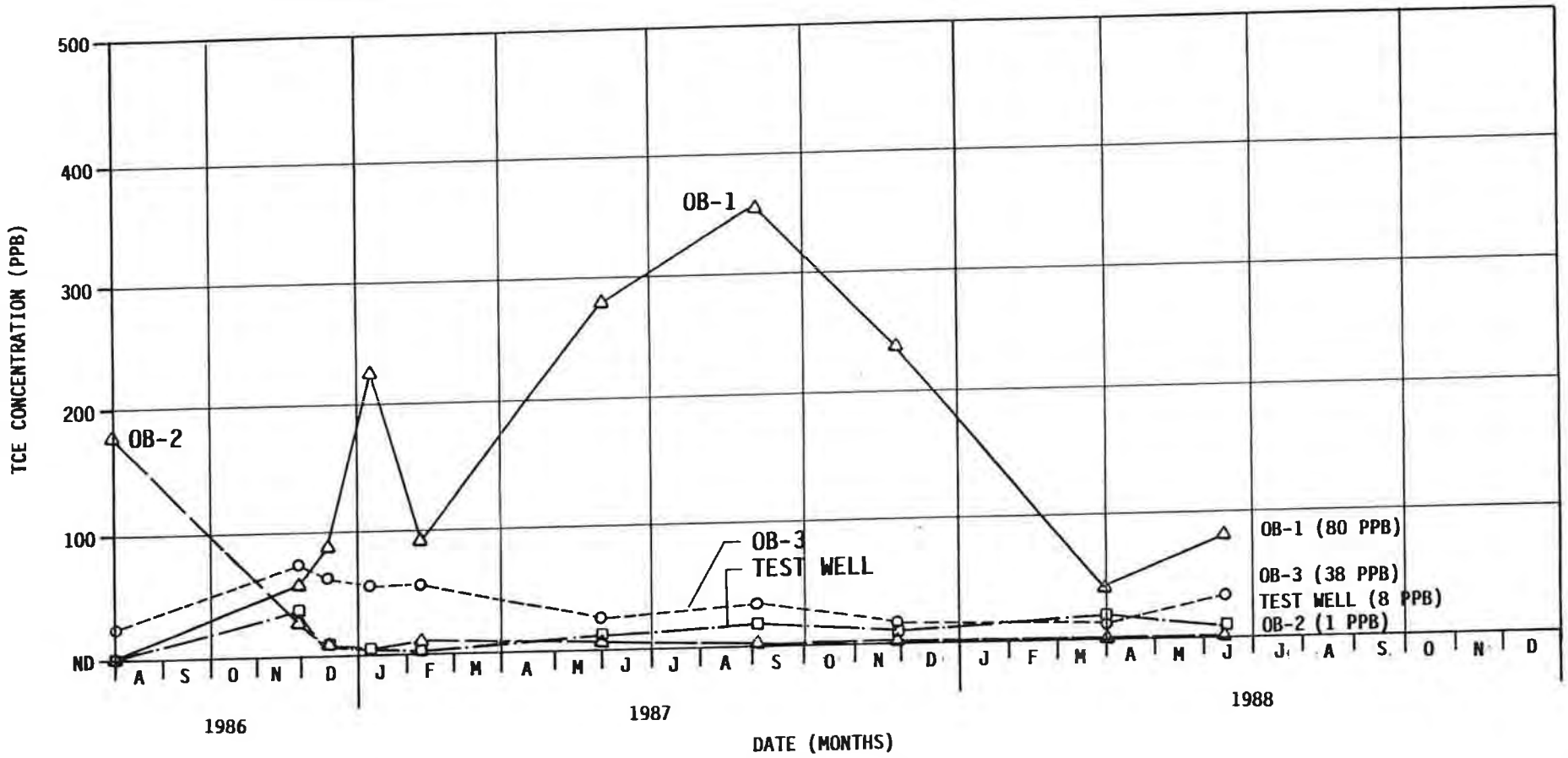
PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONCENTRATION OF TRICHLOROETHENE VERSUS TIME IN WELLS RA-1, RA-2, RA-3 AND RA-4

FIGURE 5.16

WJ007840



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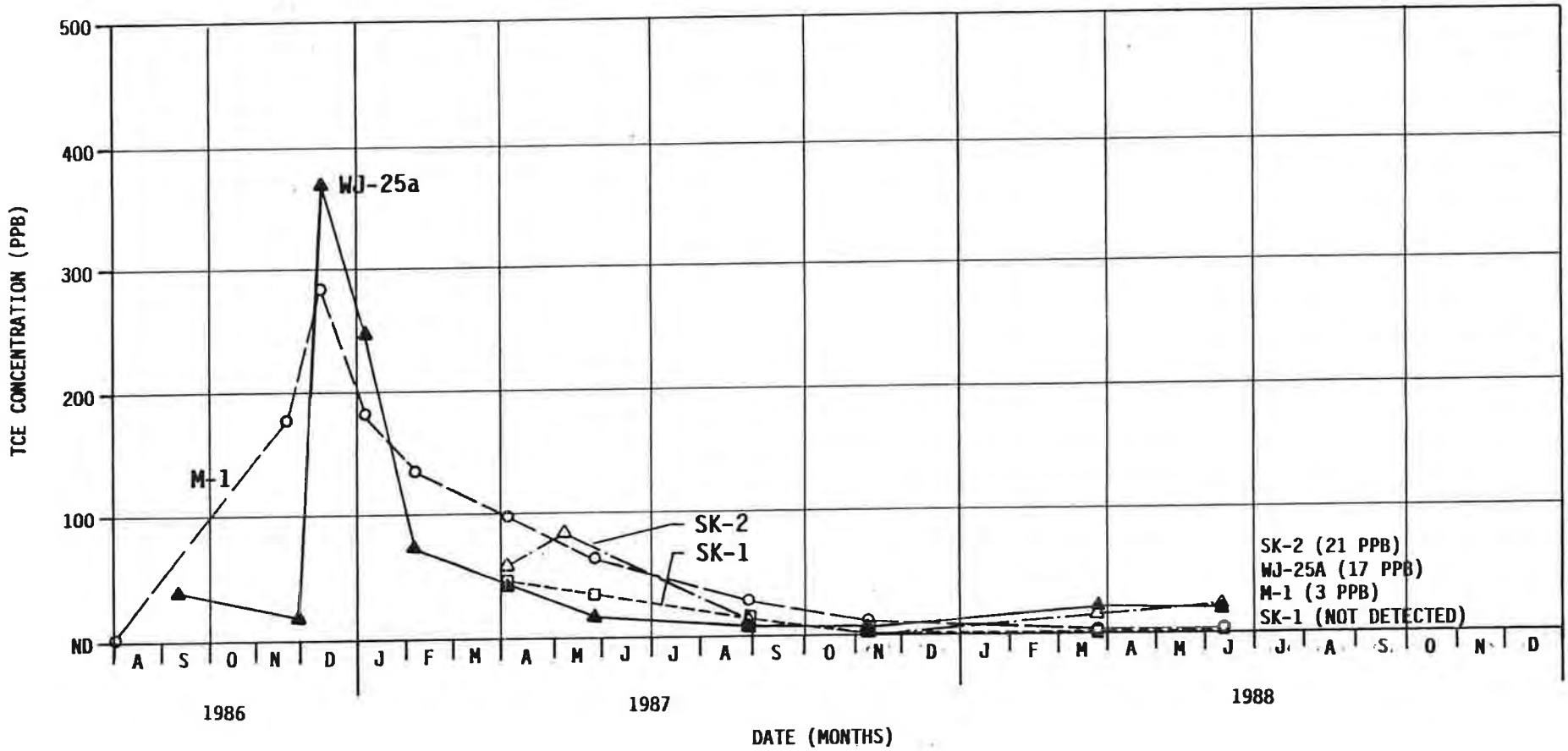
PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONCENTRATION OF TRICHLOROETHENE VERSUS TIME IN WELLS OB-1 OB-2, OB-3 AND TEST WELL

FIGURE 5.17

WJ007841



R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONCENTRATION OF TRICHLOROETHENE VERSUS TIME IN WELLS M-1, SK-1, SK-2 AND WJ-25A

FIGURE 5.18

WJ007842

The other EPA contaminant of concern in the regional zone is 1,1-DCE. Recent data on the distribution of 1,1-DCE in the regional zone is shown on Figure 5.19. The 1,1-DCE contamination has been found in only a few samples and is limited to the area of the TCE plume. Another contaminant of EPA concern in the ground-water is VC. Although found in the perched zone, VC has not been detected in the regional zone.

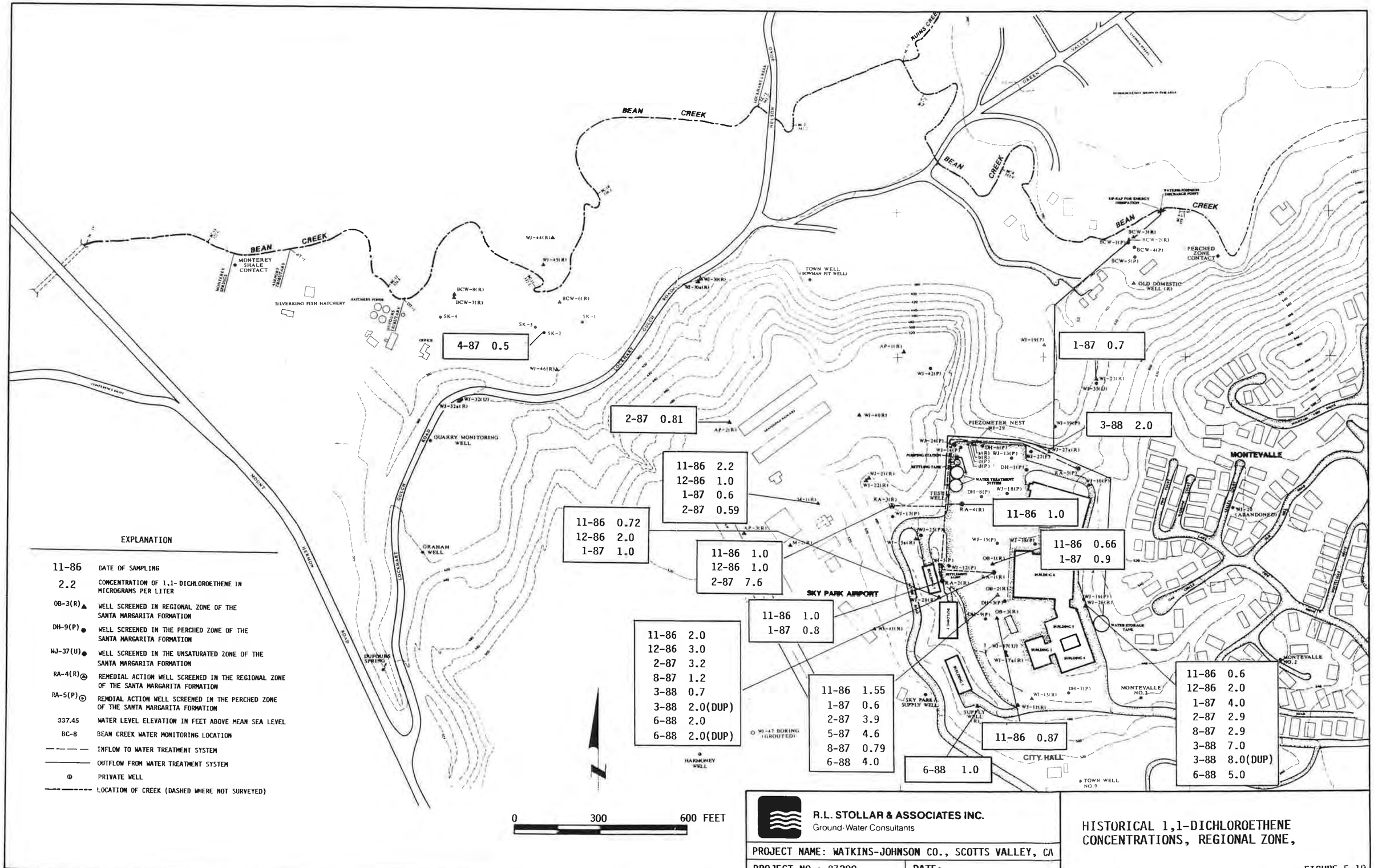
5.7 Stream-Aquifer Interactions

Bean Creek acts as a major drain for ground water where the stream intersects the Santa Margarita aquifer system. Regionally, ground water in the Santa Margarita aquifer flows toward Bean Creek which divides the aquifer into northern and southern halves. Regionally, ground-water discharge to streams has been estimated to account for about 63 percent of outflow, from the Scotts Valley Basin, with the remainder pumped out through wells, exported from the basin, or lost to evapotranspiration. Most of the ground-water is discharged to Bean Creek, with a base flow reported to be 3.3 cubic feet per second (cfs), (Todd, 1987). It is estimated that approximately 3.5 cfs (2.3 million gallons per day, mgpd) flowed to the creek under natural conditions before pumping in the study area. This would be the reach between the plant and Monterey Springs where Santa Margarita outcrops at Bean Creek (Figure 2.8). This estimate is based on the ground-water modeling results reported in the Section 5 of report Assessment of Existing Hydrogeologic and Contaminant Source Data (RLSA, January, 1988). The model was designed to approximate values from stream gaging before remediation. Other results from the ground-water model showed that there was a reduction in flow of water from the aquifer to the creek of 0.2 mgd due to pumping at Watkins-Johnson and an equal reduction when Silverking was pumping.

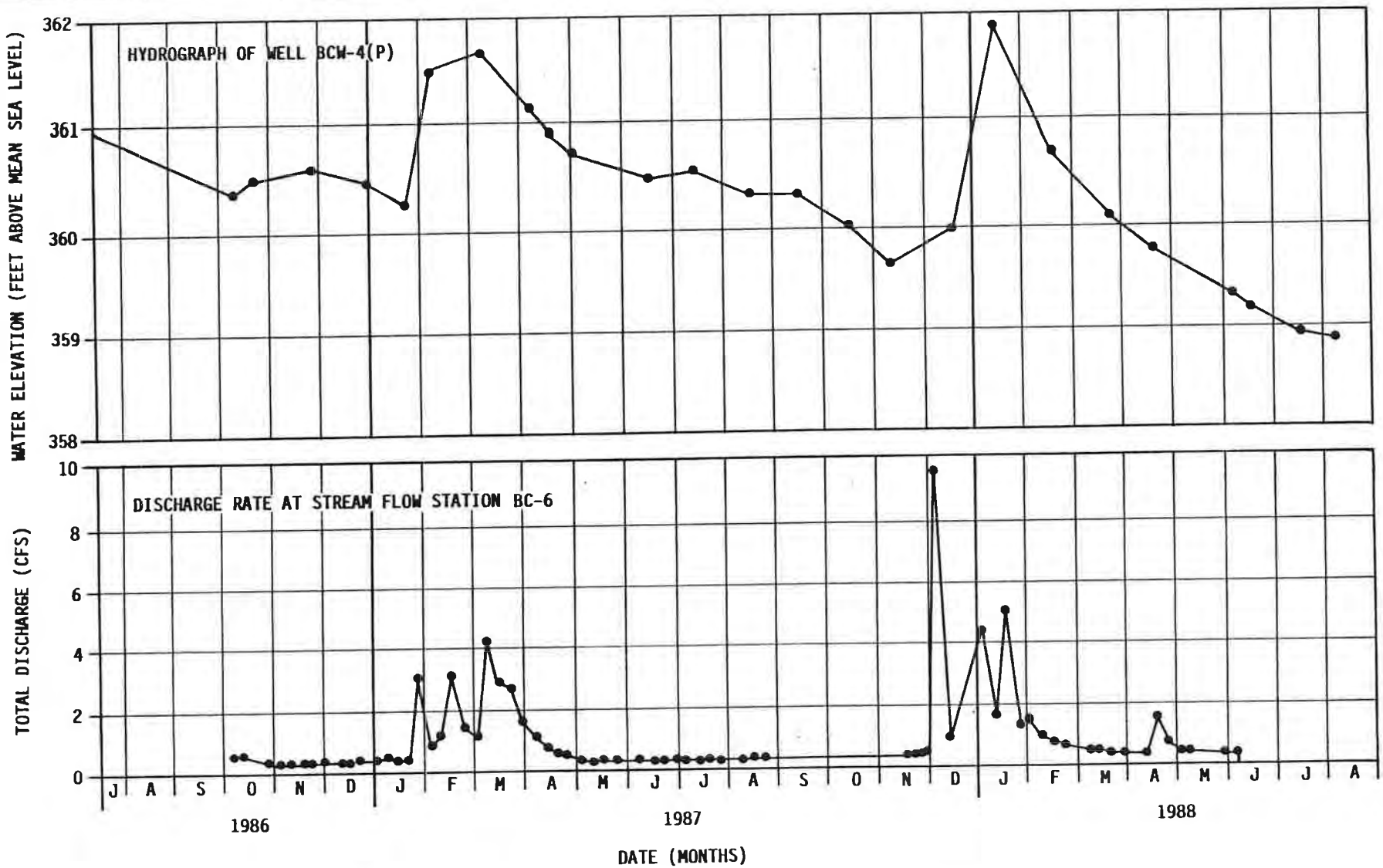
Flow in Bean Creek is much reduced directly north of the plant compared to the reaches near Silverking. This is probably because the creek does not receive recharge from the regional zone along its entire reach.

A hydrograph (Figure 5.20) was prepared for Well BCW-4, which was completed in the perched zone near Bean Creek north of the plant. This location is approximately 100 feet downstream of where Watkins-Johnson discharges the treated water to the Creek. The

WJ007843


BEAN CREEK
MONTEREY SHALE CONTACT
SILVERKING FISH HATCHERY
HATCHERY POND
WOODS PRODUCE
OFFICE
QUARRY MONITORING WELL
GRAHAM WELL
DUFOURG SPRING
HERMON ROAD
MOUNT
LOCKHART GULCH ROAD
VOLKMAN GULCH ROAD
HILLTOP ROAD
RUINS CREEK
GREEN VALLEY
TOWN WELL (BOWMAN PIT WELL)
PIEZOMETER NEST WJ-29
PUMPING STATION
SETTLING TANK
WATER TREATMENT SYSTEM
TEST WELL
SKY PARK AIRPORT
SKY PARK SUPPLY WELL
SUPPLY WELL R1
WJ-47 BORING (GROUTED)
HARMONEY WELL
RIP-RAP FOR ENERGY DISSIPATION
WATERWLJOHNSON DISCHARGE POINT
PERCHED ZONE CONTACT
OLD DOMESTIC WELL (R)
MONTEVALLE
MONTEVALLE NO.1
MONTEVALLE NO.2
WATER STORAGE TANK
CITY HALL
TOWN WELL NO.9
4-87 0.5
2-87 0.81
11-86 2.2
12-86 1.0
1-87 0.6
2-87 0.59
11-86 0.72
12-86 2.0
1-87 1.0
11-86 1.0
12-86 1.0
2-87 7.6
11-86 1.0
1-87 0.8
11-86 2.0
12-86 3.0
2-87 3.2
8-87 1.2
3-88 0.7
3-88 2.0(DUP)
6-88 2.0
6-88 2.0(DUP)
11-86 1.55
1-87 0.6
2-87 3.9
5-87 4.6
8-87 0.79
6-88 4.0
1-87 0.7
3-88 2.0
11-86 1.0
11-86 0.66
1-87 0.9
11-86 0.87
6-88 1.0
11-86 0.6
12-86 2.0
1-87 4.0
2-87 2.9
8-87 2.9
3-88 7.0
3-88 8.0(DUP)
6-88 5.0
EXPLANATION
11-86 DATE OF SAMPLING
2.2 CONCENTRATION OF 1,1-DICHLOROETHENE IN MICROGRAMS PER LITER
OB-3(R) WELL SCREENED IN REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
DH-9(P) WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
WJ-37(U) WELL SCREENED IN THE UNSATURATED ZONE OF THE SANTA MARGARITA FORMATION
RA-4(R) REMEDIAL ACTION WELL SCREENED IN THE REGIONAL ZONE OF THE SANTA MARGARITA FORMATION
RA-5(P) REMDIAL ACTION WELL SCREENED IN THE PERCHED ZONE OF THE SANTA MARGARITA FORMATION
337.45 WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
BC-8 BEAN CREEK WATER MONITORING LOCATION
INFLOW TO WATER TREATMENT SYSTEM
OUTFLOW FROM WATER TREATMENT SYSTEM
PRIVATE WELL
LOCATION OF CREEK (DASHED WHERE NOT SURVEYED)
0 300 600 FEET
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA
PROJECT NO.: 87200-
DATE:
HISTORICAL 1,1-DICHLOROETHENE CONCENTRATIONS, REGIONAL ZONE,
FIGURE 5.19

WJ007844



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PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

STREAM-AQUIFER INTERACTION

FIGURE 5.20

WJ007845

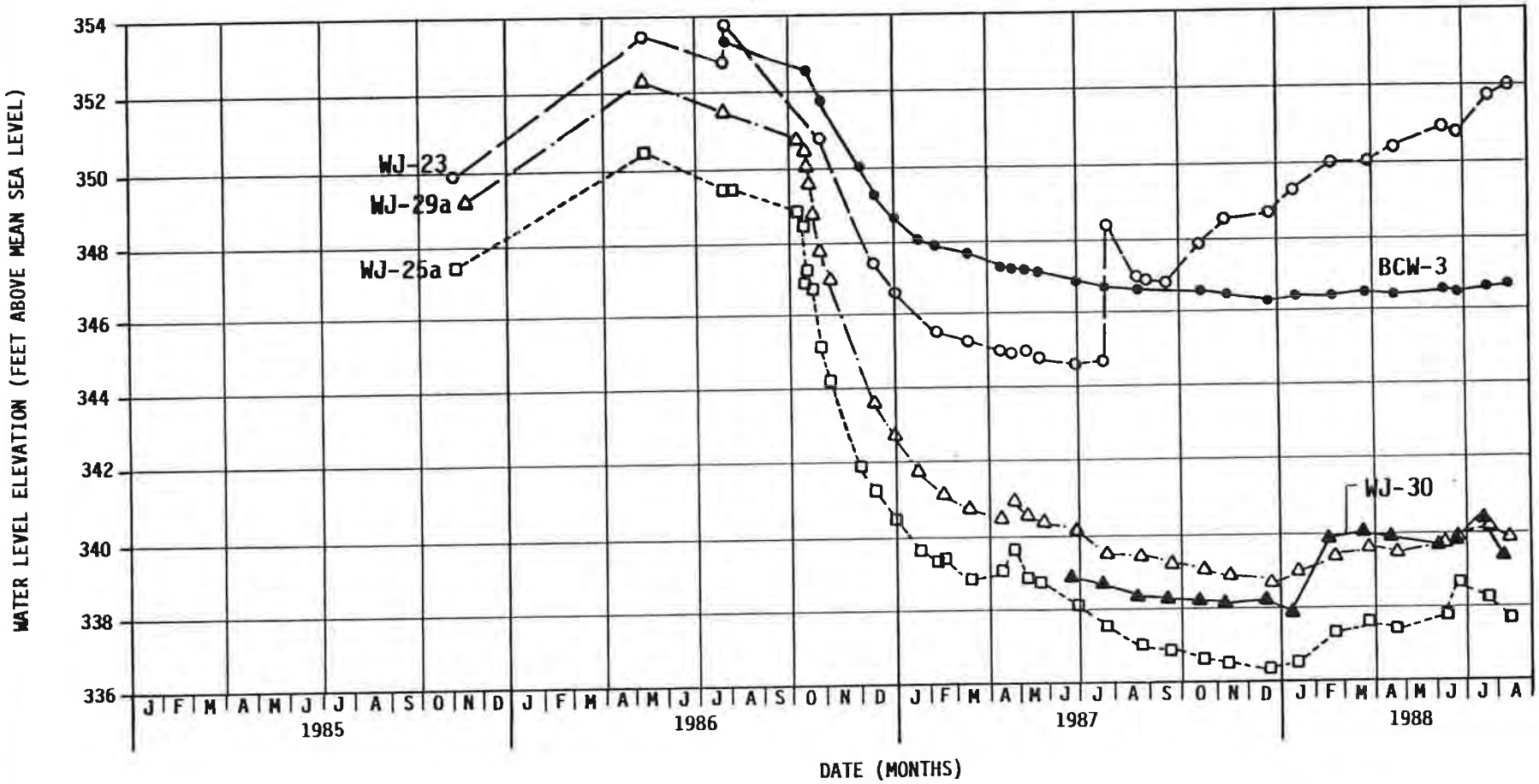
water levels in Well BCW-4 roughly follow the trend of the discharge in Bean Creek at nearby Stream-flow Station BC-6. Well BCW-3 was completed in the regional aquifer and is located only a few feet from well BCW-4. The two wells, however, exhibit very different water-level fluctuations and trends for the same period of time (Figures 5.20 and 5.21). The hydrograph for Well BCW-3 depicts drawdown in the regional aquifer and the shape of the curve is very similar to other regional wells. This indicates that the drawdown in BCW-3 is probably caused by pumping from the remedial action wells. Comparison of these two hydrographs provides additional evidence for the connection of Bean Creek with the perched zone rather than with the regional aquifer in the area of Stream-flow Station BC-6. Because the hydrograph of the perched zone well does not show any effect of remedial pumping, the creek in this area also has probably not been affected. Upstream of Ruins Creek, the creek is therefore probably connected to the perched zone and not the regional aquifer. Here some water is lost by percolation downward through unsaturated Santa Margarita sandstone, recharging the regional aquifer. Bean Creek is possibly gaining water upstream from BC-6 in part by water discharging into the creek from one or more perched aquifers. The presence of the aquitard in the apparent perched region is shown as an outcrop on the photograph in Figure 4.6. The location of this outcrop is approximately 400 feet upstream from Wells BCW-3 and BCW-4. Downstream of Ruins Creek, Bean Creek is connected to the regional Santa Margarita aquifer and receives flow from ground-water discharging from the aquifer.

Weekly streamflow measurements have been made at eight locations along Bean Creek since September 25, 1986. A summary of the flow and quality data from Bean Creek is listed in Appendix F.

Water samples from Bean Creek have been collected at the same locations and on the same dates as the discharge measurements. The results of analysis of those samples for volatile organics are given in Appendix E. The concentrations of TCE in surface water have been dropping with time. Before Silverking started pumping, TCE had been found at Stream Sampling Stations BC-11, BC-12 and BC-13. (Figure 5.22).

As stated previously, Well SK-2 began pumping at about 75 gpm in March 1987. Since then the concentrations of TCE at Stream Station BC-11 (Figure 5.22) have dropped to

WJ007846



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PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

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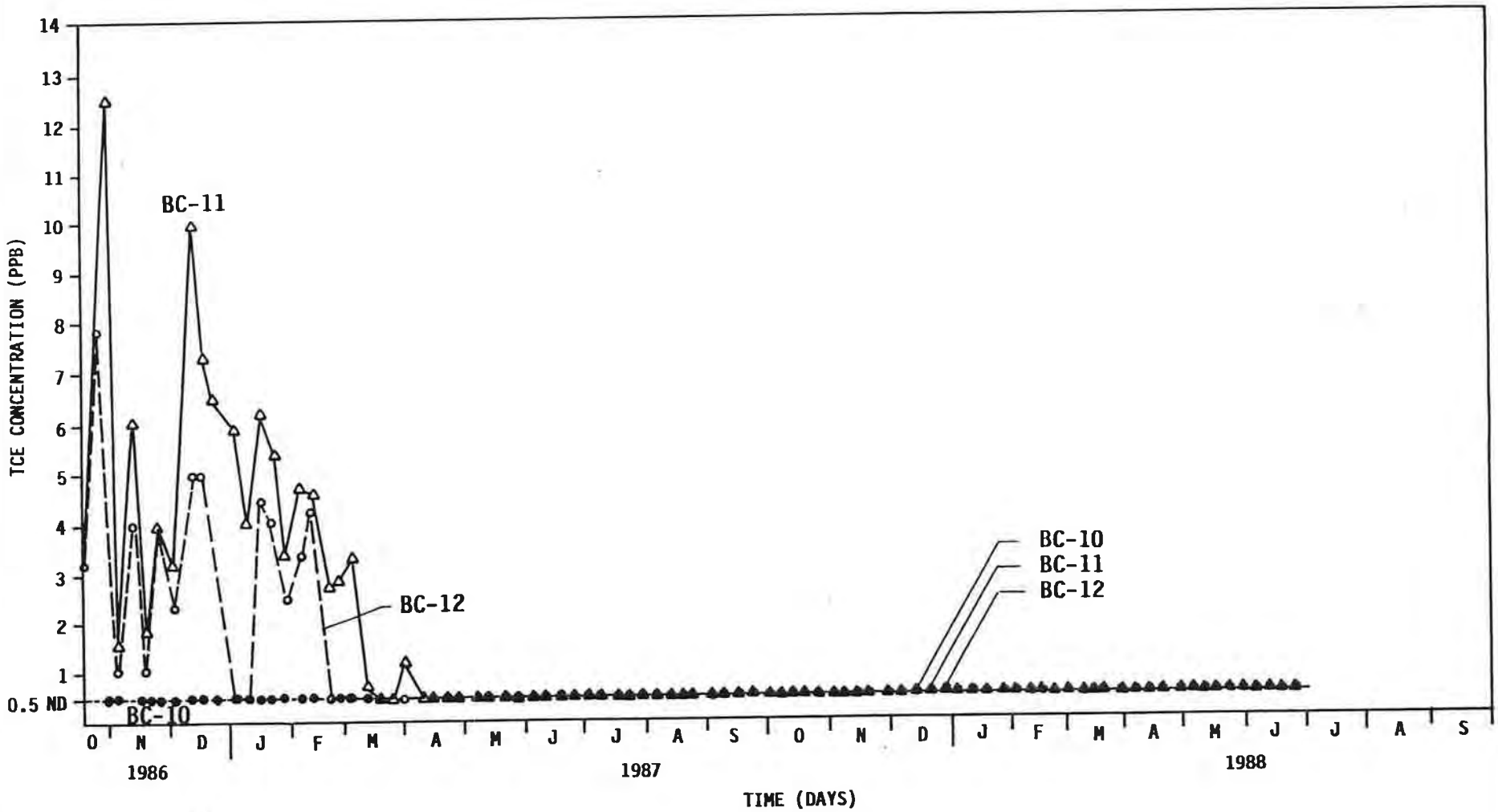
HYDROGRAPH OF WELLS WJ-23, WJ-25a, WJ-29a, WJ-30 AND BCW-3

FIGURE 5.21

WJ007847



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PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

CONCENTRATION OF TRICHLOROETHYLENE (TCE) IN SURFACE WATER COLLECTED AT BEAN CREEK SAMPLING STATIONS, BC-10, BC-11 AND BC-12

FIGURE 5.22

WJ007848

very low levels, often below detectable limits. The pumping of Well SK-2 appeared to have created a cone-of-depression which diverted the regional flow of contaminated ground water away from the creek and toward the well. A pumping rate of 75 gpm at these locations, therefore, appears to be adequate to prevent the migration of TCE to the creek.

Contamination originating in the Watkins-Johnson vicinity moves northwest and eventually should discharge into the creek if it is not first captured by the present remedial action pumpage. With the addition of a second pumping center (Silverking) extracting water from the Santa Margarita aquifer along the natural flow path for contaminants, the discharge of these contaminants to Bean Creek no longer appears to occur. The effect of pumping Silverking wells on the movement of TCE into Bean Creek is dependent on the spacial distribution of TCE within the ground-water system. If the entire TCE plume is being contained by or is within the flow field that is being captured by the Watkins-Johnson remedial action wells, then TCE will no longer flow toward Bean Creek. However, if there are small residual low concentration plumes of TCE, which have not been detected due to the spacial distribution of wells, the residual plumes will flow toward the creek. Whether the TCE in these potential residual plumes reaches the creek will be dependent on the pumpage at Silverking. If Silverking extracts water at rates greater than 75 gpm, then TCE will not discharge to the creek. On the other hand, if Silverking ceases all pumpage, the TCE will discharge to the creek.

The June 20 to 22, 1988 aquifer test at SK-1 was designed to evaluate the extent to which Bean Creek might be acting as a boundary to the ground-water system. During the EPA authorized field program, two wells, WJ-44 and WJ-45, were completed north of Bean Creek. These wells are located on the opposite side of Bean Creek from wells BCW-6 and SK-1. Water levels in these wells were recorded during a sustained aquifer test on SK-1. The results and analysis of the data are contained in Appendix E of this report. It was found that after a short period of time that wells WJ-44 and WJ-45 responded to pumping south of the creek. This indicates that Bean Creek was limited in acting as a recharge boundary; and if there was great enough stress from pumping north of the creek, contaminants could possible migrate in that direction. However, water levels in WJ-44 and 45 (Figure 5.10) and in Bean Creek indicate that north of Bean Creek there is a southward gradient in the aquifer toward the creek. The direction of ground-water flow near the creek and the water levels in these wells, indicate that ground water in the

WJ007849

Santa Margarita moves toward Bean Creek and then either enters the creek as recharge or moves west under the creek as underflow to the outlet of the Santa Margarita subbasin of the greater Scotts Valley area. Therefore, under present conditions contaminants not entering the Silverking wells or Bean Creek somewhere along the reach west of Stream Station BC-11 are not expected to be migrating north of the creek but probably west as underflow and into the creek downstream.

5.8 Potential For Contaminants To Migrate To Other Formations

Most of the hydrogeologic formations in the Scotts Valley area are used as a water supply to some extent. Near the Watkins-Johnson plant, the Monterey and Lompico aquifers are pumped for municipal and commercial suppliers. As these formations lie below the contaminated Santa Margarita Formation, concern has been raised over the potential for contaminants to migrate to these formations. The following sections describe the hydrogeology of the Monterey, Lompico, and other units and their relationship to the Santa Margarita.

5.8.1 Monterey Formation

The Monterey Formation unconformably underlies the Santa Margarita Formation in the Scotts Valley area. The top of the Monterey defines the base of the overlying Santa Margarita aquifer. The Monterey consists mainly of mudstone, siltstone and silty sandstone and behaves as an aquitard to the migration of ground water. The formation yields only small quantities of water in most areas (Akers and Jackson, 1977). However, locally there are wells that tap the sand stringers in the Monterey which yield water for domestic and industrial supplies.

The upper surface of the Monterey is unconformable with the overlying Santa Margarita Formation and is gouged by paleo-valleys (Figure 2.8). As illustrated in cross-sections A-A', B-B' and C-C' (Figure 2.6 and 2.7), the Monterey Formation is 150 to 350 feet thick in the Scotts Valley area. It thickens to the north towards the axis of the Scotts Valley syncline but thins to the west and south adjacent to topographic highs of the crystalline basement. The Monterey Formation is also thinned by erosion in the location of the paleo valleys.

WJ007850

The lower boundary of the Monterey is conformable with the Lompico sandstone. The contact between these two formations is commonly ill-defined, as units of both intertongue in the transition zone. Todd (1987) has stated that the base of the formation "has been folded or faulted into a series of elongated troughs and ridges". Todd based this conclusion on a contour map of the base of the Monterey (Todd, 1987; Plate 1). The contours are drawn around a sparse and irregularly distributed number of wells. Furthermore, "picks" of the base of the Monterey are commonly subjective due to the conformable nature of the contact with the underlying Lompico Sandstone. The contact surface, if in fact it is representative of the base of the Monterey, could easily be a depositional feature rather than a result of deformation. Broad shoals and channels of the Lompico Sandstone Formation could account for the configuration.

Many wells penetrate the Monterey, deriving water from sandy intervals of the formation (Figure 2.6 and 2.7). The permeable units in the Monterey may derive water from a number of sources. In some areas upper Monterey sand units may be in hydrogeologic connection with the Santa Margarita Formation either through direct stratigraphic contact or by way of fractures in fine grained rocks. Units may also be recharged from updip contacts of these units with the Santa Margarita aquifer. This may occur where erosion of the Monterey has exposed permeable units at the unconformity between the Santa Margarita Formation and the Monterey, particularly south of the Scotts Valley area (Cross-sections A-A' and C-C'). In addition, the unit is known to be fractured and is considered a leaky confining unit for the underlying Lompico Formation. Flowing water in wells tapping the Lompico aquifer and lower Monterey units (e.g., SK-4) suggest the Monterey is being recharged by the underlying Lompico to some extent.

Figure 5.23 shows hydrographs from wells screened in the regional zone of the Santa Margarita and wells screened in the Monterey. Wells OB-2 and Sky Park Supply are located in the major cone-of-depression around the remedial action wells at Watkins-Johnson. OB-3 shows substantial water-level decline due to the pumping in the regional zone of the Santa Margarita. However, the Sky Park Supply well, completed in the Monterey, has shown little change in water level during the same time period. A somewhat similar pattern can be seen between BCW-6 and SK-3. The hydrograph of BCW-6, screened in the regional Santa Margarita, shows a pattern of fluctuations corresponding to pumping well SK-1 whereas SK-3, which is screened in the Monterey, does not. Figure 5.24 shows water-table surface profiles of pre-pumping and recent water levels in the

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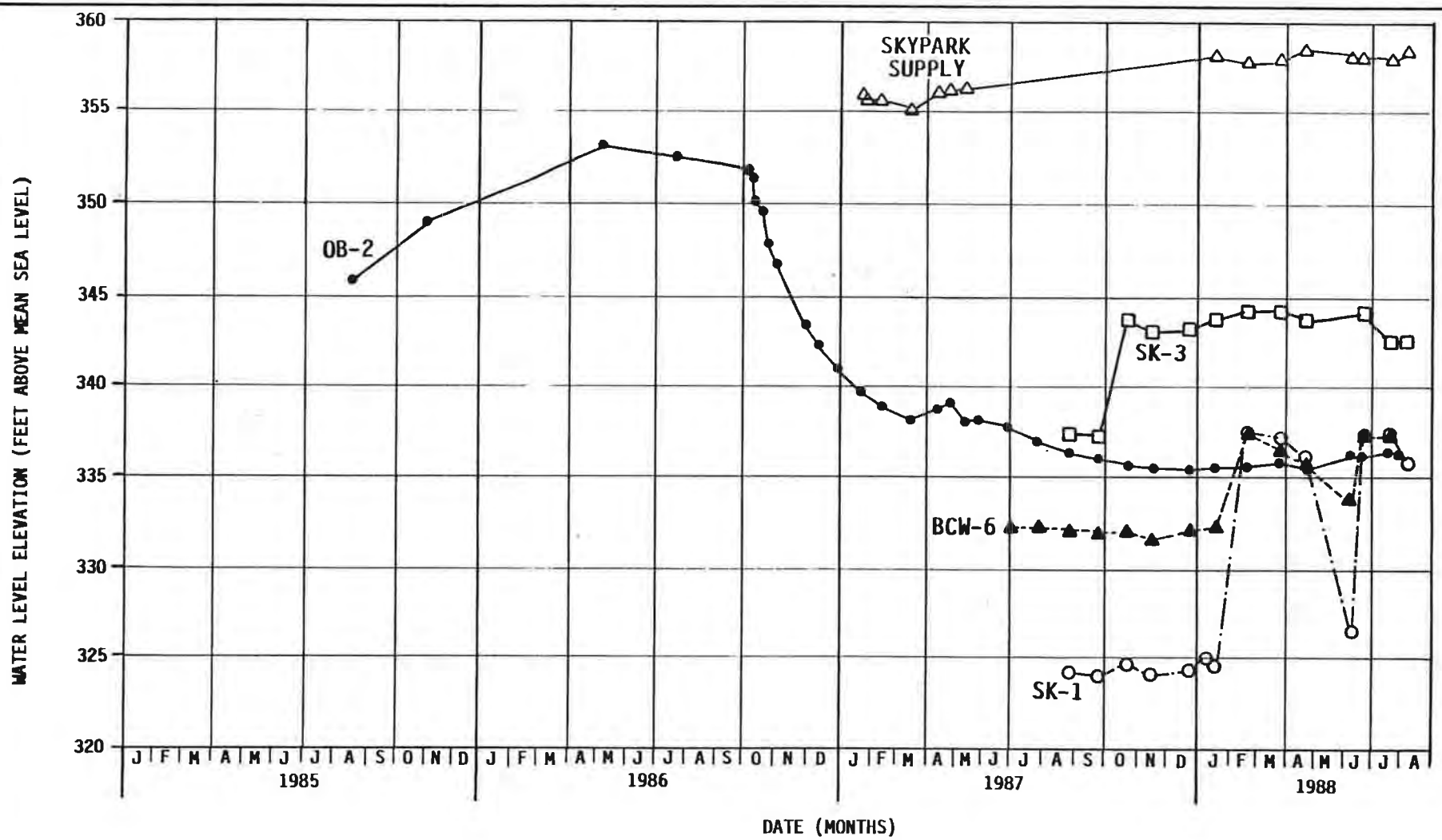

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PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

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COMPARISON OF REGIONAL SANTA MARGARITA AND MONTEREY WATER LEVELS - HYDROGRAPHS FOR WELLS, OB-2 SKYPARK SUPPLY, SK-1, SK-2 AND BCW-6

FIGURE 5.23

WJ007852

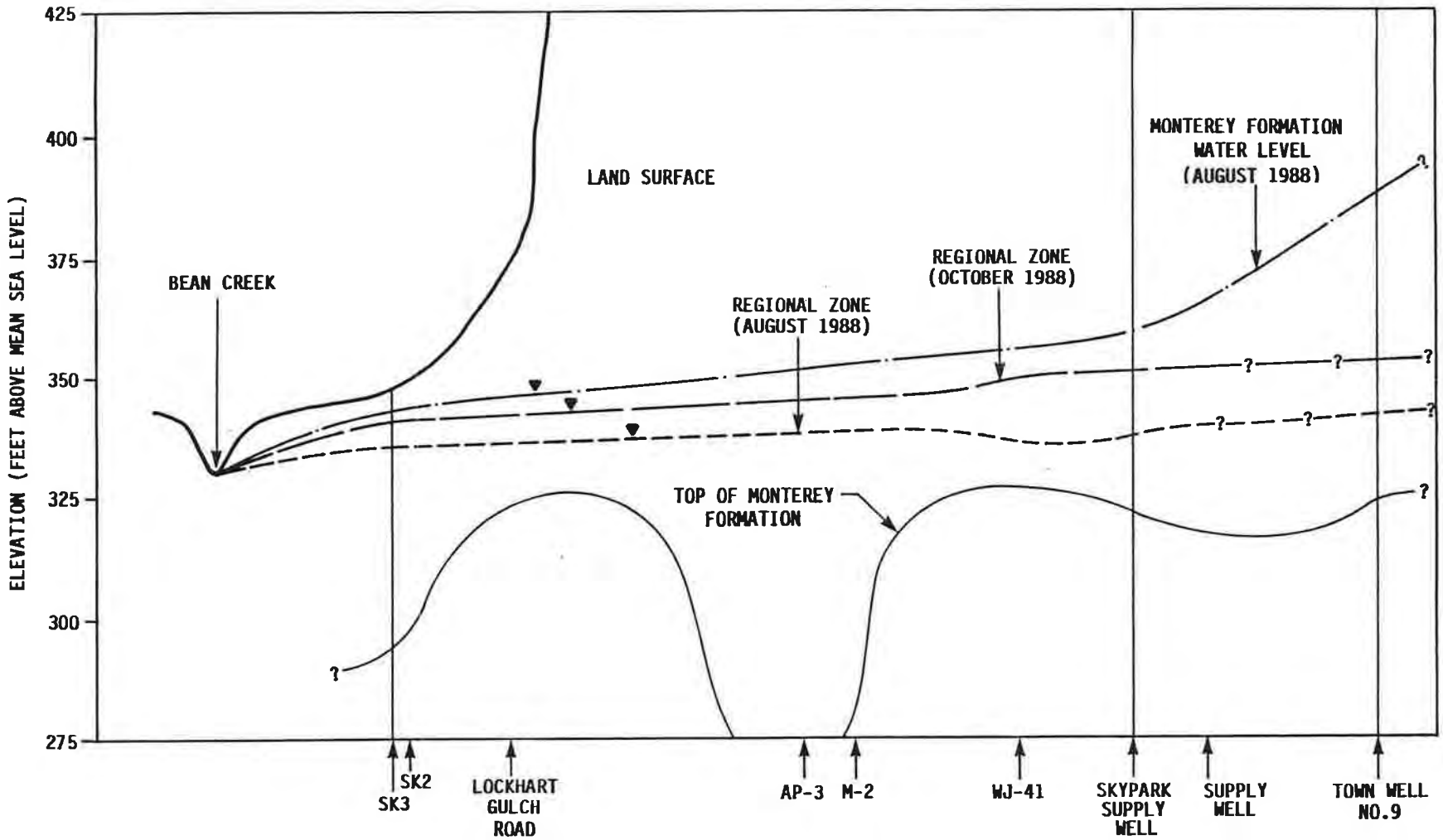
Santa Margarita and recent levels in the Monterey. The Monterey potentiometric surface is based on water levels from SVWD's Town Well No. 9, Sky Park Supply Well, and Well SK-3. Town Well No. 9 is screened in both the Santa Margarita and the Monterey Formations. The water levels in the Town Well are considerably higher than water levels that would be expected in the regional Santa Margarita based on projecting the pre-pumping gradient beneath Watkins-Johnson back to Town Well No. 9 (Figure 5.24). Therefore, the Water District's well is considered to reflect Monterey conditions. The profile readily shows that there is a vertically upward gradient from the lower aquifers into the Santa Margarita.

Confined conditions in the Monterey and Lompico Formations imply that the potential for movement of contaminants related to the plume at Watkins-Johnson into these formations is unlikely. Water-levels have dropped 15 to 20 feet in the areas beneath Watkins-Johnson where the plume contains the highest concentration of contaminants. The lowering of the water-levels should have increased upward gradients from the lower aquifers into the Santa Margarita. Wells SK-3 and SK-4 at Silverking Oceanic Farms are screened in the Monterey and are downgradient from the Watkins-Johnson site. Well SK-3 is close to SK-2 where the edge of the TCE plume in the regional Santa Margarita had been identified (Figures 5.11 and 5.12). Results of analysis for volatile organic compounds in water samples collected from SK-3 and SK-4 have been below detection limits indicating that potential contamination from the Santa Margarita into the lower formation is minimal. Results of chemical analysis in Wells SK-3 and SK-4 are shown in Appendix F.

5.8.2 Lompico Formation

The Lompico Sandstone Formation occurs at a depth of 400 to 600 feet in the Scotts Valley area, and at greater depths to the north, toward the axes of the Scotts Valley syncline (Figures 2.6 and 2.7). Several wells in the Scotts Valley Drive and Camp Evers areas are reported to extend into the formation (Todd, 1987). The thickness of the Lompico is at least 120 feet in the Scotts Valley area and may thicken to the northwest (Cross section A-A' and B-B'). Few wells extend deep into the Lompico but a similar thickness is exposed in outcrop to the southwest of the study area, on the southern limb of the syncline. The subface of the Lompico is in unconformable contact with siltstones of the Locatelli Formation. Deposition of Lompico sands on the unconformable surface

WJ007853



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POTENTIOMETRIC SURFACE PROFILES COMPARING THE SANTA MARGARITA AND MONTEREY FORMATIONS

FIGURE 5.24

WJ007854

has probably resulted in local variation in thickness of the Lompico, but due to the lack of subsurface data at these depths, this is undetermined.

The configuration of the regional geology and flowing water from wells suggests that the ground-water in the lower Monterey and Lompico depths are under confined conditions. According to the driller's log, flowing water was encountered during the drilling of SK-4 for Silverking Oceanic Farms at a depth of 165 feet which is in Monterey sediments. The drillers log for SK-4 is shown in Appendix A. The Lompico has been reported to be confined and under pressure in the El Pueblo area (Todd, 1986). Cross sections A-A', B-B', and C-C' illustrate the position of the largely permeable Lompico Formation overlain by the semi-permeable Monterey Formation (Figure 2.6 and 2.7). The structural dip of the southern limb of the Scotts Valley syncline and recharge from the updip Lompico sediments probably result in the artesian conditions. Lompico Sandstone crops out in a small area to the southwest of the Scotts Valley (Figure 3.3), and only 40 acres of the Lompico crops out north of the area for direct recharge from precipitation (Jacobovitz, 1987). The Lompico is likely in contact with the Santa Margarita aquifer in a wide band updip (southwest) of Scotts Valley (cross-sections A-A' and C-C'), and with crystalline rocks as well (cross-section B-B'), providing a source of ground-water recharge to the Lompico.

As suggested by Jacobvitz (1987), the greater heads in the Lompico could recharge the Santa Margarita aquifer through the Monterey Formation. The rate of leakage would be determined by the vertical permeability of the Monterey. The Monterey is known to be fractured and contains relatively large amounts of silt and sand in the Scotts Valley area.

As previously mentioned in Section 5.8.1, because of the apparent upward gradient of the Lompico and lower Monterey, it is unlikely that contamination in the Santa Margarita aquifer will affect the lower formations.

5.8.3 Other Units

The Santa Cruz Mudstone overlies much of the Santa Margarita Formation north of the study area (Figure 2.3). The unit has a low permeability but may yield small quantities of water where fractured (Akers and Jackson, 1977). Leakage through fractures may contribute recharge to the underlying Santa Margarita Formation (Jacobvitz, 1987).

WJ007855

The Locatelli Formation and crystalline plutonic rocks underlying the Miocene sequence are reported to have low permeabilities and yield limited quantities of water (Akers and Jackson, 1977). The Locatelli is comprised mostly of siltstone of low permeability but locally coarse units, especially near the base of the formation, may be more productive. Wells perforated in crystalline plutonic rocks derive water from fractures and weathered zones. The weathered zone is probably comprised of saprolite weathered and decomposed rock which commonly is heavily fractured and poorly consolidated but limited to the surface of the crystalline rock bodies. Conversely, fracture systems could be extensive through unweathered portions of the crystalline rock bodies. However, the extent and productive capacity of this type of aquifer in the Scotts Valley area has not been evaluated.

5.9 Analysis of Regional Water Quality Results

As discussed in Section 4.7, a discussion of the perched zone water quality results, the ground water in the perched and regional zone wells have been sampled and analyzed during both the RWQCB and EPA programs. The sampling which occurred during March 8 to 17, 1988 was the first quarterly round of the EPA RI/FS program. During this round ground-water samples from the regional zone were analyzed for the complete suite of chemical parameters on the TCL as described for the perched zone wells in Section 4.7. During June 13 - 20, 1988 the second EPA RI/FS quarterly sampling round took place. As with previous work under the RWQCB program the water samples were analyzed for purgeable organic compounds (EPA Method 601) only.

The following sections discuss the analysis of results from the RI/FS sampling program for purgeable halocarbons, volatile organics, semivolatile organics, and inorganics. Analysis of the stream sampling results and a discussion on regional zone contaminant pathways follow.

5.9.1 Purgeable Halocarbons - Regional Zone

For the RI/FS program samples from 32 regional zone wells were collected during March 8 to 17, 1988 and from 38 well during June 13 to 20, 1988. Table 5.2 shows the results of purgeable halocarbon analysis using EPA Method 610 for 31 analytes. Of these 31

WJ007856

Table 5.2a

Concentration of Purgeable Halocarbon Analysis (EPA Method 601)
Regional Zone (in micrograms per liter)[1]
March 8-17, 1988[2] and June 13-20, 1988[3]

Wells	Freo 11		1,1-DCE		Freon-113		1,1-DCA		C-DCE		CF		1,1,1-TCA		TCE		1,1,2-TCA		PCE		1,2-DCB	
OB-1				U/1				U/1						U/1	J43	J36/J80				J3/J21		
OB-2				4	16						J1		2		2	1						
OB-3					1					1	J2	1		1	12	38				2		
SK-1	1																					
SK-2	1				1	1			2	2					15	J21						
SK-3																						2
SK-4	1																					
AP-1																						1
AP-3																						
RA-1			1.7/2	2/2	4/8				2/3	4/5				1/2	31/58	J67/J81				1/2		
RA-2															27	18	.5			1		
RA-3										1						4						
RA-4																						
M-1										2						3						
BCW-2	2																					
BCW-6	1																					
BCW-7	1																					

[1] J indicates estimated: 1/1 indicates sample/duplicate [2] March 1988 results in first column [3] June, 1988 results in second column Blank means below detection limits

WJ007857

Table 5.2b (Continued)

Results of Purgeable Halocarbon Analysis (EPA Method 601)
Regional Zone (in micrograms per iter)[1]
March 8-17, 1988[2] and June 13-20, 1988[3]

Wells	Freon II		1,1-DCE		Freon-113		1,1-DCA		C-DCE		CF		1,1,1-TCA		TC		1,1,2-TCA		PCE		1,2-DCB	
BCW-8																						
Supply Well				1				1									3					
HF Well																						
WJ-21																				1/U		
WJ-22																						
WJ-23	2/U																					
WJ-25A				2/U				1/1		3/2				1/U	0.8/U	J17/J7		J57/U				
WJ-26	1/1		7/8	5	13/13	4	1/1	2					7/8	8/U	9/10	J14	2/2	1			U/1	
WJ-27A			2						2	2	1					1						
WJ-28								2/U		6/U				1/U	7	J88/J34				1/2		
WJ-29A																						
WJ-30	1																					
WJ-32A									4													
WJ-37A																						

[1] J indicates estimated: 1/1 indicates sample/duplicate [2] March 1988 results in first column [3] June, 1988 results in second column Blank means below detection limits

WJ007858

analytes, 11 were found in the regional zone samples. Of the 11, 5 have been reported to be used onsite; Freon 11, Freon 113, 1,1,1-TCA, PCE and TCE. Concentrations of TCE, by far the highest of all the analytes ranged from 1 to 88 ug/l. The highest level of TCE was detected in WJ-28 at 88 ug/l although the WJ-28 Dup had 34 ug/l. Three of the analytes, 1,1-DCE, 1,1-DCA, and c-DCE although not reported to be used onsite are known breakdown products of the analytes known to have been used at the site. A more detailed discussion of the chemical transformations is contained in Section 3.4.1 on the soil and in Section 4.7.1 on the perched zone purgeable halocarbon analysis. Table 4.2 shows measured chlorinated aliphatic compounds found in the ground water at Watkins-Johnson and whether the compound was used onsite or is a potential breakdown product of other compounds measured. Section 6 on the QA/QC discusses problems and solutions of 1,2-DCA detection. Due to laboratory problems, the analyses for 1,2-DCA were considered invalid.

Two chlorinated aliphatic compounds found in the regional and perched zones but not reported to be used at the site were 1,1,2-TCA, and CF. These compounds were identified in the soils program. The compound 1,1,2-TCA may be an impurity in compounds used at the site.

As described in Section 4.7.1 statistical data has been calculated for the endangerment assessment (Task 8). These are shown on Table 5.3 for Purgeable Halocarbon Analysis. A discussion on the migration pathways is found in Section 5.9.6.

5.9.2 Volatile Organics -- Regional Zone

During March 8 to 17, 1988, 35 ground-water samples were collected from 32 regional wells for volatile organics analysis. Of the 34 analytes analyzed by EPA 625, 6 were found (Table 5.3). As shown on Table 5.4 concentrations of 1,1-DCA, CF, 1,1,1-TCA, and 1,1,2-TCA were low estimates close to the SQL. Two compounds 1,1-DCE and TCE had estimated concentrations up to 5 ug/l and 45 ug/l respectively. All 6 analytes that were found were also detected in the regional zone samples which were analyzed for purgeable halocarbon using EPA Method 601. Their presence and origin are discussed in Section 5.9.1.

WJ007859

Table 5.3

Statistics on Compounds Found in Regional Zone Samples for Purgeable Halocarbon and Semivolatile Organics Analyses

Organics (601)	Detects/Samples	Mean[2]	Max	(S)[3]
Chloromethane	1/82	0.56	6	0.62
Trichlorofluoromethene	9/82	0.55	2	0.29
1,1-Dichloroethene	12/82	0.90	8	1.36
Freon-113[1]	9/72	1.25	16	2.89
1,1-Dichloroethane	8/82	0.55	2	0.29
Cis-1,2-Dichloroethene	15/82	0.91	6	1.07
Chloroform	4/82	0.51	2	0.22
1,1,1-Trichloroethane	11/82	0.81	8	1.38
Trichloroethene	28/82	9.29	88	19.53
1,1,2-Trichloroethane	5/82	0.55	3	0.38
Tetrachloroethene	11/82	1.52	57	6.61
1,2-Dichlorobenzene	1/82	0.48	1	0.12
Semivolatiles (625)				
DI-N-Octylphthalate	1/35	4.91	2	0.51
Phenol	1/35	4.91	2	0.51

(1) Data rejected on 10 analyses
(2) Non detects counted as detection limit/2, estimated concentration and duplicates counted
(3) Standard deviation

Table 5.4

Measured Volatile Organic Compounds (EPA Method 624) in Regional Zone, March 8 to 17, 1988

	Compound in microgram/liter[1]					
Well	VC	1,1 DCA	CF	1,1, 1TCA	TCE	1,1,2 TCA
M-1					J3	
OB-1					32	
OB-2			J1		J2	
OB-3			J2		19	
RA-1		J.05		J1	45	
RA-1DUP		J.07		J2	43	
RA-2					26	
RA-3					6	
RA-3DUP					8	
SK-2					23	
WJ SUPPLY			J.06			J4
WJ-26	5	J1		J10	12	
WJ-26DUP	5	J1		J10	11	
WJ-28					9	
WJ-32A			J2		9	

NOTES:
1 - J indicates estimated concentration

5.9.3 Semivolatile Organics - Regional Zone

Thirty-five (35) regional zone samples from 32 wells collected during March 8 to 17, 1988 were analyzed for semivolatile organics by EPA Method 625. Of the 69 analytes analyzed, 2 were found in 2 wells. An estimated value of 2 ug/l for phenol was found in the WJ-26 DUP and an estimated value of 2 ug/l for di-n-actylphthalate DNOP was found in BCW-6. As both are such low estimates they are not considered significant to this study. Statistics on the semivolatile organics analysis needed for the endangerment assessment (Task 8) are shown on Table 5.3. The statistical data are described in Section 4.7.1.

5.9.4 Inorganic Analyses - Regional Zone

Thirty-five ground-water samples for the first quarterly round of sampling were analyzed for dissolved inorganics and two ground-water samples were analyzed for total organics. Water samples for dissolved organics analysis are filtered in the field through a 0.45 um membrane filter and preserved with concentrated HNO_3 to pH less than 2. The concentrations of total inorganics are determined from unfiltered, acidified water samples. The subsequent round of water sampling was not analyzed for inorganics due to the negligible findings in the first round. Table 5.5 presents a summary of the key inorganic parameters detected at the site. The results are listed in Appendix F.

As shown on Table 5.5, arsenic, lead, and selenium were not detected in ground water from the regional zone. These three constituents were each detected in the perched zone one to two times in concentrations below the SQL. Cyanide was detected right at the detection limit of 5 ug/l in wells M-1 and OB-1. Cyanide was not detected in the perched zone. Barium, iron, manganese, silver and zinc were detected the most frequently. Barium was detected in 74 percent of the collected samples in concentrations up to 34 ug/l. However, none of the results exceeded the SQL. Iron was also detected in 74 percent of the samples; only 17 percent (6 samples) exceeded the SQL. Ninety four percent of the samples contained manganese, which is a widely distributed, abundant element (Merck, 1983). Zinc was detected at 63 percent of the sites, with only 23 percent exceeding the SQL. The occurrence of iron, manganese, and zinc are related in many geologic and hydrogeologic environments. Additionally, elevated concentrations of iron and manganese have been reported to be associated with septic systems (Canter and

WJ007862

Table 5.5

Summary of Inorganic Analyses from Regional Zone March 8-17, 1988

Inorganic Compound	Regional Aquifer		
	Concentration Range[1]	Number of Samples with Concentrations Above Sample Quantitation Limit[2]	Number of Samples with Concentrations Below Sample Quantitation Limit[3]
Arsenic	ND[4](3.3)-(3.5)	0	0
Barium	ND(1.0)-34	0	26
Cadmium	ND(2.0)-7.4	2	1
Chromium	ND(3.0)-33.8	9	8
Copper	ND(11.0)-13.9	0	1
Cyanide	ND(5.0)-5.0	2	0
Iron	ND(1.0)-3780	6	20
Lead	ND(1.0)	0	0
Manganese	ND(1.0)-380	23	10
Mercury	ND(0.2)-0.2	0	1
Selenium	ND(3.7)	0	0
Silver	ND(4.0)-61.4	12	11
Zinc	ND(4.0)-100	8	14

1 - Values in ug/l.
2 - Number of samples in which concentrations were reported at or above sample quantitation limit.
3 - Number of samples in which concentrations were detected below the sample quantitation limit but which did meet the identification criteria. The concentrations are estimates only.
4 - ND = Not Detected (detection limit).

Knox, 1985). Silver was detected in 66 percent of the samples. Thirty-four percent exceeded the SQL, with concentrations up to 61.4 ug/l. However, the concentration of 61.4 ug/l detected at the Town Well (Appendix F) is an isolated instance. The second highest concentration detected in the regional zone was 31.4 ug/l in WJ-30A. Recent EPA proposals for modification of drinking water criteria do not consider chronic exposure to dissolved silver to pose a health threat.

Comparison of the results of the analyses for total inorganics (unfiltered) versus dissolved inorganics (filtered) indicates little difference, except for three analytes. In each instance, the concentrations of iron, nickel and zinc were an order of magnitude greater in the samples collected for total inorganics.

The results from the first round of sampling for inorganics indicated that the concentrations of inorganics in the ground water are not a matter of concern. As discussed in previous sections, the primary contaminants of interest at the site are organic compounds.

5.9.5 Surface-Water Analysis

During March 8 to 17, 1988, water samples were collected at 13 stream gaging stations along Bean Creek or its tributaries; Airport tributary, Dufour's Tributary, Lockhart Gulch, and Ruins Creek. The samples were tested for purgeable halocarbons (EPA Method 601), volatile organics (EPA Method 624), semivolatile organics (EPA Method 625), pesticide organics (EPA Method 608) and dissolved inorganics. During June 13 to 20, 1988, samples were collected for EPA 601 analysis. All analytes tested for were below the detection limits except for the inorganic analyses which are shown on Table 5.6.

5.9.6 Ground-Water Analyses: Monterey Wells

Three wells in the RI/FS ground-water monitoring program are screened in the Monterey Formation. These are SK-3, SK-4, and Sky Park Supply. The organics analyses described above for the perched and regional zone well were conducted on samples from these Monterey wells and all analytes tested below detection. Inorganics were detected. The results are summarized in Table 5.7. Only iron shows somewhat elevated concentrations at 312.8 ug/l in SK-4.

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Table 5.6

Summary of Measured Inorganic Constituents
Surface-Water Station March 15 & 17, 1988
in Micrograms per Liter

ANALYTE	RANGE
ALUMINUM	47.6 - 104.3 (estimates)
ARSENIC	3.3 (estimate)
BARIUM	1.0 - 27.6 (estimate, SQL=1.0)
CALCIUM	25,800 - 65,500
IRON	17.9 - 68.9
MAGNESIUM	2220 (estimate) - 9100
MANGANESE	7.2 (estimate) - 95.7
NICKEL	13.2 (estimate, SQL = 11.0)
POTASSIUM	966 - 1950 (estimates)
SILVER	6.7 - 15.4
SODIUM	13,200 - 42,400
VANADIUM	10.5 (estimate, SQL = 5.0)
ZINC	8.0 (estimate, SQL = 4.0)

Table 5.7

Summary of Inorganic Analyses from Monterey Formation, March 8-17, 1988

Inorganic Compound	Monterey Formation		
	Concentration Range[1]	Number of Samples with Concentrations Above Sample Quantitation Limit[2]	Number of Samples with Concentrations Below Sample Quantitation Limit[3]
Arsenic	ND(3.3)	0	0
Barium	ND(1.0)-24.18	1	1
Cadmium	ND(2.0)	0	0
Chromium	ND(3.0)-15.7	1	0
Copper	ND(11.0)	0	0
Cyanide	ND(5.0)-5.0	1	0
Iron	17.8-312.8	1	2
Lead	ND(1.0)	0	0
Manganese	9.5-29.6	2	1
Mercury	ND(0.2)	0	0
Selenium	ND(3.7)	0	0
Silver	ND(4.0)-8.7	0	1
Zinc	ND(4.0)	0	0

1 - Values in ug/l.
2 - Number of samples in which concentrations were reported at or above sample quantitation limit.
3 - Number of samples in which concentrations were detected below the sample quantitation limit but which did meet the identification criteria. The concentrations are estimates only.
4 - ND = Not Detected (detection limit).

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5.9.7 Regional Zone Contamination Migration Pathways

Figures 5.11 through 5.15 show the changing distribution of TCE in the regional zone of the Santa Margarita Aquifer from May 1987 to June 1988. The center of the TCE plume has remained near wells OB-1 and RA-1 through the remedial action program. The extended plume which had reached Bean Creek by May 1987 near BC-11 had followed ground-water flow patterns which are northwest from Watkins-Johnson to Bean Creek.

Figure 5.15, the distribution of TCE in the regional zone for June 13 to 20, 1988, shows the plume under the central plant area extended east to WJ-26. The shape of the plume is distorted due to the remedial action pumping wells although the area of high concentration has remained beneath the central parking lot. Although this area is not directly beneath the contaminated soil or the major perched zone contamination, the areas area probably related. Purgeable halocarbon contamination in the perched zone was shown to be beneath the Building 6 area (See Figure 4.13 and Section 4.6). Contamination in the perched zone south of the ground-water mound beneath the north parking lot can move vertically through the aquitard down to the regional zone. The area of higher contamination in the perched zone is also in a stagnation zone in the perched water table. This will tend to hold the center of the perched TCE plume in one place over time, increasing the opportunity for more of the perched zone contaminants to migrate to the regional zone. Therefore the contamination in the regional Santa Margarita aquifer is probably related to the soil and perched zone contamination beneath the Watkins-Johnson plant.

No evidence of purgeable halocarbon contamination has been found during the monitoring program in the two wells that are screened in the Monterey (Sky Park Supply Well and Well SK-3). Due to the higher water levels found in the Monterey as compared to the regional Santa Margarita, such an occurrence is unlikely (See Section 5.8). Contamination is being removed and drawn to the remedial action pumping wells as can be readily seen by the TCE plumes diminishing size (See Figures 5.11 through 5.15).

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6.0 QUALITY ASSURANCE REVIEW OF ANALYTICAL DATA

Analytical data received from the laboratory must meet specific quality levels approved by the EPA in order to be acceptable. Data validation determines whether data are adequate for their intended use. Inorganic and organic analytical data from ground-water samples collected during the current investigation were validated. In addition, organic soil analyses performed by Acurex Laboratory were also validated. Inorganic analytical data from soils samples have not undergone complete validation at this time.

The results of validation and the procedures employed to perform the validation are summarized in this section. The validation reports for each sample group are in the RLSA project files. The QA column in each database indicates whether the results have been validated and if so, which organization performed the validation. The databases have been revised according to the changes indicated in the validation reports.

The organics analyses were validated according to EPA guidelines specified in "Laboratory Data Validation -- Functional Guidelines for Evaluating Organics Analyses, EPA, May, 1985". The inorganics validation was performed in accordance with guidance provided in the EPA publication "Laboratory Data Validation -- Functional Guidelines for Evaluating Inorganics Analyses" (undated). The following is a description of the criteria reviewed for each sample:

- Integrity and stability of the sample. The objective is to determine the validity of laboratory results through analysis of sample holding times. The holding time is defined as the difference between the time of collection and the time of analysis.

- Performance of instruments used for analysis. Evaluated primarily through inspection of results of calibration. These data are analyzed to ensure that the instrument is capable of producing information that can be correctly interpreted.

- Possibility of sample contamination during analysis. Evaluated through inspection of results of blank analysis. If significant concentrations of analytes are found in blanks, the possibility of sample contamination must be investigated.

- Identification and quantitation of analytes. Evaluated through inspection of raw data. For gas chromatograph (GC) analyses this evaluation consists of inspection of chromatagrams and recalculation of some compound concentrations from data presented in integration reports. For gas

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chromotograph/mass spectrometer (GC/MS) analyses multispectral data must also be analyzed. For inorganics analyses precision and accuracy results as described below are used to evaluate the method's ability to properly identify and quantify analytes.

- Precision. Evaluated through inspection of results of duplicate analyses. The relative percent difference between concentrations of analytes in duplicate samples must be within specified limits.

- Accuracy. Evaluated through analysis of spiking data. For each sample analyzed, surrogate compounds(s) must be added at known concentrations, and the percent recovery of these compounds must be monitored. These surrogate recoveries are used to evaluate the laboratory's ability to identify analytes in individual samples. In addition, a minimum of 10 percent of all samples should be evaluated in duplicate and spiked with known concentrations of each compound detectable by the method. The samples should then be evaluated for percent recovery. These Matrix Spike (MS)/Matrix Spike duplicate (MSD) analyses are performed in order to determine the long term precision of the method.

If no qualifiers are assigned, the data are acceptable for use. Data qualifiers modify the usefulness of the individual values. Qualifiers used in validation of the analytical data and the meanings of these qualifiers are given in Table 6.1.

All of the second round of water samples analyzed using EPA Method 601 were validated by RLSA staff. In addition, validation of all soil samples analyzed using EPA Method 8270 and drilling mud samples analyzed using Methods 8010 and 8240 was accomplished by RLSA. The code "S" in the QA column of the databases signifies RLSA validation. The remainder of the organics analyses from water samples and a portion of the soil samples obtained for the current investigation were validated by EPA staff or subcontractors and checked by RLSA. The code "E/S" is used in the QA column of the databases to signify this review process. Those entries that have not been validated are coded "N".

6.1 Water Analyses

6.1.1 Organics

Water samples for the first quarterly round of sampling were analyzed for organics using EPA Methods 601, 608, 624, and 625. The subsequent round of water sampling was modified based upon the results from the first round. The second quarterly round of sampling was analyzed for purgeable halocarbons (EPA Method 601).

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Table 6.1

Definitions of Data Qualifiers

U	-	The compound was analyzed for but was not detected.
J	-	The associated numerical value is an estimated quantity because either quality control criteria were not met or compounds were detected below sample quantitation limits (SQL).
UJ	-	The compound was analyzed for and may or may not have been detected. If the compound was detected, the sample quantitation limits have been adjusted to the level of detection in the sample because of failure to meet quality control criteria. If the compound was not detected, the sample quantitation limits are estimated because of failure to meet quality control criteria.
R	-	Quality control indicates that data are unusable. The compound may or may not be present.
L	-	In inorganics analysis, results have been qualified because they fall between the Contract Required Quantitation Limit (CRQL) and the Instrument Detection Limit (IDL). These are results for analysis for elements that are present but for which the results are quantitatively unreliable because of the uncertainty of analytical precision close to the detection limit.

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6.1.1.1 First Quarterly Round of Water Sampling. Acurex laboratory analyzed 88 samples in March and April, 1988 for organics using EPA Methods 601, 608, 624, and 625. The results were validated by EPA staff and spot checked by RLSA staff.

Typically, some compounds in each travel group were qualified with "J" or "UJ" because of failure to meet initial or continuing calibration criteria as established in the QAPP. Also, SQL for MC in Method 601 and 624 analyses and acetone in Method 624 analyses were qualified "UJ" in all samples to indicate that these limits are estimated because of blank contamination. TCE in Method 601 and 624 analyses, Freon 11 in Method 601, and N-Nitrosodiphenylamine and BP in Method 624 analyses were also qualified "UJ" in some samples because of blank contamination. Sample holding times were exceeded in 11 samples, and therefore, SQL's for these samples were qualified "UJ". Finally, the concentration of the compounds TCE and PCE exceeded the calibrated range of the instrumentation in some samples. These concentrations were therefore qualified "J" to indicate that they are estimated.

6.1.1.2 Second Quarterly Round of Water Sampling. A second round of 105 water samples was obtained in June, 1988 and was analyzed by Acurex laboratory for purgeable halocarbons (EPA Method 601) only. Validation of these data was accomplished by RLSA. SQL's for a number of samples were qualified "UJ" because of failure to meet specified initial or continuing calibration criteria. Freon 113 was flagged "R" in some samples to indicate that the data associated with this compound are unusable because of extremely poor continuing calibration performance. MC was qualified "UJ" in all samples because of either blank contamination or poor calibration performance. Chloromethane was also detected in one blank and was flagged "UJ" in all samples of the associated travel group for this reason. The concentration of TCE was again above the calibrated range of the instrumentation in several samples and was flagged "J" in these samples to indicate an estimated concentration. Also, PCE was above the calibrated range of the instrument in one instance and its concentration was also flagged "J" for this reason.

Inspection of laboratory duplicate analyses revealed MC in one sample outside precision criteria as established in the QAPP. Analysis of field duplicates revealed several compounds outside precision criteria. These compounds were flagged either "UJ" or "J" in the associated samples to indicate that their SQL's/concentrations are estimated.

In a number of instances, surrogate recovery values determined from Method 601 analyses were outside accuracy limits as stated in the QAPP. However, because no firm guidelines have been established by the EPA for acceptable surrogate recovery ranges for Method 601 analyses, no qualifiers were assigned on the basis of surrogate recovery values alone. MS/MSD recovery analysis revealed all samples within accuracy limits specified in the QAPP.

The reviewers recalculated many of the concentrations provided by the laboratory from the raw calibration and sample integration data. All laboratory values are acceptable. However, where a concentration provided by an EPA reviewer differed from the laboratory's reported concentration, the EPA value was used.

6.1.1.3 1,2-Dichloroethane Contamination. Water samples from the first and second quarterly rounds of sampling showed detectable levels of 1,2-DCA. The prevalence of this compound without variation or a pattern lead the EPA to adjust the SQL for this compound to 10 ug/l and quantify it "UJ" for all results showing 1,2-DCA at 10 ug/l or less. The EPA attributed the source of the 1,2-DCA to field contamination and requested that a program be conducted to determine the source. The program was carried out during the first week of August, 1988. The data indicate that the hydrochloric acid preservative supplied by Acurex was the source. A letter documenting the results of the program and the laboratory analytical sheets are in Appendix H.

6.1.2 Inorganics.

Eighty-six water samples were analyzed by Acurex laboratory for dissolved metals and cyanide. Two additional samples were analyzed for total metals and cyanide. These analyses were performed in accordance with the methods given in Table 3.9. All of these samples were from the first quarterly round of sampling and were validated by EPA staff. The elements arsenic, chromium, lead, mercury, selenium, silver, sodium, and helium were qualified either "J" or "UJ" in some samples because of poor MS recovery performance. In addition, the elements mercury, selenium, and thallium were qualified either "J" or "UJ" in some samples because of failure to meet precision requirements for duplicate analyses as outlined in the QAPP. Finally, a number of compounds were qualified "L" because their concentrations fell between the Contract Required Detective Limit and the Instrument Detection Limit.

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6.2 Soils

6.2.1 Organics

Sixty-six soil samples were analyzed for organics by Acurex Laboratory during April, May, and June 1988 using EPA Methods 8010, 8240, and 8270. In addition, Acurex analyzed 10 drilling mud samples using these methods. Validation of the 8010 and 8240 soil sample analyses and two of the drilling mud 8010 and 8240 analyses was accomplished by Tetra Tech, Inc., a subcontractor of the EPA. Validation of eight drilling mud samples analyzed using Methods 8010 and 8240 and all of the Method 8270 analyses was accomplished by RLSA.

6.2.1.1 Purgeable Halocarbon (EPA Method 8010) and Volatile Organics (EPA Method 8240). Although no specific holding time criteria have been established for soil matrices, four samples that exceeded the 14 day holding time criteria established for water matrices were assigned "UJ" or "J" qualifiers to indicate that their SQL's / concentrations are estimated. SQL's for MC and acetone were flagged "UJ" for all Method 8240 analyses because of blank contamination. In addition, MC was detected in some method blanks analyzed in accordance with Method 8010. Samples associated with these blanks were also flagged "UJ". The compound TCE was assigned estimated qualifiers in two samples analyzed by Method 8010 and one sample analyzed by Method 8240 because of failure to meet precision and/or accuracy criteria as established in the QAPP. No other data qualifiers were assigned.

6.2.1.2 Semivolatile Organics (EPA Method 8270). "UJ" qualifiers were assigned to compounds in a number of samples due to initial and continuing instrument calibration criteria falling outside of limits specified in the QAPP. "UJ" qualifiers were also assigned to all results for N-nitrosodiphenylamine due to a pervasive problem of method blank contamination. Several of the results for DEP and DP were assigned "UJ" qualifiers because of blank contamination. No other data qualifiers were assigned.

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Table 6.2
Relative Percent Difference Values for
Original and Field Duplicate Inorganic Soil Analyses
Watkins-Johnson Company Site, Scotts Valley, California

Analyte	SB2-1 (50 feet)[1]	SB6-4 (25 feet)	SB6-6 (30 feet)	SB8-1 (30 feet)
Aluminum	-18	-16	-60	-3
Antimony	ND[2]	ND	ND	ND
Arsenic	-22	ND	-49	37
Barium	16	-4	-26	18
Beryllium	ND	ND	---	ND
Cadmium	9	---[3]	ND	-18
Calcium	-23	-2	-12	132
Chromium	-24	-56	-18	18
Cobalt	-13	-25	---	-10
Copper	5	-18	102	114
Iron	-15	-2	-17	29
Lead	20	9	-39	78
Magnesium	-18	-13	-35	-2
Manganese	-20	10	-1	42
Mercury	ND	ND	ND	ND
Nickel	2	34	-34	45
Potassium	-12	-25	-12	-6
Selenium	ND	ND	ND	ND
Silver	ND	ND	---	ND
Sodium	24	-24	23	22
Thallium	ND	ND	ND	ND
Vanadium	-42	-39	-27	-31
Zinc	-7	9	12	27
Cyanides (total)	ND	ND	ND	ND

1 Sample depth.
2 Not detected.
3 --- One of the samples contained concentrations below the quantification limit. Therefore, the relative percent difference could not be calculated.

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6.2.2 Inorganics

Relative percent differences between field duplicate analyses for inorganics are provided in Table 6.2. Full validation of these data will be included in the RI report. Inspection of the inorganic analyses reveal no concentrations above EPA specified limits. No qualifiers were assigned on the basis of inorganics precision results.

6.3 Overall Assessment

In general, the data are acceptable for use. Qualifiers have been assigned that modify the usefulness of data obtained from some samples. In some instances, qualifiers have been assigned because of failure to meet specified holding time criteria, precision and/or accuracy criteria, or initial/continuing calibration specifications. In addition, some compounds have been assigned qualifiers because of blank contamination or because the concentrations measured by the laboratory were above the calibrated range of the instrumentation.

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7.0 SUMMARY AND CONCLUSIONS

7.1 Background of Study

In April 1983, the RWQCB indicated that Watkins-Johnson should initiate a ground-water monitoring program. In 1984, based on an anonymous telephone call, the RWQCB inspected the dilution tanks at Building No. 2 and 6 and the septic tanks at Building No. 8. No contamination was found at that time. A few weeks later, based on another anonymous telephone call, the RWQCB again inspected the dilution tank at Building No. 6. This second inspection revealed that this dilution tank was contaminated.

In June 1984, Watkins-Johnson Company developed a plan in conjunction with the RWQCB whereby Watkins-Johnson would clean up the contamination. On January 22, 1987, the U.S. Environmental Protection Agency proposed the addition of Watkins-Johnson to the National Priorities List. On September 4, 1987, in response to the Special Notice letter, the document entitled "Watkins-Johnson Company, Scotts Valley, California, Work Plan for Remedial Investigation and Feasibility Study" (RLSA, September 1987) was submitted to the EPA. The work plan presented tasks which the EPA had determined to be required by the EPA RI/FS process as applicable to the Watkins-Johnson site. This document, Characterization of Subsurface Conditions," fulfills Tasks 4 and 7 of the RI/FS as presented in the workplan. The purpose of Task 4 was to characterize ground-water flow and contaminant migration patterns. The purpose of Task 7 was to perform a soil investigation to determine the degree and extent of soil contamination in the zone of aeration in areas where contamination is suspected.

7.2 Objectives of Study

Details of the hydrogeologic investigations and cleanup action by Watkins-Johnson have been presented in previous reports by RLSA, consultants for Watkins-Johnson Company, which were submitted to RWQCB and the EPA. The purpose of this characterization is to provide a conceptual model of the ground-water system and contamination migration patterns. The conceptual model is based on previously reported information in the hydrogeologic data assessment, from RI/FS Work Plan Task 1, and on new information provided by the results of the ongoing monitoring programs and the RI/FS Spring 1988 field program. The field activities included drilling of soil borings to collect soil samples;

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the drilling and construction of new monitoring wells to expand and enhance the monitoring network already in place; and an aquifer test. These field activities were performed in accordance with the guidelines and plans presented in the Quality Assurance Project Plan (RLSA, February 1988) and the Sampling and Analysis Plan (RLSA, March 1988). These plans were approved by the EPA prior to commencement of the Spring, 1988 field activities. All field activities were carried out in accordance to the Health and Safety Plan (RLSA, November, 1987) which was reviewed by the EPA.

The results of the new field program have added important information to the characterization of the subsurface conditions. The major objectives of the program are as follows:

- To define the areal and vertical extent of soil and ground-water contamination; thus updating and refining the hydrogeologic system description presented in the Assessment of Existing Hydrogeologic and Contaminant Source Data (RLSA, January, 1988).
- To provide the hydrogeological information needed for redesigning the existing ground-water models.
- To support the screening of final remedial action alternatives and the design of the final remedial action.

In general, the subsurface units of interest beneath the Watkins-Johnson site include the unsaturated zone, the perched and regional zones within the Santa Margarita Formation, the Monterey Shale, and the Lompico Formation.

At the completion of the past studies it was determined that additional data was needed to complete the characterization of the subsurface conditions. Therefore, as outlined in the RI/FS Work Plan, the tasks and subtask objectives for the subsurface characterization include the following:

- To determine the degree and extent of soil contamination in the zone of aeration in areas where contamination is suspected, and to determine if contamination exists in the zone of aeration at other locations (Task 7).
- To define the ground-water flow patterns, the distribution of contaminants, and the hydrogeologic properties of the perched zone and underlying aquitard. To estimate the quantity, sources, and effects of recharge to the perched zone. To provide information needed to determine the most efficient clean-up program in the perched zone (Subtask 4.2).

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- To define the hydrogeologic properties, the ground-water flow system, and the distribution of contaminants in the regional zone (Subtask 4.1).

- To determine if there is a potential for contaminants to migrate from the Santa Margarita Formation through the Monterey Shale to the Lompico Formation (Subtask 4.3).

- To obtain the hydrogeological data necessary for the development and evaluation of alternatives for expansion or modification of the existing ground-water extraction and treatment system.

7.3 Soil Investigation

As outlined in the RI/FS Work Plan (RLSA, September, 1987) the objectives of the soils investigation are to determine the degree and extent of contamination in the zone of aeration in areas of suspected contamination. The operations history of the Stewart Division facility was reviewed with respect to manufacturing operations, chemicals used and methods for waste treatment and handling. In addition, several reported incidents of alleged surface disposal of industrial wastes were reviewed. Seven areas were identified for investigation. Six of the areas were investigated in earlier studies and all seven areas were investigated for the RI investigation. These sites are:

1. Building 2 Dilution Tank and Vicinity;
2. Building 2 and Vicinity;
3. Building 6 Dilution Tank and Vicinity;
4. Building 6 and Vicinity;
5. Building 8 Leach Field;
6. Sky Park Airport, which is offsite; and
7. Background, which is upgradient of potential source areas onsite.

- Based on the results of the analyses conducted on soil samples collected from various soil borings drilled over a period of several years. The principal contaminants of concern at the site are purgeable halocarbons. Investigations conducted prior to the RI documented the frequent occurrence of TCE, MC and CF in the soil. Occurrences of several other compounds were also noted, although on a less frequent basis. The analysis of soil samples collected during the RI confirmed the presence of five chlorinated halocarbons: TCE, CF, 1,1,1-TCA, Freon 113 and toluene.

- Soil samples collected in the vicinity of the Building 2 dilution tank and near the dry wells indicate a history of chlorinated hydrocarbon contamination. Analytes have included PCE, TCE, Freon 113, 1,1,1-TCA, 1,1-DCE, t-DCE and 1,1,2-TCA. The R1 boring confirmed TCE.

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- Analysis of soil samples collected in the vicinity of Building 2 showed only small quantities of TCE and DNBP.

- The Building 6 dilution tank and vicinity have been extensively investigated. Over time, the analytes detected have included TCE, MC, PCE, 1,1,1-TCA, CF and t-DCE. TCE and MC were in the greatest concentrations. Only TCE was confirmed in the RI confirmatory boring.

- Borings drilled in the vicinity of Building 6 contained only estimated quantities of a few semivolatiles. No occurrences of contamination were confirmed in the RI study.

- Analysis of soil samples collected in the vicinity of the Building 8 leach field indicated the presence of TCE and MC. The RI boring confirmed neither TCE or MC.

- Numerous borings in the vicinity of Sky Park Airport confirmed only the presence of total petroleum hydrocarbons, although solvents had reportedly been used at the facility.

- Background sampling during the RI study indicated estimated values for 1,1,1-TCA, Freon 113 and toluene.

Examination of the data reveals considerable variation of the concentration and occurrence of specific analytes with respect to space and time. Several conclusions are possible, based on these distributions.

1. Over time the contaminants have been transported out of the soil through volatilization or leaching, or have succumbed to biodegradation.

2. The major concentrations of contaminants are extremely limited spacially and are not frequently encountered.

3. A combination of the two previous descriptions.

The general level of understanding of the modes of contaminant migration and degradation is not sufficiently great to allow any but conclusion 3 to be adopted. It is not clear that any better understanding of the soil contamination problem is obtainable at this time. A study is being performed for the FS to document the theory of Leaching.

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7.4 Characterization of the Perched Zone in the Santa Margarita Aquifer

A perched aquifer was identified above the regional aquifer in the Santa Margarita Formation. Data acquired from the drilling and testing of RA-1 installed in September 1985 indicated the presence of a ground-water body lying 35 to 40 feet above the regional aquifer. Existing geophysical and drilling logs, and geologic data and data collected during the field program carried out in the Spring 1988 have been evaluated to determine the extent of the aquitard and the perched zone.

- The intraformational aquitard supporting the perched zone is a dense, moderately cemented, very poorly sorted conglomerate composed of well-rounded gravel, sand, and fine material. The resulting low porosity and moderate degree of cementation accounts for the low permeability. Due to the high igneous composition (relatively high natural radioactivity) and the high silica content of the material, the geophysical logging shows unusually high gamma and high resistivity responses.

- Where the aquitard exists, its thickness varies from a few feet to ten feet. However, it appears that this aquitard is not continuous, and areas where the aquitard does not exist have been identified. The discontinuities or stratigraphic holes are areas where ground water in the perched zone can leak into the regional zone more readily.

- Bean Creek flows on top of the perched zone aquitard in the area where the treated water is being discharged into Bean Creek. This is determined from visual observation of outcrops, by the response of water levels in wells tapping the perched and regional systems, and the flow in the creek. Hydrographs from wells tapping the perched zone and hydrographs for the creek in this area show similar patterns. Hydrographs for wells tapping the regional system show different patterns.

- Bean Creek is directly connected to the perched zone from the area where the treated water is discharged to the Bean Creek to the area of Ruins Creek. From this point southwest, Bean Creek is hydraulically connected to the regional aquifer.

- The bottom of the perched zone extends along Bean Creek as mentioned above. Southwest of Ruins Creek, the perched zone is approximated to extend along Lockhart Gulch Road. The perched zone, as defined, is also nonexistent in the areas where the Monterey Formation is topographically high.

- The general flow direction in the perched zone is from south to north. However, water from the plant has been discharged to the Building 8 Leach Field over the years. This discharge created a ground-water mound beneath the leach field. The mound has a large affect on flow conditions. Near the mound the flow is radial. As ground-water flows toward the mound from the south, the path is altered by the mound and flow is diverted toward the northwest and

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northeast. The saturated thickness varies from less than 1 foot to more than 15 feet in the area of the mound.

- In February, 1988 Watkins-Johnson began using Scotts Valley Municipal Sewer System, and discharge to the leach field ceased. This, in turn, caused a decay of the mound.

- Presently, about 15 gpm of treated water is injected into the leach field to attempt to have the present perched zone flow system similate the historical system.

- TCE has been found to be the major contaminant in the perched zone ground-water system. Present concentrations range from below detectable limits to a high of more than 400 parts per billion. The area consistently containing the highest concentrations is near the former Building 6 dilution tank. Well DH-3 has been used to monitor the perched zone in this area since 1984. TCE values analyzed from ground-water samples in this well range from 34 to 13,000 ppb.

- In general, the TCE migrates away from the high concentrations near DH-3 in a northeasterly and a northwesterly direction. This migration pattern is governed by the ground-water flow from south to north and by the ground-water mound just north of DH-3.

- In addition to TCE, 1,1-DCE and VC are constituents of concern. Detection of significant amounts of 1,1-DCE was limited to samples from DH-6, 7, Test Well, WJ-14, 16, 25, and 29D. These wells are located at the edge of the TCE plume. VC was detected from samples in two wells, Test Well and Well WJ-29D in the June sampling program.

- For this study, the following analyses have been carried out on ground-water samples from the perched zone:

  - Purgeable halocarbons (EPA 601)
  - Volatile organics (EPA 624)
  - Organochlorine pesticides and PCB (EPA 608)
  - BNA extractables (EPA 625)
  - Dissolved metals analysis (EPA 06010, 7000, 7060, 7470)
  - Total cyanides (EPA 9010)

- Results of the purgeable halocarbons indicate 13 chlorinated aliphatic compounds have been detected. Eight of these, Freon 11, Freon 113, 1,1,1-TCA, TCE, 1,2-DCB, CF, PCE, and 1,4-DCB have ben used by the plant. Four compounds VC, 1,1-DCE, 1,1-DCA, c-DCA are potential breakdown products of the group of the eight listed above. The thirteenth constituent, 1,1,2-TCA could be an impurity in compounds used on site.

- Results of the volatile organic analyses indicate that 7 analytes were detected. TCE and PCE were found in eleven and five wells respectively. The other five analytes VC, 1,1-DCA, CF, 1,1,1-TCA and 1,1,2-DCA were all estimated values with concentrations near detectable limits.

- Results of semivolatile organic analysis, indicate three analytes were detected. These are 1,2-DCB, DNBP, and diethylhexylphthalate. All concentrations were estimates or at the detection limits except for the diethyhexylphthalate. This analyte had an estimated value at 140 ug/l.

- Results of the inorganic analyses indicate that none of the analytes were detected at values to be of concern. Therefore, future analyses of inorganics will not occur.

- The major analytes of concern found in the perched zone have been identified to be TCE, 1,1-DCE, and VC. The highest concentrations of TCE, c-DCE, and PCE in the perched zone are found in Well DH-3. This is near a potential site of contamination, the Building 6 dilution tank. Soil in this area has also been found to contain similar analytes.

7.5 Characterization of the Regional Zone of the Santa Margarita Aquifer

The major water-table aquifer in the study area is the Santa Margarita sandstone. Prior to remedial action pumping, beginning in October, 1986, the depth to ground water in the regional aquifer was over 100 feet and the saturated thickness was about 45 feet. The aquifer was considered unsaturated or of limited areal extent to the east and southwest. The saturated thickness to the northwest, near Silverking Oceanic Farms, was 60 percent of the thickness underlying the plant. The direction of ground-water flow was to the northwest, toward Bean Creek, which is a gaining stream. The creek discharges to the west and leaves the topographic basin. Following remedial action pumping, the saturated thickness beneath the plant decreased up to 20 feet.

The monitoring well network for the regional zone presently consists of 42 wells. Thirty five of the wells were installed at the direction of Watkins-Johnson. Wells were installed in the regional zone during investigations initiated by the RWQCB and subsequently by the EPA.

- The saturated thickness of the regional aquifer is controlled by bedrock topography of the underlying Monterey Formation and the water-table surface. The Monterey surface underlying the site is characterized by a branching, northerly-trending paleo-valley. The main axis, west of the boundary of the Watkins-Johnson property, underlies the Sky Park Airport. A smaller branch trends to the northwest and underlies the plant parking lot diagonally. As a result of the relief of the Monterey surface, the regional aquifer varies in thickness from 40 to 60 feet beneath the site, and is unsaturated overlying the subsurface Monterey highs.

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- The direction of ground-water flow is toward Bean Creek, to the northwest. The water table is affected by seasonal fluctuations and by pumping in localized areas. The aquifer is recharged by precipitation and runoff from outcrop areas of the Santa Margarita to the south, and by potential leakage from overlying formations to the north, south and east. Recharge may also occur by upward leakage from the Lompico and Monterey Formations.

- Three aquifer tests have been performed to determine the aquifer characteristics of the regional zone. The transmissivity ranged from 34,600 gpd/ft to 58,000 gpd/ft. The effective porosity was estimated to 0.18. The value of the effective porosity confirms the storage coefficient determined in the 1985 test.

- Remedial action pumping commenced on October 14, 1986, and a cone-of-depression formed. The pumping rate was reduced from 325 gpm (468,000 gpd) to about 250 gpm (360,000 gpd) on April 27, 1987. The rate of drawdown within the enlarging cone-of-depression slowed with the reduction in pumpage.

- Silverking Oceanic Farms began pumping from the Santa Margarita aquifer in Spring, 1987. Pumpage changed from a continuous to an intermittent basis in January, 1988. Changes in water levels in WJ-30 and AP-2 indicate that pumpage at Silverking has an effect on the depressed water levels resulting from the remedial action pumping.

- The saturated thickness of the aquifer has been reduced by 12 feet or more around the plant site. The cone-of-depression due to remedial action pumping reversed the gradient near the pumping well and diminished flow toward Bean Creek. A ground-water divide located on the east side of the airport shifted closer to the plant property when pumpage was reduced at the plant and increased at Silverking. The design of the final remediation will have to take into account the combined effects of pumpage at Silverking and Watkins-Johnson.

- Purgeable halocarbons have been detected in ground water collected from wells completed in the regional zone. TCE was the major contaminant detected, together with lesser concentrations of 1,1,1-TCA, t-DCE, and 1,1-DCE. The concentrations of TCE form a narrow cigar-shaped plume which extends to the northwest, toward Bean Creek. The highest concentrations of TCE are west of Building No. 6.

- Data collected over time indicate that the contaminant plume has steadily diminished. A possible residual plume with very low concentrations may exist between Watkins-Johnson and Silverking due to flat gradients between the two pumping centers. The EPA has indicated that 1,1-DCE is a contaminant of concern.

- Regionally, ground water discharges to Bean Creek, which accounts for 63 percent of the out-flow from the basin. Baseflow in the creek is reported to be 3.3 cfs (Todd, 1987). Approximately 2.3 mgpd were estimated from modeling results to flow to the creek from the study area prior to remedial action pumping. The model estimated that discharge to the creek was reduced by 0.2 mgd due to pumping at Watkins-Johnson and was reduced an additional 0.2 mgd due to pumping at Silverking.

Data from Well BCW-3 supports the possibility that Bean Creek is connected with the perched zone. This connection is thought to occur downstream from BC-6, in the area where the treated water is discharged to the creek, and upstream of Ruins Creek. The stream and regional aquifer and hydraulically connected down stream of Ruins Creek.

- The Monterey and Lompico aquifers underlie the contaminated Santa Margarita Formation. The top of the Monterey defines the base of the Santa Margarita. Wells screened in the Monterey Formation, Sky Park Supply Well and SK-3, show water-level elevations greater than the surface of the regional aquifer in the Santa Margarita Formation and do not show water-level fluctuations corresponding to pumpage in the Santa Margarita Formation. Data indicate that a vertical upward gradient exists from the underlying aquifers to the overlying Santa Margarita. The Lompico Formation underlies the area at depths ranging from 400 to 600 feet. There is an apparent upward gradient from the Lompico to the Monterey. These data indicate that the potential for contaminants to flow from the Santa Margarita to the Monterey or Lompico is very small.

- For the RI/FS program, water samples were collected from 32 regional zone wells in March, 1988 and from 38 wells in June, 1988. Eleven analytes from the purgeable halocarbon analyses were detected in the samples. Five of the eleven analytes were reported to be used onsite, Freon 11, Freon 113, 1,1,1-TCA, PCE and TCE. Three of the analytes, 1,1-DCE, 1,1-DCA and c-DCE are breakdown products of analytes reported to have been used onsite. Two compounds, 1,1,2-TCA and CF were not reported to be used onsite.

- Ground-water samples analyzed for volatile organics analysis had 6 analytes detected. These same analytes were also detected in the purgeable halocarbon analysis. Only two semivolatile organics were detected in two wells. They are not a matter of concern. The results of sampling for inorganics indicated that the concentrations of inorganics in the ground water are not a matter of concern.

- Results from surface-water samples indicate that no contaminants are of concern.

- Purgeable halocarbon contamination in the regional zone is probably related to soil contamination and perched zone contamination near the Building 6 dilution tank.

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WJ007887

Characterization of

SUBSURFACE CONDITONS

WATKINS-JOHNSON COMPANY
Scotts Valley, California

VOLUME II APPENDICES A - E

Submitted to

U. S. Environmental Protection Agency
San Francisco, California

September 16, 1988

WJ007889

APPENDIX A

WELL INVENTORY AND CONSTRUCTION DATA

Appendix A

Index to Well Information Diagrams

Well (s)	Figure	Well(s)	Figure
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RA-4	6	WJ-18	34
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WJ-13	29	SK-2	57
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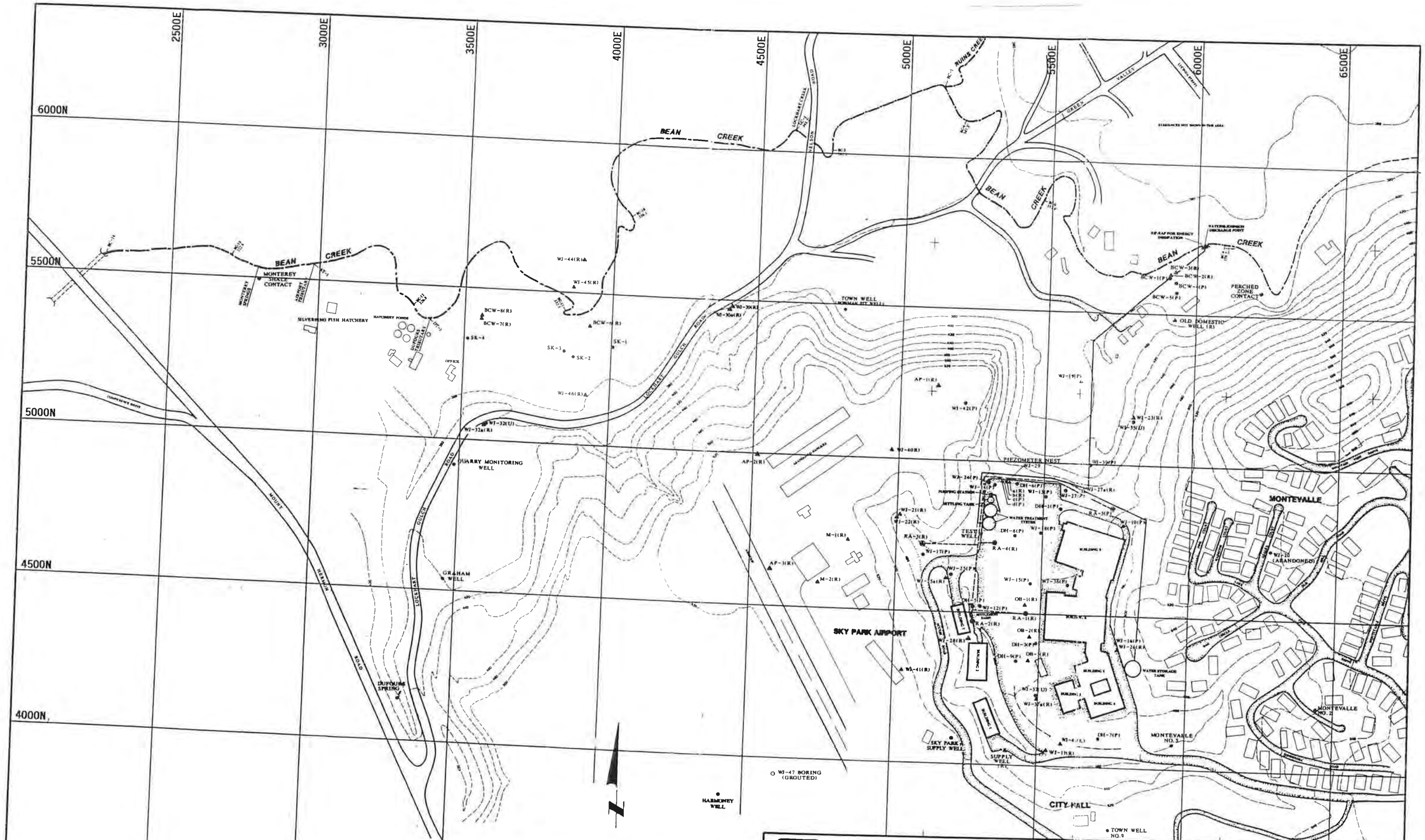
WJ27/1



R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-

DATE:

WELL LOCATION COORDINATE SYSTEM
WATKINS-JOHNSON REMEDIATION PROGRAM

FIGURE A.1

Table A.1a

Study Area Well Inventory
Wells Monitored By Watkins-Johnson
Within the Watkisn-Johnson Property
Watkins-Johnson Company, Scotts Valley, California

Well Number	Aquifer or Zone/ Potential Conduit	Northing	Easting	Date Completed	Depth Drilled (feet)	Depth Completed (feet)	Depth of Screened Interval (feet)	Sanitary Seal Interval (feet)	Gravel Pack Interval (feet)	Gravel Pack Grainsize	Elevation of TOC[a] (feet)	Elevation of Screened Interval (feet)	Casing Schedule/ Material	Screen Slot Size (inches)/ Material	Casing ID[b] (inches)	Borehole Diameter (inches)/ Drilling Method	Status	Use	Pump Capacity (GPM)
DH-1	P/NO	4857.48	5557.21	6/11/84	90.5	90	70-90	0-16	Q	Q	444.33	374.3-354.3	40/PVC	.016/PVC	2	c, l	d, f	h	—
DH-2	—	—	—	—	91	—	—	—	—	—	—	—	—	—	—	c, l	d, r	—	—
DH-3	P/NO	4398.30	5486.64	6/11/84	94	94	78.5-93.5	0-10	Q	Q	458.49	380.0-365.0	40/PVC	.016/PVC	2	c, l	c, f	h	—
DH-4	—	—	—	—	81	—	—	—	—	—	—	—	—	—	—	c, l	d, r	—	—
DH-5	P/NO	4523.02	5272.05	6/15/84	50	50	20-50	0-10	Q	Q	454.03	434.0-404.0	40/PVC	.016/PVC	2	c, l	d, f	h	—
DH-6	P/NO	4941.54	5709.44	7/5/84	88.5	88.5	68.33-88.33	0-55.8	55.8-88.5	#4MS(T)	448.10	379.8-359.8	40/PVC	.016/PVC	2	c, l	d, f	h	—
DH-7	P/NO	4087.07	5705.50	7/5/84	98.5	98.5	57.25-97.25	0-48.3	48.3-86	#4MS	469.32	412.1-372.1	40/PVC	.016/PVC	2	c, l	d, f	h	—
DH-8	P/NO	4763.15	5404.94	7/17/84	50	50	24.5-49.5	0-21	21-32	#4MS	448.40	423.9-398.9	40/PVC	.016/PVC	2	c, l	d, f	h	—
DH-9	P/NO	4342.65	5419.60	7/17/84	93	93	72.66-92.66	0-67.3	67.3-73	#4MS	456.01	383.4-363.4	40/PVC	.016.PVC	2	c, l	d, f	h	—
WJ-10	P/NO	4808.86	5782.11	12/20/84	105	99.5	84-99	0-69	69-105	#3MS	460.67	376.7-361.7	40/PVC	.020/PVC	2	6,mr	f	h	—
WJ-11	S/NO	4041.35	5532.66	12/16/84	133	130	109.5-129.5	0-99.5	99.5-130	#3MS	467.41	357.9-337.9	40/PVC	.020/PVC	2	6,mr	f	h	—
WJ-12	P/NO	4522.01	5290.69	12/10/84	74	74	58.5-73.5	0-51	51-74	#3MS	453.39	394.9-379.9	40/PVC	.020/PVC	2	8, mr	f	h	—
WJ-13	P/NO	4897.93	5507.48	12/15/84	80.5	80.5	65-80	0-56	56-80	#3MS	445.19	380.2-365.2	40/PVC	.020/PVC	2	8, mr	f	h	—
WJ-14	P/YES	4935.44	5337.63	12/18/84	86	85.5	70-85	0-63	63-86	#3MS	449.07	379.1-364.1	40/PVC	.020/PVC	2	6, mr	f	h	—
WJ-15	P/NO	4604.73	5459.93	12/19/84	87	84.5	69-84	0-58	58-87	#3MS	451.93	382.9-367.9	40/PVC	.020/PVC	2	—	f	h	—
WJ-16	P/NO	4410.37	5758.83	12/28/84	110	110	95.110	0-92	92-110	#3MS	477.10	382.1-367.1	40/PVC	.020/PVC	2	6, mr	f	h	—
WJ-17	P/NO	4694.69	5102.79	12/29/84	100	100	85.100	0-80	80-100	#3MS	466.96	382.0-367.0	40/PVC	.020/PVC	2	6, mr	f	h	—
WJ-18	P/NO	4773.82	5492.67	12/29/84	80	80	65-80	0-60	60-80	#3MS	446.37	381.4-366.4	40/PVC	.020/PVC	2	6, mr	f	h	—
WJ-19	P/NO	5283.72	5620.08	6/20/85	25	25	10-25	0-17	17-25	#8MS	385.13	375.1-360.1	40/PVC	.020/PVC	2	7, mr	f	h	—
WJ-20	—	4714.16	6272.01	—	180	—	—	—	—	—	—	—	—	—	—	—,mr	r	—	—
WJ-21	S/NO	4814.96	5009.09	8/7/85	141	140	110-140	0-105	105-140	#8MS	477.43	367.4-337.4	40/PVC	.020/PVC	2	8, mr	f	h	—
WJ-22	S/NO	4807.06	5002.53	8/3/85	202	200	185-200	0-172	172-202	#8MS	477.81	292.8-277.8	40/PVC	.020/PVC	2	8, mr	f	h	—
WJ-23	S/NO	5173.37	5799.10	9/7/85	84	81	61-81	0-56	56-84	#8MS	422.70	361.7-341.7	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-24	S/YES	4935.77	5329.57	10/29/85	140	140	85-135	0-55	55-140	#8MS	449.58	364.6-314.6	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-25	P/YES	4618.07	5191.05	11/8/85	157	155	95-155	0-90	90-157	#8-16 Blend MS	459.37	364.4-304.4	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-25A	S/NO	4618.66	5185.98	11/8/85	152	150	120-150	0-90	90-157	#8-16Blend MS	460.31	340.3-310.3	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-26	S/NO	4397.72	5762.96	11/5/85	178	175	115-175	0-110	110-180	#8MS	477.80	362.8-302.8	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-27	P/YES	4920.77	5571.56	10/30/85	110	108	78-108	0-75	75-108	#8MS	446.65	368.7-338.7	40/PVC	.020/PVC	4	8,mr	f	h	—
WJ-27A	S/NO	4919.04	5612.82	10/30/85	115	112	109-112	0-107	107-112	#8MS	445.77	336.8-333.8	40/PVC	.020/PVC	2	8, mr	f	h	—
WJ-28	S/NO	4406.54	5249.84	11/9/85	153	150	95-150	0-90	90-151	#8-16 Blend MS	463.78	368.8-313.8	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-29A	S/NO	4940.19	5393.89	11/14/85	128	126	123-126	0-120	120-129	#8-16 Blend MS	448.81	325.8-322.8	40/PVC	.020/PVC	2	8, mr	f	h	—
WJ-29B	S/NO	4940.34	5388.45	11/15/85	110	109	104-109	0-102	102-109	#8-16 Blend MS	448.83	344.8-339.8	40/PVC	.020/PVC	2	8, l	f	h	—
WJ-29C	P/NO	4940.46	5383.49	11/18/85	99	98	95-98	0-93	93-108	#8-16 Blend MS	448.90	353.9-350-9	40/PVC	.020/PVC	2	8, l	f	h	—
WJ-29D	P/NO	4940.60	5378.54	11/19/85	87	85	80-85	0-78	78-85	#8-16 Blend MS	448.92	368-9-363.9	40/PVC	.020/PVC	2	8, l	f	h	—
WJ-35	P/NO	5165.24	5797.38	5/13/87	52.5	52	42-52	0-37	37-52.5	#3MS	423.25	381.5-371.5	40/PVC	.020/PVC	4	8, mr	f	h	—
WJ-37	P/NO	4213.72	5492.17	5/15/87	86	86	76-86	0-70	70-86	#3MS	461.92	386.5-376.0	40/PVC	.020/PVC	4	8,mr	f	h	—
WJ-37A	S/NO	4222.61	5489.27	5/13/87	164	164	124-164	0-118	118-164	#3MS	462.55	338.9-298.9	40/PVC	.020/PVC	4	8, mr	f	h	—
RA-1	S/YES	4499.86	5448.45	8/7/85	147.3	145	90-135	0-80	80-147	#6MS	455.29	364.9-319.6	U	.070/Stainless	12	22, n	f	h, j, k	55
RA-2	S/NO	4466.82	5289.54	8/26/86	150	150	105-140	0-99.5	99.5-150.5	#6-12 Blend MS	454.37	350.1-315.1	V	.060/Stainless	12	22, n	f	h, j, k	80
RA-3	S/NO	4725.72	5074.95	8/20/86	195	195	134-189	0-120	120-195	#12-20 Blend MS	468.70	335.2-280.2	V	.040/Stainless	12	22, n	f	h, j, k	112
RA-4	S/NO	4736.68	5338.96	8/22/86	145	145	105-135	0-92	92-143	#12-20 Blend MS	449.87	344.8-314.8	V	.040/Stainless	12	22, n	f	h, j, k	60
RA-5	P/NO	4890.99	5737.61	9/3/86	100	100	77.5-92.5	0-70	70-100	#12-20 Blend MS	455.86	377.7-362.7	V	.040/Stainless	8	17, n	f	h	—

MWJ9/1

NOTES:

Well prefixed withj WJ, AP, RA, OB, BCW were supervised by R. L. Stollar & Associates, Inc.

a. TOC is top of casing
b. ID is inside diameter
c. Information not available
d. Drilling program supervised by Terratech
e. Proposed, not driled due to access problems
f. In use
g. Abandoned
h. Observation
i. Domestic
j. Industrial
k. Remediation
l. Hollow Stem Auger
m. Monterey Formation
mr. Mud Rotary
n. Reverse Circulation Rotary
o. Dual Tube Precussion Hammer
p. Perched Zone Aquifer
q. No Gravel Pack, Formation collapsed around casing
r. Boring collapsed, well not constructed
s. Santa Margarita aquifer
t. MS-Monterey Sand
u. .25-inch thick blank steel
v. .375-inch thick blank steel
w. LL-Lapis Lustre sand
z. Not in use
- Not applicable, no data

Table A.1b

Study Area Well Inventory
Wells Monitored By Watkins-Johnson
Within the Watkins-Johnson Property
Watkins-Johnson Company, Scotts, Valley, California
(Continued)

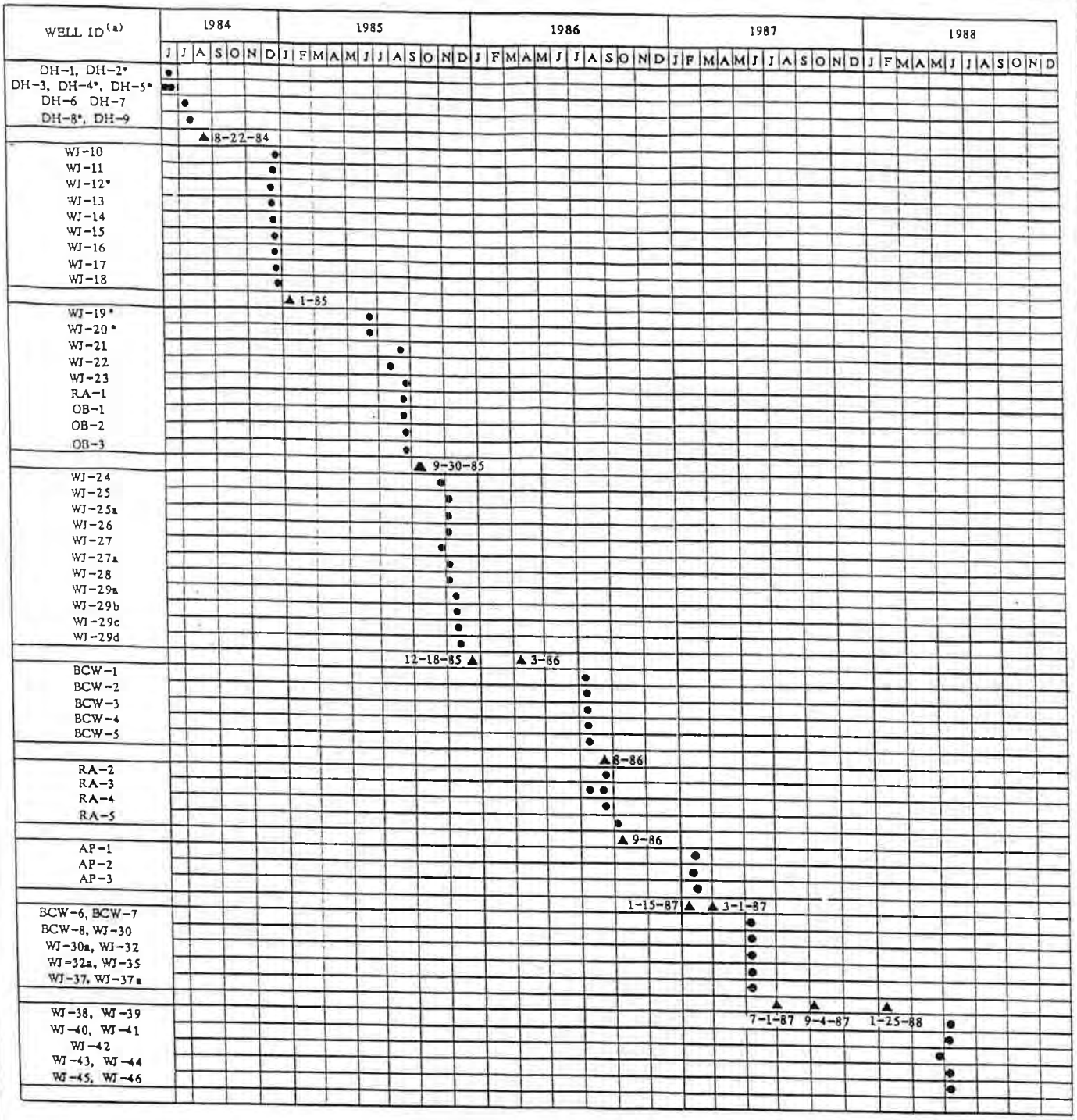
Well Number	Aquifer or Zone/ Potential Conduit	Northing	Easting	Date Completed	Depth Drilled (feet)	Depth Completed (feet)	Depth of Screened Interval (feet)	Sanitary Seal Interval (feet)	Gravel Pack Interval (feet)	Gravel Pack Grainsize	Elevation of TOC[a] (feet)	Elevation of Screened Interval (feet)	Casing Schedule/ Material	Screen Slot Size (inches)/ Material	Casing ID[b] (inches)	Borehole Diameter (inches)/ Drilling Method	Status	Use	Pump Capacity (GPM)
OB-1	S/NO	45.29.51	5444.64	8/16/85	146	145	90-145	0-82	82-145.6	#8MS	453.12	363.1-308.1	40/PVC	.020/PVC	4	11	f	h	—
OB-2	S/NO	4421.26	5464.08	8/23/85	160	157.5	87.5-157.5	0-80	80-160	#8MS	455.63	368.6-298.6	40/PVC	.020/PVC	4	11	f	h	—
OB-3	S/NO	4344.54	5458.59	8/20/85	160	156.48	81.5-156.48	0-80	80-160	#8MS	456.61	375.1-300.1	40/PVC	.020/PVC	4	11	f	h	—
BCW-1	P/NO	5641.47	5903.56	7/16/86	20	14.5	9.5-14.5	0-7	7-20	#16LL(W)	370.99	361.5-356.5	40/PVC	.020/PVC	2	10	f	h	—
BCW-2	S/NO	5649.04	5908.95	7/16/86	25	24	21-24	0-19	19-25	#8-16MS	371.35	350.4-347.4	40/PVC	.020/PVC	2	10	f	h	—
BCW-3	S/NO	56.57.59	5924.23	7/17/86	33	32.5	29.5-32.5	0-27	27-33	#16LL	370.31	340.8-337.8	40/PVC	.020/PVC	2	10	f	h	—
BCW-4	P/NO	5622.63	5927.68	7/21/86	15	14	9-14	0-7	7-15	#16 Mesh	371.21	362.2-357.2	40/PVC	.020/PVC	2	10	f	h	—
BCW-5	P/NO	5589.12	5929.91	7/22/86	16.5	16	11-16	0-9	9-16.5	#16 Mesh	371.70	360.7-355.7	40/PVC	.020/PVC	2	10	f	h	—
WJ Supply well	S/NO	4039.65	5390.23	c	c	c	c	c	c	c	483.18	c	c	c	c	c	f	j, k	50
Test Well	P,S/YES	4756.91	5297.38	9/21/83	143	110	40-110	0-40	40-110	#6 Mesh	452.11	412.1-352.1	160/PVC	.040/C	6	12.5	f	j, k	7
RI/FS WELLS																			
WJ-38	P/?	4598.53	5592.94	5/21/88	110	97	76.4-96.4	0-75	75-97	#3 Lonestar	462.39	367.0-385.0	40/PVC	.020/PVC	4	10, mr	f	h	—
WJ-39	P	5008.44	5654.69	5/10/88	55	43.7	23-43	0-18	18-43.7	#3 Lonestar	409.22	366.2-386.2	40/PVC	.020/PVC	4	10, mr	f	h	—
WJ-43	R	4061.12	5572.71	5/22/88	180	173	125-170	0-117	117-173	#3 Lonestar	467.42	297.4-342.4	80/PVC	.020/PVC	4	10, mr	f	h	—

MWJ9/2

NOTES:

Well prefixed withj WJ, AP, RA, OB, BCW were supervised by R. L. Stollar & Associates, Inc.

a. TOC is top of casing
b. ID is inside diameter
c. Information not available
d. Drilling program supervised by Terratech
e. Proposed, not driled due to access problems
f. In use
g. Abandoned
h. Observation
i. Domestic
j. Industrial
k. Remediation
l. Hollow Stem Auger
m. Monterey Formation
mr. Mud Rotary
n. Reverse Circulation Rotary
o. Dual Tube Precussion Hammer
p. Perched Zone Aquifer
q. No Gravel Pack, Formation collapsed around casing
r. Boring collapsed, well not constructed
s. Santa Margarita aquifer
t. MS-Monterey Sand
u. .25-inch thick blank steel
v. .375-inch thick blank steel
w. LL-Lapis Lustre sand
z. Not in use
- Not applicable, no data



▲ Report prepared by R.L. Stollar & Associates, Inc.
First two reports prepared by RLSA for Safety Specialists.

* Well abandoned or not able to be measured

(a) Wells with prefix DH were completed prior to RLSA investigations.

Wells WJ-31, WJ-33, WJ34 and WJ-36 could not be drilled due to access problems

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL DRILLING HISTORY
WATKINS-JOHNSON MONITORING PROGRAM

FIGURE A.2

WJ007896

Table A.2

Study Area Preliminary Well Inventory
Wells Monitored by Watkins-Johnson
Outside Watkins-Johnson Property

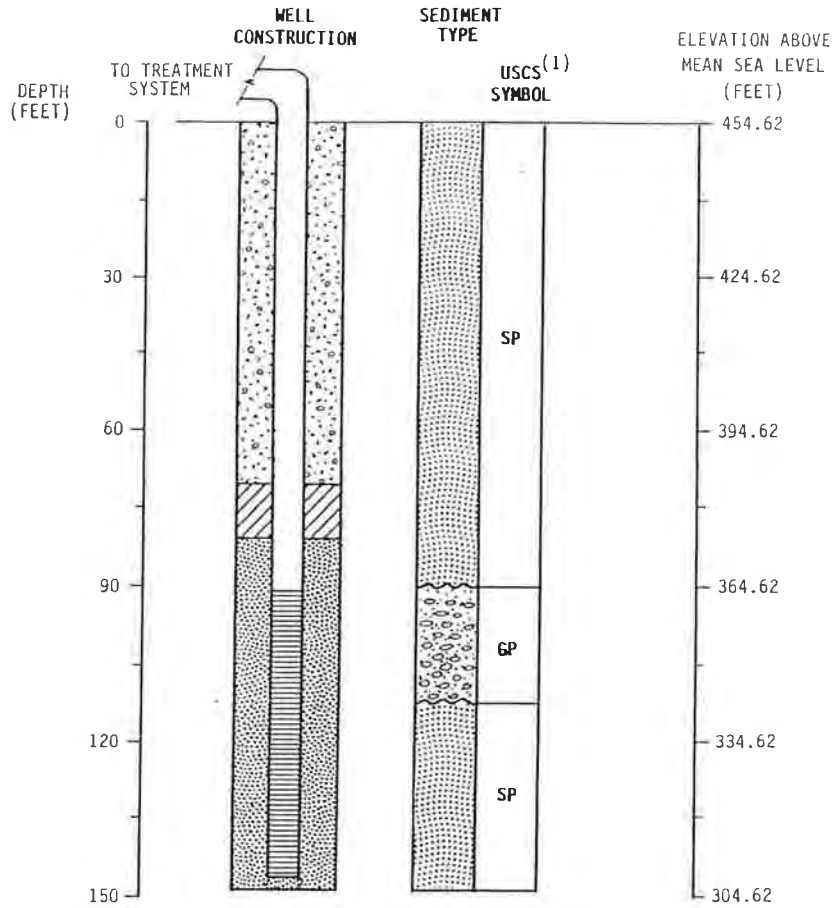
Well Number	Aquifer or Zone/ Potential Conduit	Northing	Easting	Date Completed	Depth Drilled (feet)	Depth Completed (feet)	Depth of Screened Interval (feet)	Sanitary Seal Interval (feet)	Gravel Pack Interval (feet)	Gravel Pack Grainsize	Elevation of TOC[a] (feet)	Elevation of Screened Interval (feet)	Casing Schedule/ Material	Screen Slot Size (inches)/ Material	Casing ID[b] (inches)	Borehole Diameter (inches)/ Drilling Method	Status	Use	Pump Capacity (GPM)
WJ-30	S/NO	5486.04	4409.25	5/20/87	30	30	20-30	0-16	16-30	#3MS	360.41	339.4-329.4	40/PVC	.020/PVC	4	8, mr	f	h	--
WJ-30A	S/NO	5481.69	4405.41	5/19/87	82	81	61-81	0-57	57-81	#3MS	360.97	298.9-279.0	40/PVC	.020/PVC	4	8, mr	f	h,l	7
WJ-32	P/NO	5665.72	3588.92	5/21/87	30	29	24-29	0-22	22-30	#3MS	383.37	359.6-354.6	40/PVC	.020/PVC	4	8, mr	f	h	--
WJ-32A	S/NO	5060.37	3584.33	5/20/87	42	39	34-39	0-33	33-42	#3MS	383.13	349.9-344.9	40/PVC	.020/PVC	4	8, mr	f	h	--
AP-1	S/NO	5243.05	5122.00	2/4/87	237.5	236	191-236	0-181	181-237.5	#8-16 Blend MS	532.49	341.5-296.5	80/PVC	.020/PVC	4	9, o	f	h	--
AP-2	S/NO	4987.96	4519.88	2/1/87	227	226	170-225	0-160	160-226	#8-16 Blend MS	526.01	356.0-301.0	80/PVC	.020/PVC	4	9, o	f	h	--
AP-3	S/NO	4609.67	4579.71	2/7/87	218	217	177-217	0-168	168-218	#8-16 Blend MS	522.90	344.9-304.9	80/PVC	.020/PVC	4	9, o	f	h	--
BCW-6	S/NO	5397.50	3921.92	5/18/87	48	46	31-46	0-28	28-48	#3MS	348.48	316.5-301.5	40/PVC	.020/PVC	4	8, mr	f	h	--
BCW-7	S/NO	5406.66	3556.71	5/14/87	42	41.5	34-41.5	0-32	32-42	#3MS	343.68	308.7-301.2	40/PVC	.020/PVC	4	8, mr	f	h	--
BCW-8	S/NO	5412.41	3558.01	5/21/87	14	14	9-14	0-9	9-14	#3MS	343.65	333.7-328.7	40/PVC	.020/PVC	4	8, mr	f	h	--
WELLS OWNED BY CITY OF SANTA CRUZ																			
M-1	P,S/YES	4730.34	4836.96	4/10/85	245	244.25	175.33-1195.25	0-50	50-245	#6-12 Blend MS	524.38	349.1-329.1	40/PVC	.040/PVC	6	10, mr	f	h	--
M-2	P,S/YES	4586.21	4739.72	4/16/85	230	229.25	169.25-179.25	0-50	50-230	#6-12 Blend MS	524.24	355.0-345.0	40/PVC	.040/PVC	6	10, mr	z	h	--
Airport Supply Well	M/C	4027.86	5217.29	6/9/72	400	400	189.25-229.25 220-240 300-340 380-400	0-50	50-400	282-302 182-222 122-142	522.01	335.0-295.0 c	10 guage/c	.12/c	c	c, c	f	h	--
WELLS OWNED BY SILVERKING OCEANIC FISH HATCHERY																			
SK-1	S/NO	531.65	4002.72	3/13/87	60	52	21-51	0-20	20-60	#9-16 Blend MS	347.48	326.5-296.5	Class 160/PVC	.040/PVC	12	21, mr	f	h, j	270
SK-2	S/NO	5292.51	3872.64	3/17/87	56	52	21-51	0-20	20-56	#9-16 Blend MS	349.14	328.1-298.1	Class 160/PVC	.040/PVC	12	21, mr	f	h, j	50
SK-3	M/NO	5317.01	3962.00	12/82	120	100	60-100	0-50	50-100	#8-16 Blend MS	345.64	285.6-245.6	Class 200/PVC	.040/PVC	8.5	12, mr	f	h	--
SK-4	M/NO	5339.34	3510.27	8/11/87	395	320	52-112 162-320	0-50	50-320	#8-16 Blend MS	343.02	291.0-231.0 181.0-23.0	SDR21/PVC	.040/PVC	8	11.5, mr	f	h, j	25
WELL OWNED BY GRAHAM PROPERTY OWNER																			
Graham Well	M/C	4524.22	3467.84	c	c	c	c				401.12	c	c	c	c	c, c	f	h	--
WELLS OWNED BY CITY OF SCOTTS VALLEY																			
Town Well	S/YES	5506.39	4806.57	11/17/76	85	83	58-78	no seal	0-85	#8 Mesh	376.41	318.4-298.4	12 guage steel	Mill slot/steel	6.3	12, mr	f	h	--
Quarry Monitoring Well	C/C	4916.59	3485.20	c	c	c	c				392.67	c	c	c	c	c, c	f	h	--
RI/FS WELLS																			
WJ-40	P	5024.91	4973.16	5/5/88	205	193.8	173.3-193.4	0-167.1	167.6-193.8	#3 Lonestar	529.23	335.8-355.9	80/PVC	.020/PVC	4	10, mr	f	h	--
WJ-41	R	4296.53	5032.19	5/15/88	220	202.3	171.9-201.9	0-162	162-202.3	#3 Lonestar	522.51	320.6-350.6	80/PVC	.020/PVC	4	10, mr	f	h	--
WJ-42	R	5197.08	5217.11	4/26/88	195	181.7	161.2-181.2	0-155	155-181.7	#3 Lonestar	534.31	353.1-373.1	80/PVC	.020/PVC	4	10, mr	f	h	--
WJ-44	R	5618.65	3894.54	5/27/88	77	60.5	10-60	0-8	8-60.5	#3 Lonestar	348.50	288.5-338.5	40/PVC	.020/PVC	4	10, mr	f	h	--
WJ-45	R	5526.43	3862.03	5/19/88	60	52.1	6.6-51.6	0-6	6-52.1	#3 Lonestar	346.66	295.1-340.1	40/PBC	.020/PVC	4	10, mr	f	h	--
WJ-46	R	5161.93	3914.72	5/28/88	40	34	12.4-32.4	0-6	6-34	#8-16 Blend MS	354.03	321.6-341.6	40/PBC	.020/PVC	8	13, mr	f	h	--

MWJ9/3

NOTES:

Well prefixed withj WJ, AP, RA, OB, BCW were supervised by R. L. Stollar & Associates, Inc.

a. TOC is top of casing
b. ID is inside diameter
c. Information not available
d. Drilling program supervised by Terratech
e. Proposed, not driled due to access problems
f. In use
g. Abandoned
h. Observation
i. Domestic
j. Industrial
k. Remediation
l. Hollow Stem Auger
m. Monterey Formation
mr. Mud Rotary
n. Reverse Circulation Rotary
o. Dual Tube Precussion Hammer
p. Perched Zone Aquifer
q. No Gravel Pack, Formation collapsed around casing
r. Boring collapsed, well not constructed
s. Santa Margarita aquifer
t. MS-Monterey Sand
u. .25-inch thick blank steel
v. .375-inch thick blank steel
w. LL-Lapis Lustre sand
z. Not in use
- Not applicable, no data



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

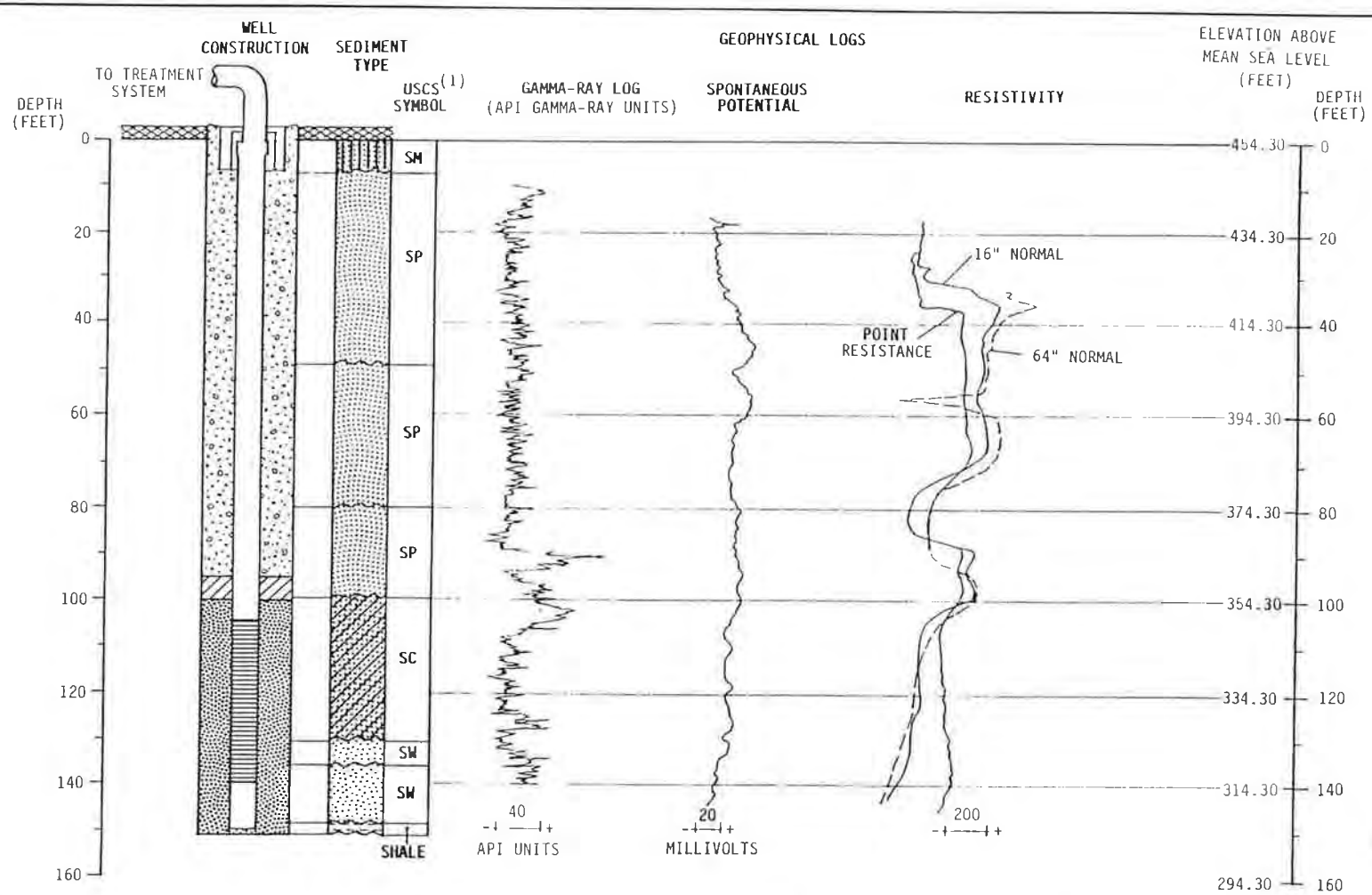
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL RA-1

FIGURE A.3

W10078 98



WJ007899

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

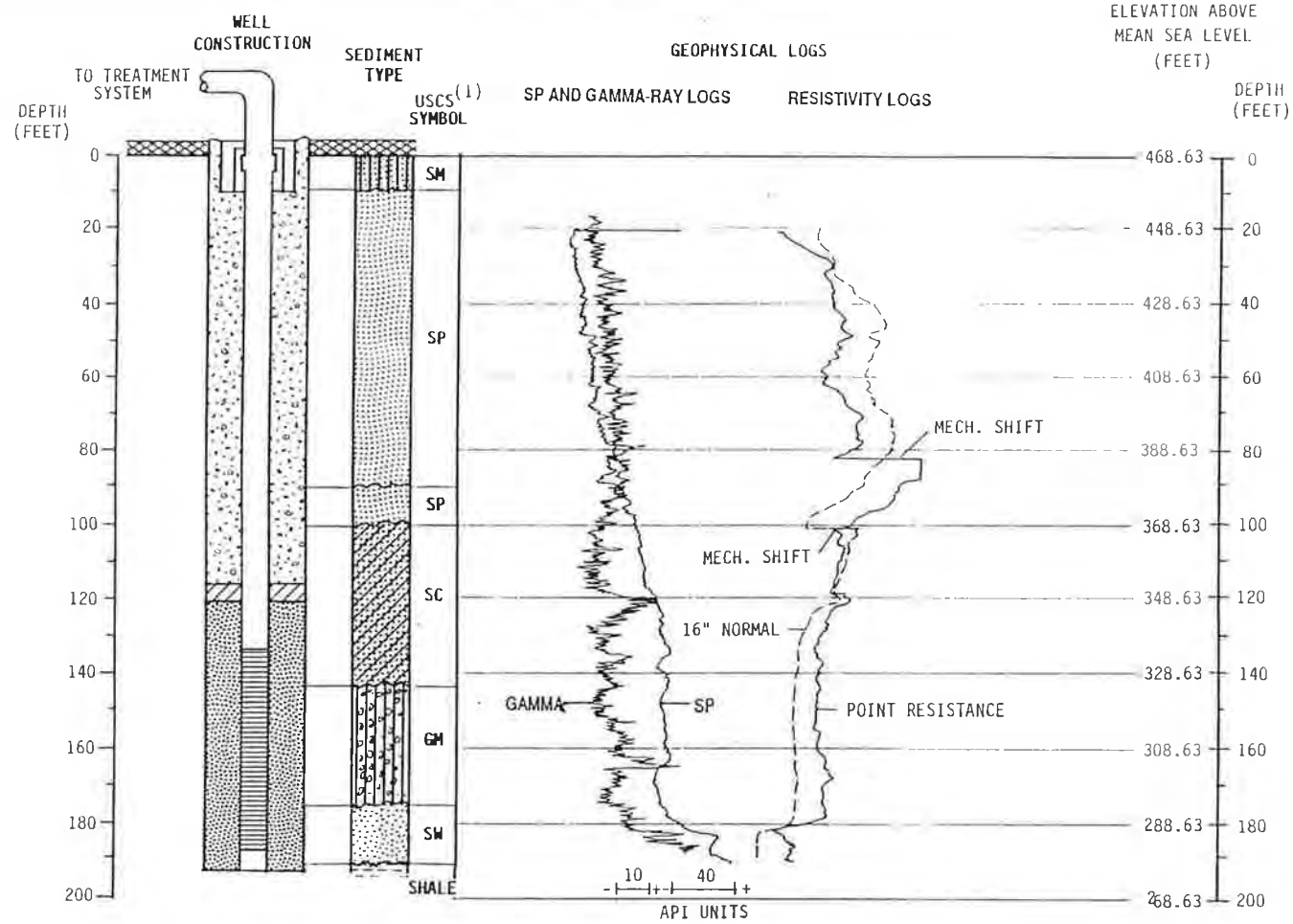
R.L. STOLLAR & ASSOCIATES INC.
Ground Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL RA-2

FIGURE A.4



WJ007900

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

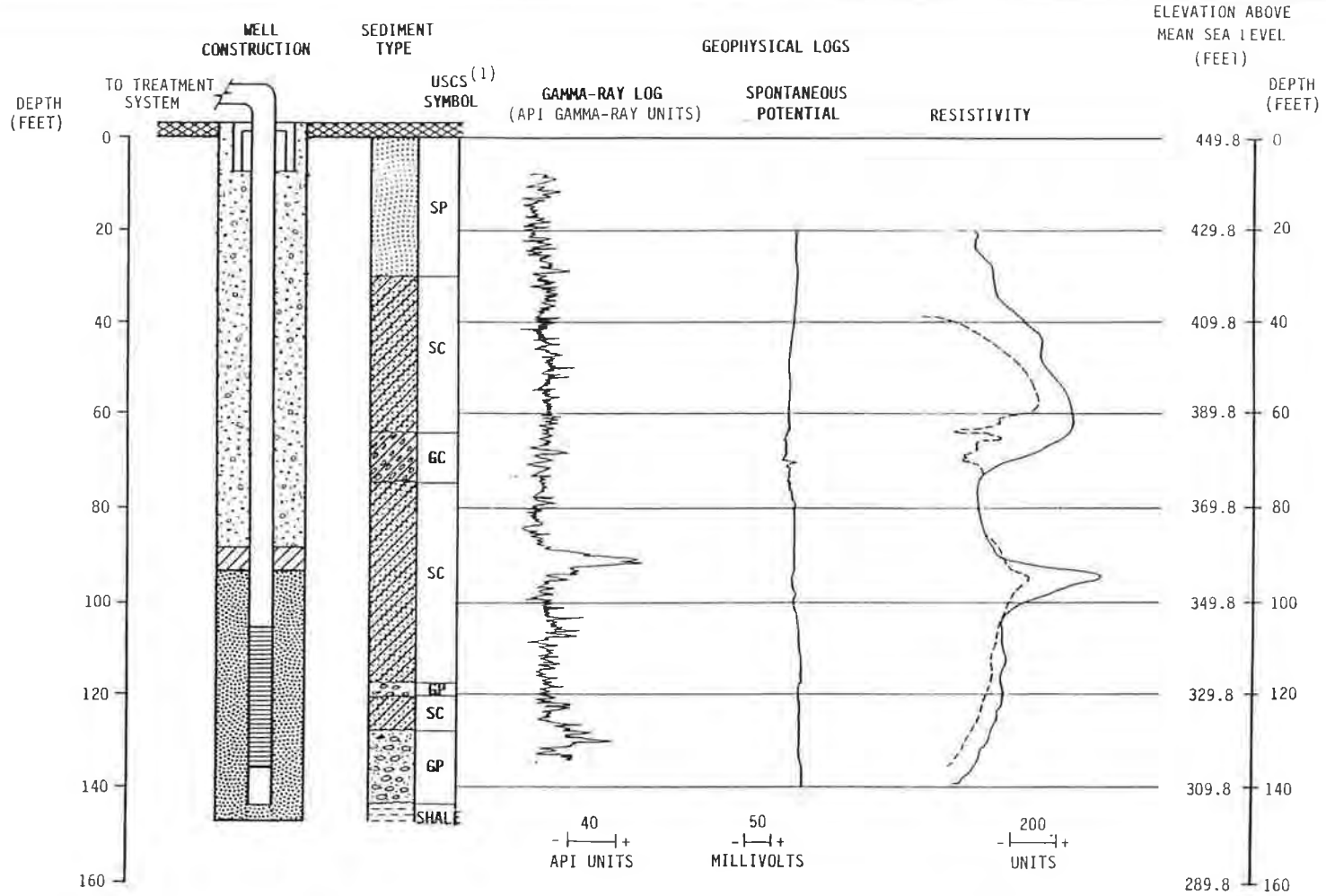
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL RA-3

FIGURE A.5



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

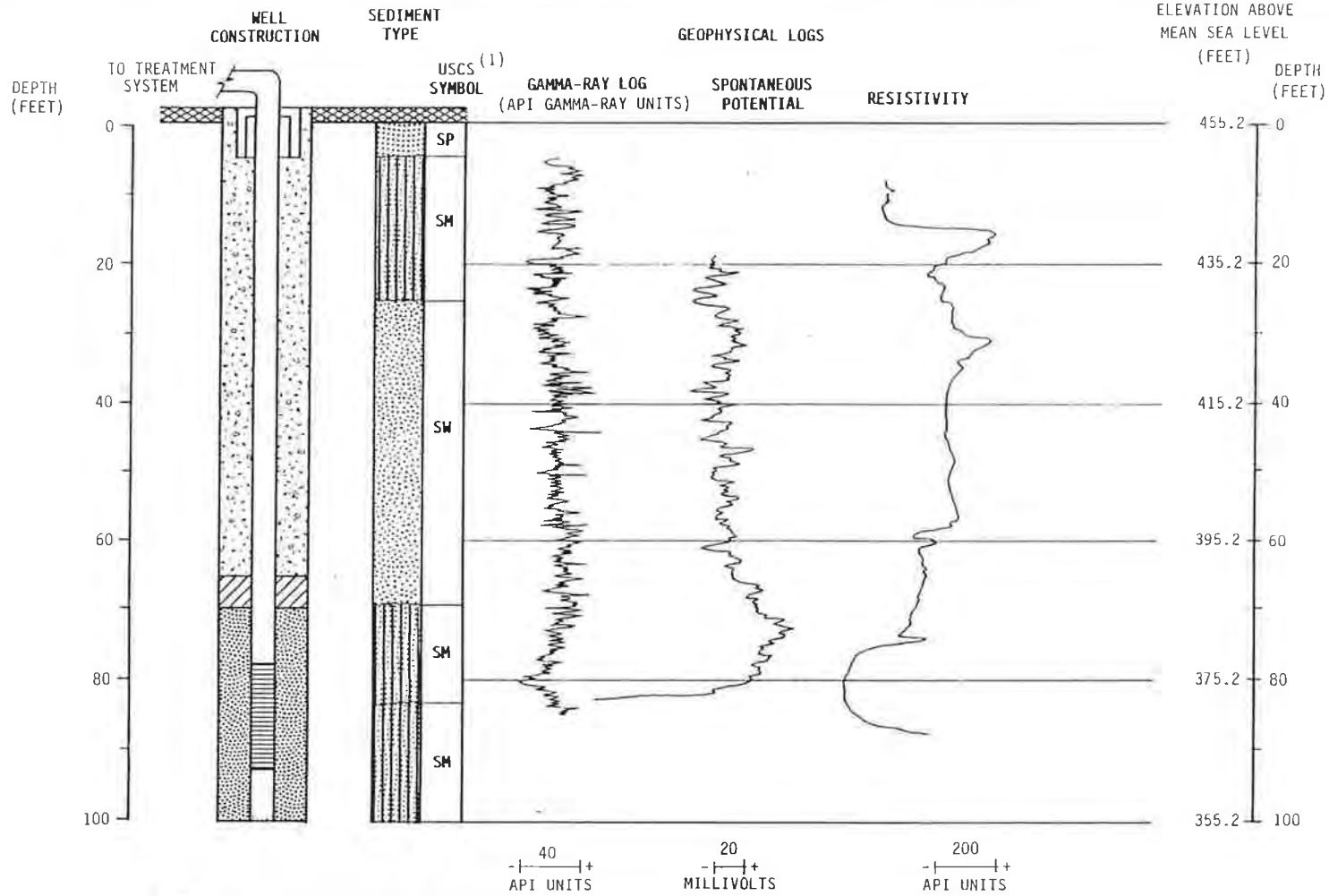
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL RA-4

FIGURE A.6

WJ007901



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

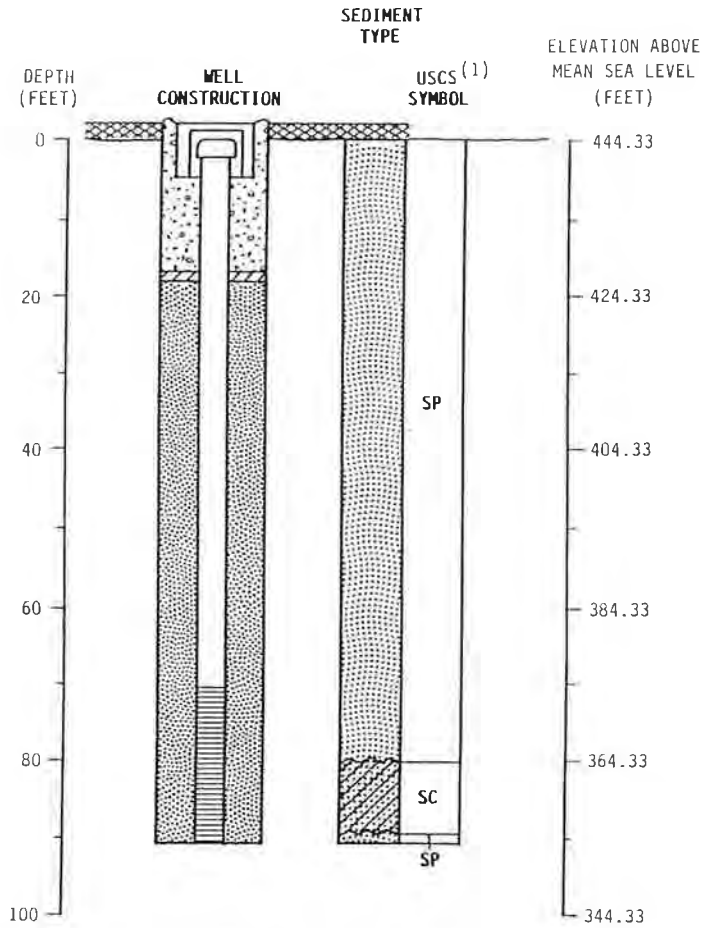
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL RA-5

FIGURE A.7

WJ007902



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

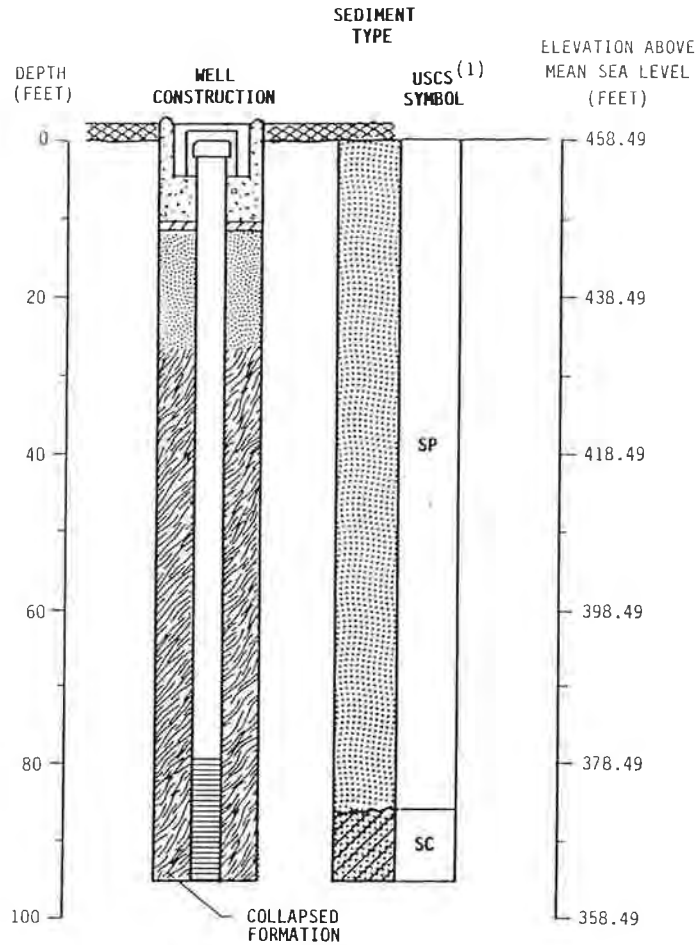
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-1

FIGURE A.8

WJ007903



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

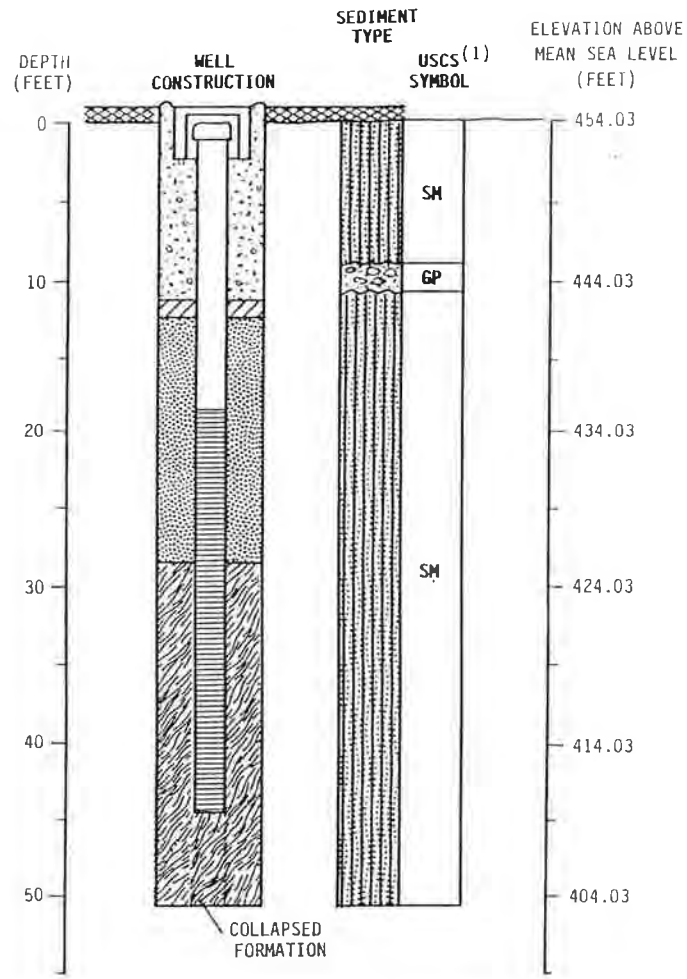
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-3

FIGURE A.9

W10079O4



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

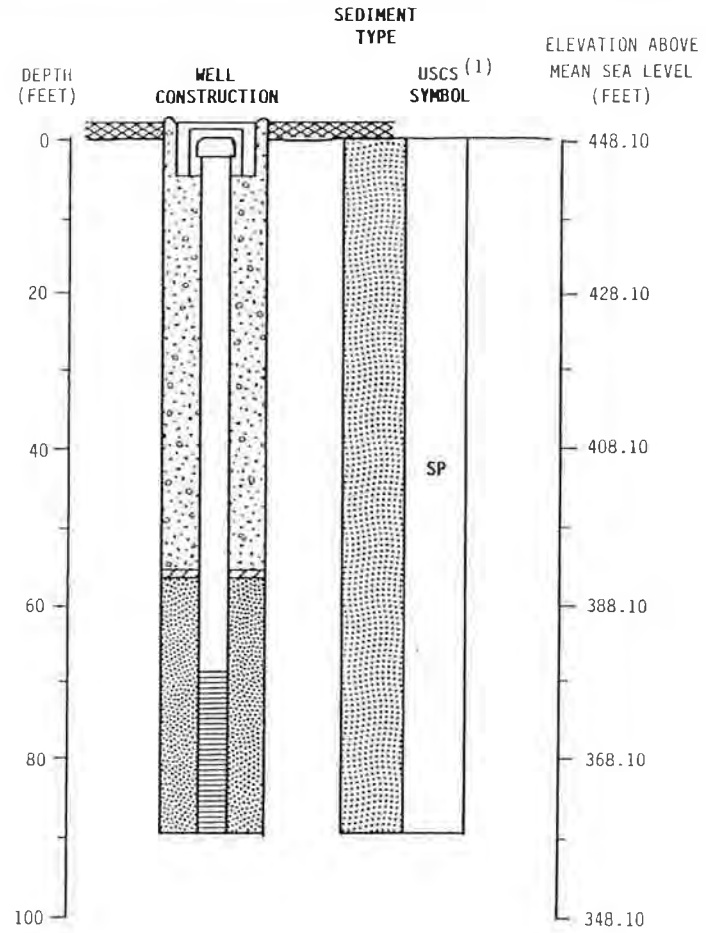
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-5

FIGURE A.10

WJ007905



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

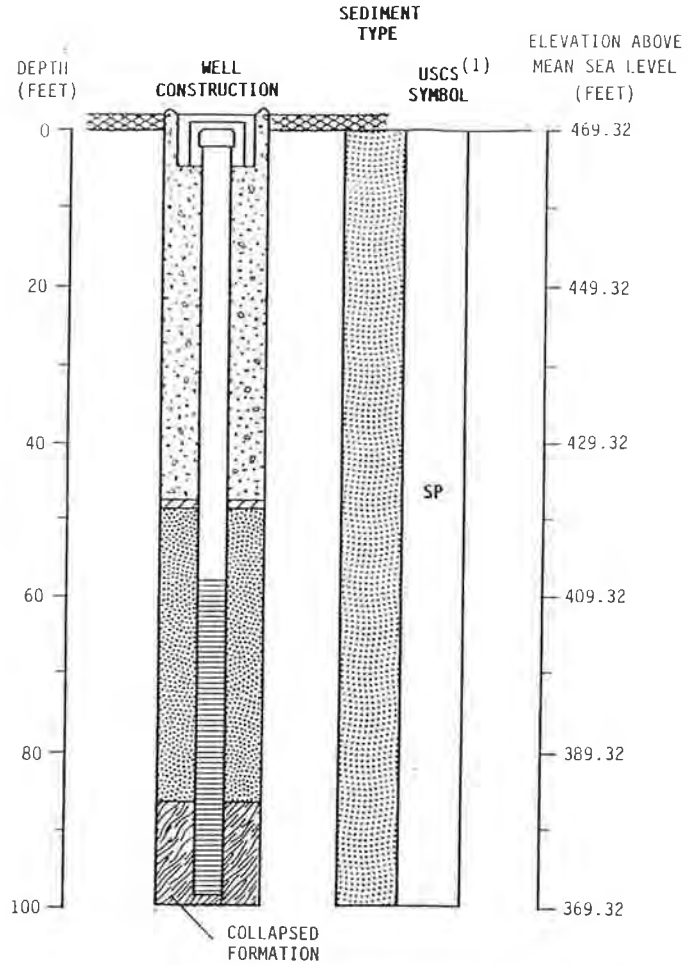
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-6

FIGURE A.11

W10079O6



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

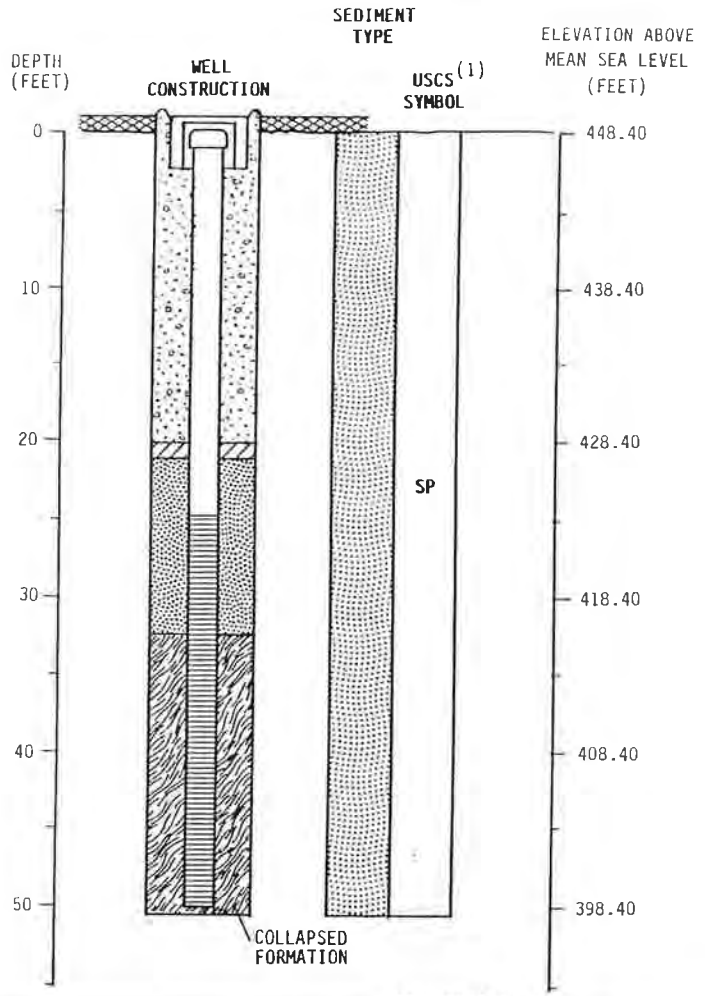
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-7

FIGURE A.12

WJ007907



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

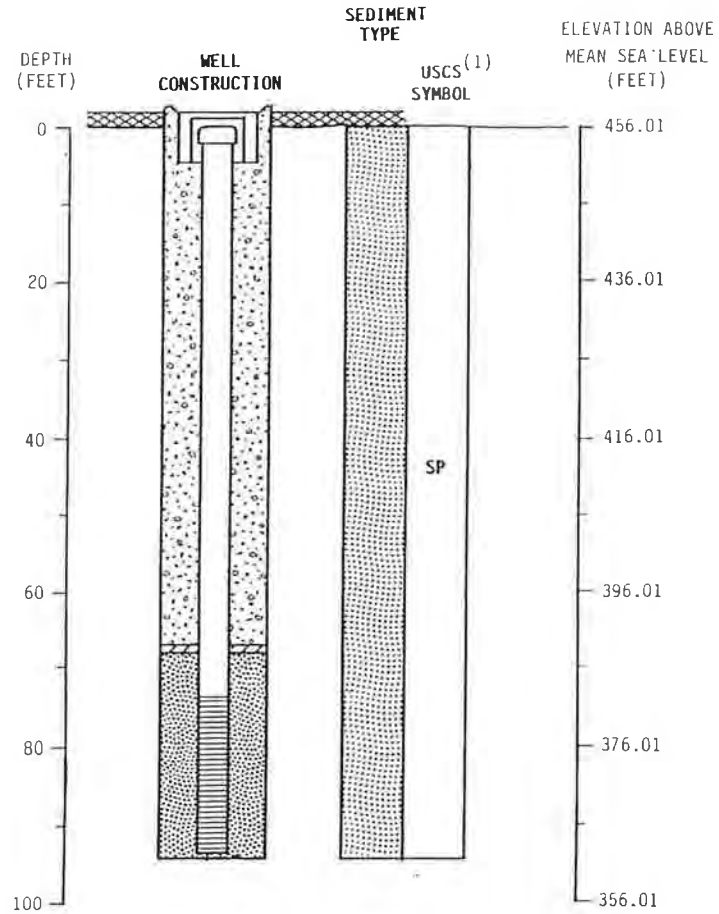
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-8

FIGURE A.13

WJ007908



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

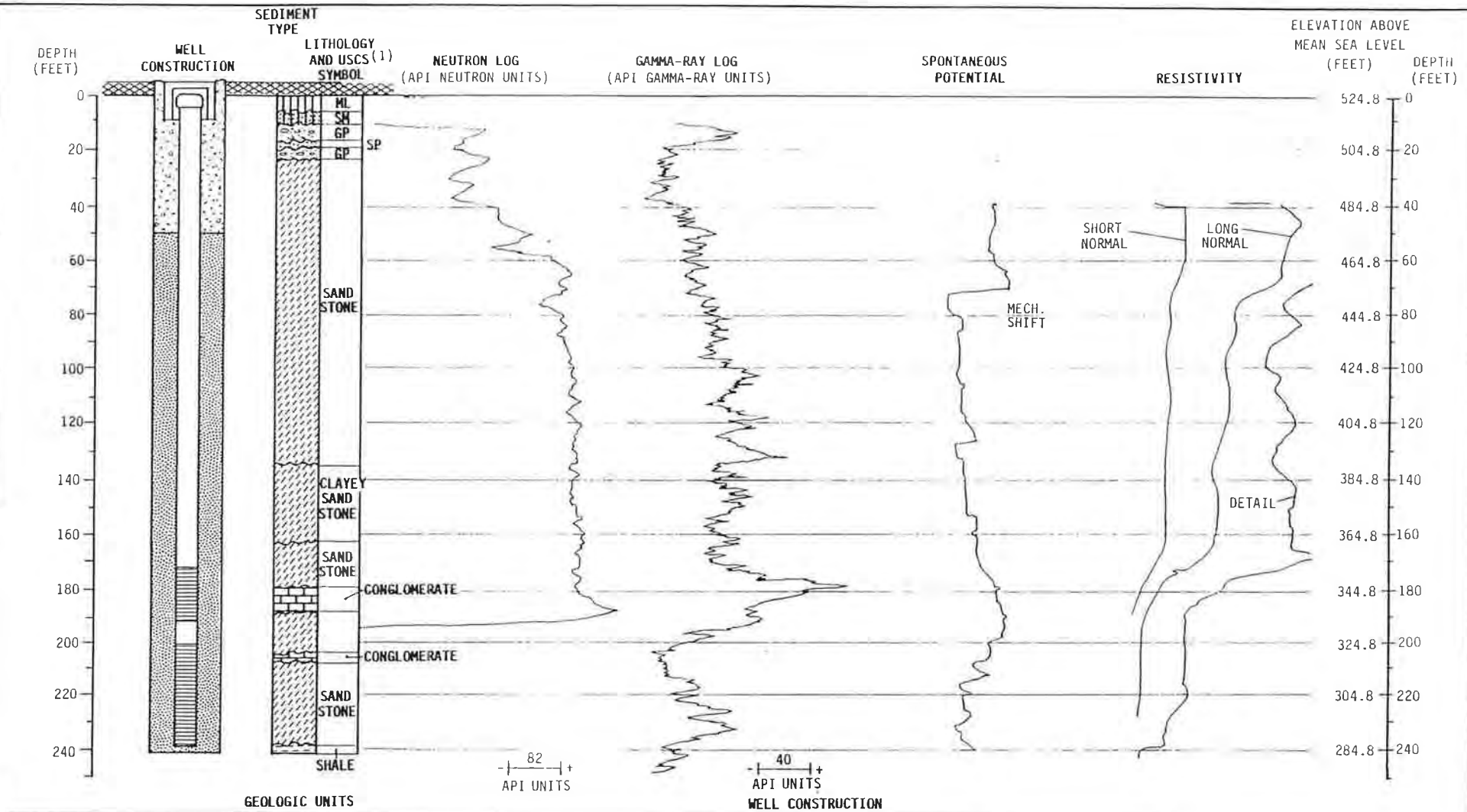
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL DH-9

FIGURE A.14

WJ007909



PAVEMENT
SAND (SW)
SAND (SP)
SAND, SILTY (SM)
SAND, CLAYEY (SC)
CLAY, SILTY (CL)
SILT (ML)
GRAVEL (GW)
GRAVEL (GM)
GRAVEL (GP)
GRAVEL, CLAYEY (GC)
LOAM
SHALE
CEMENTED CONGLOMERATE
SANDSTONE
APPROXIMATE LOCATION OF GEOLOGIC CONTACT
CEMENT PAD
CEMENT GROUT
CEMENT/BENTONITE GROUT
BENTONITE SEAL
GRAVEL PACK
LOCKING PROTECTIVE CASING
PVC BLANK CASING
PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

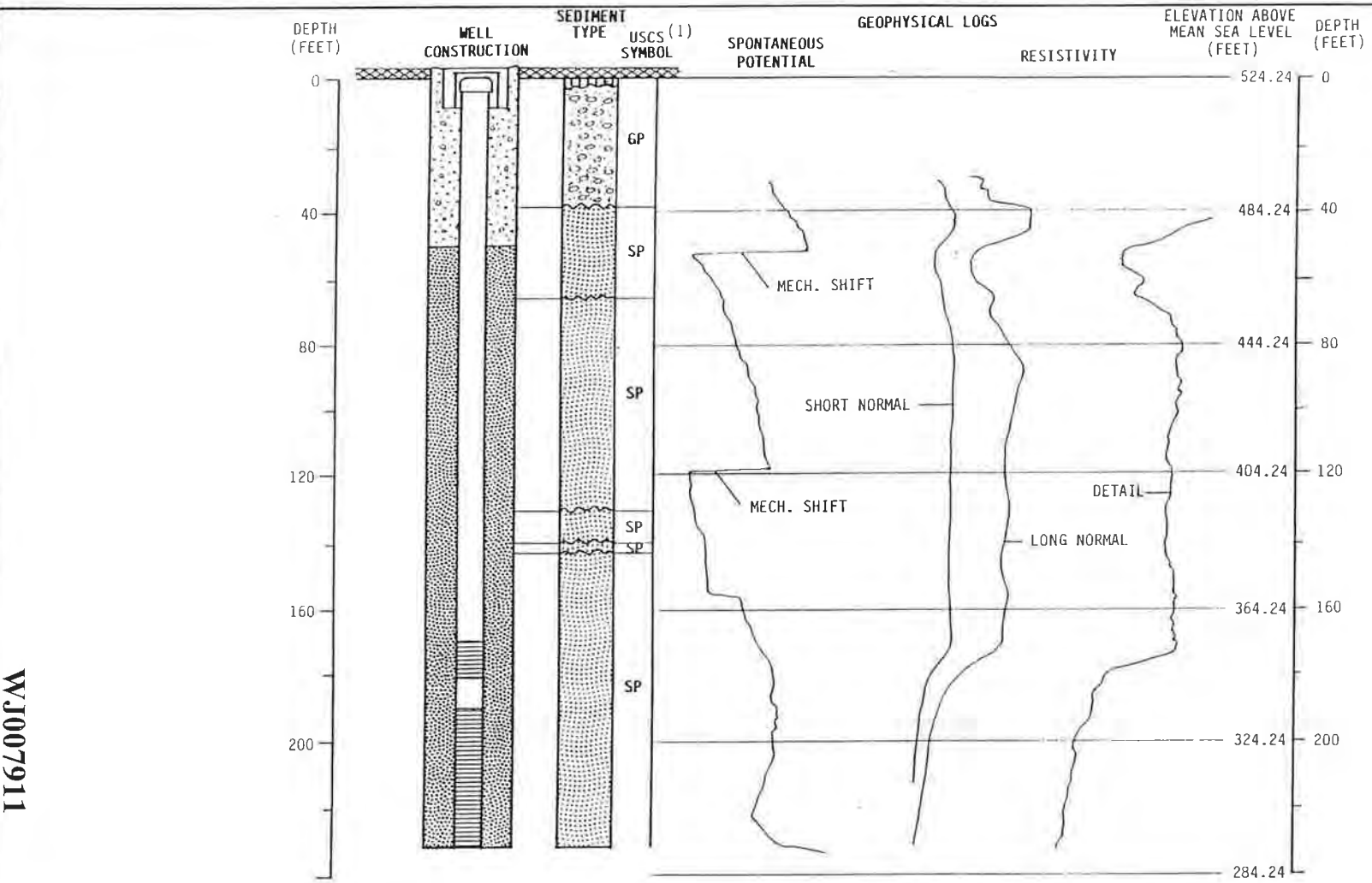
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL M-1

FIGURE A.15

WJ007910



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

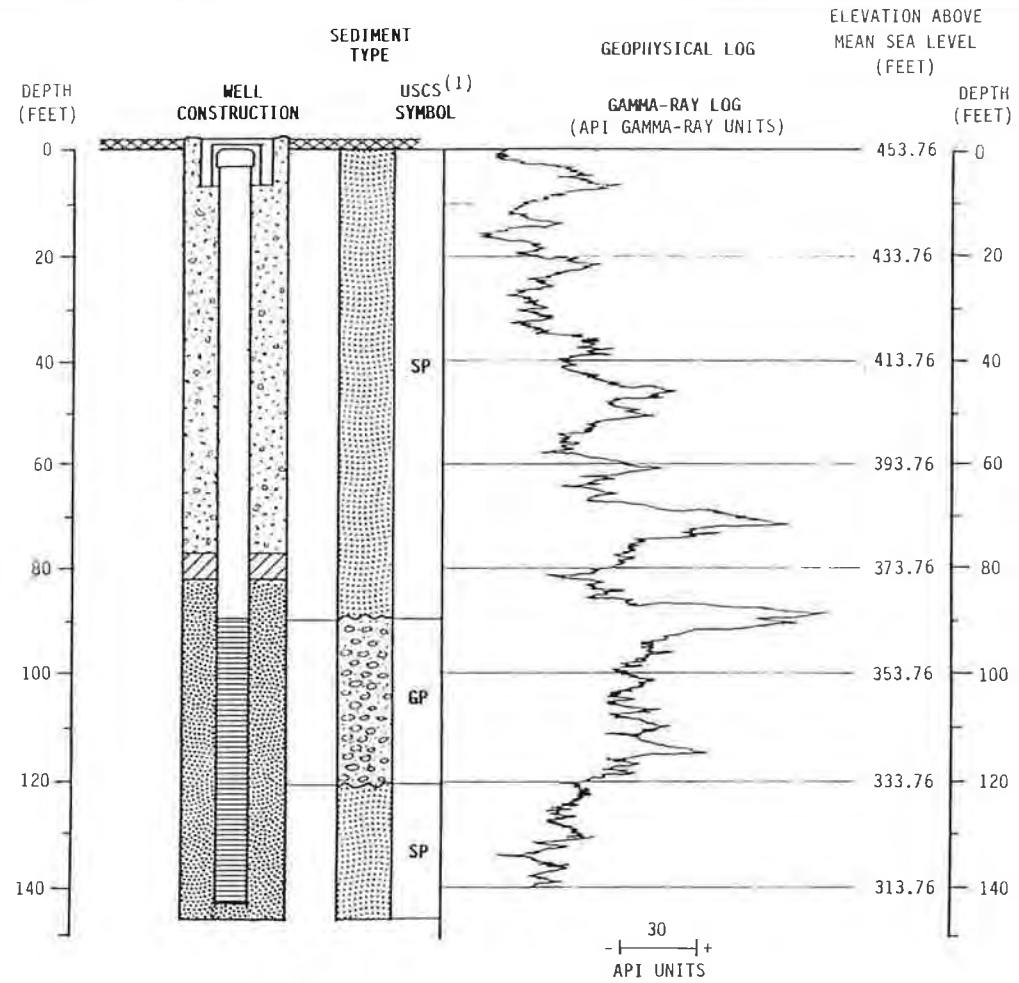
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL M-2

FIGURE A.16

WJ007911



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

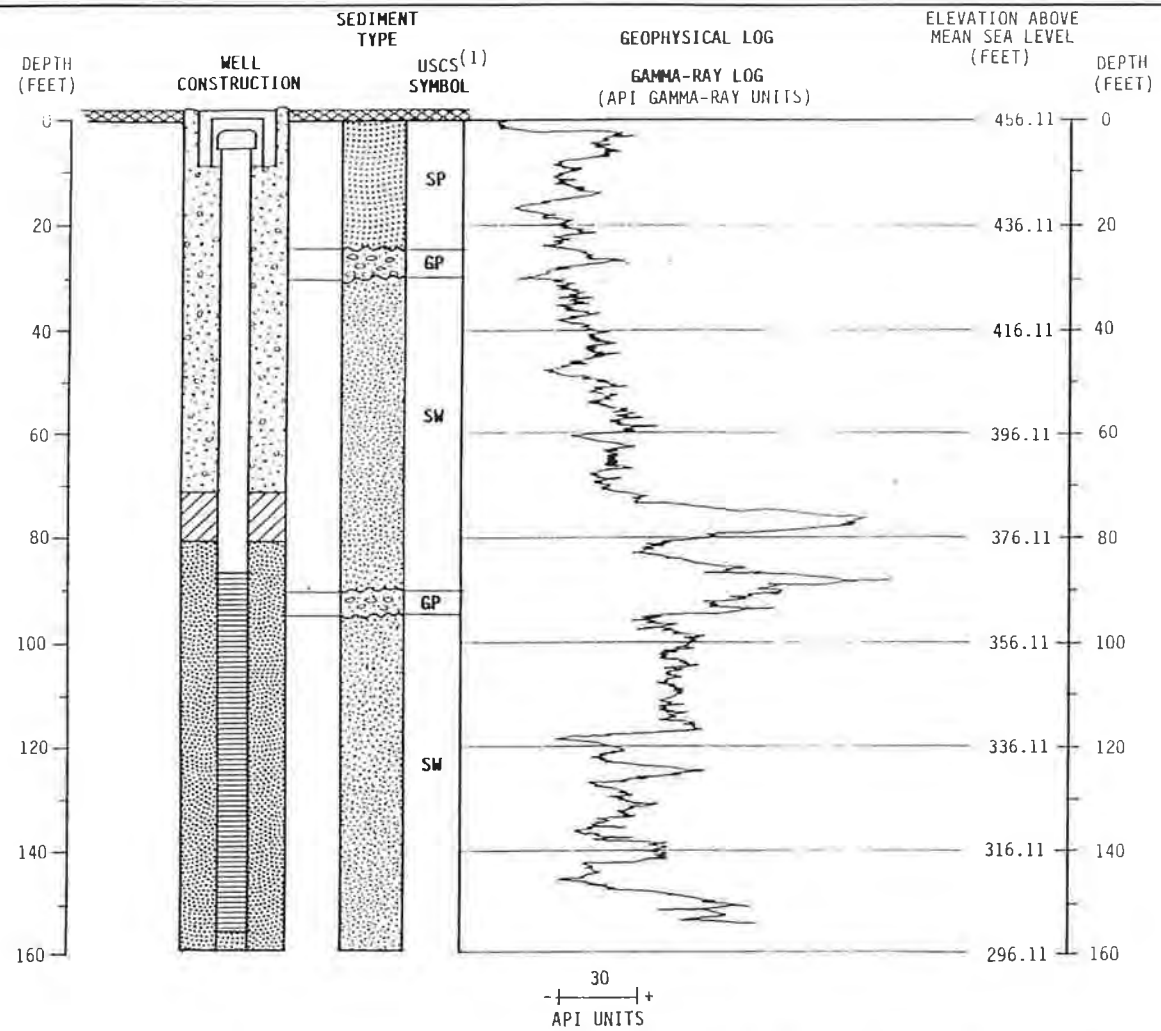
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL OB-1

FIGURE A.17

WJ007912



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

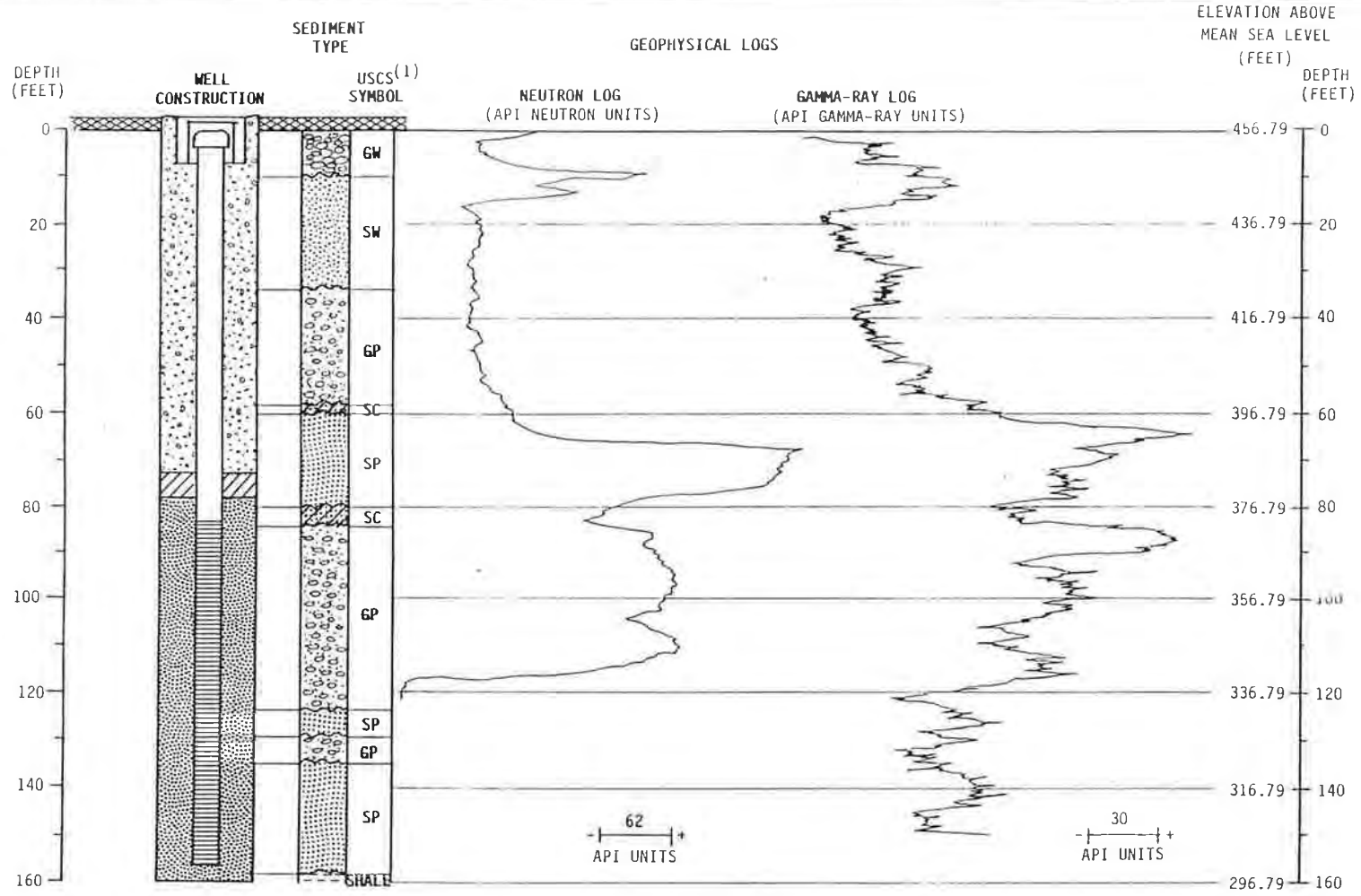
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL OB-2

FIGURE A.18

WJ007913



WJ007914

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

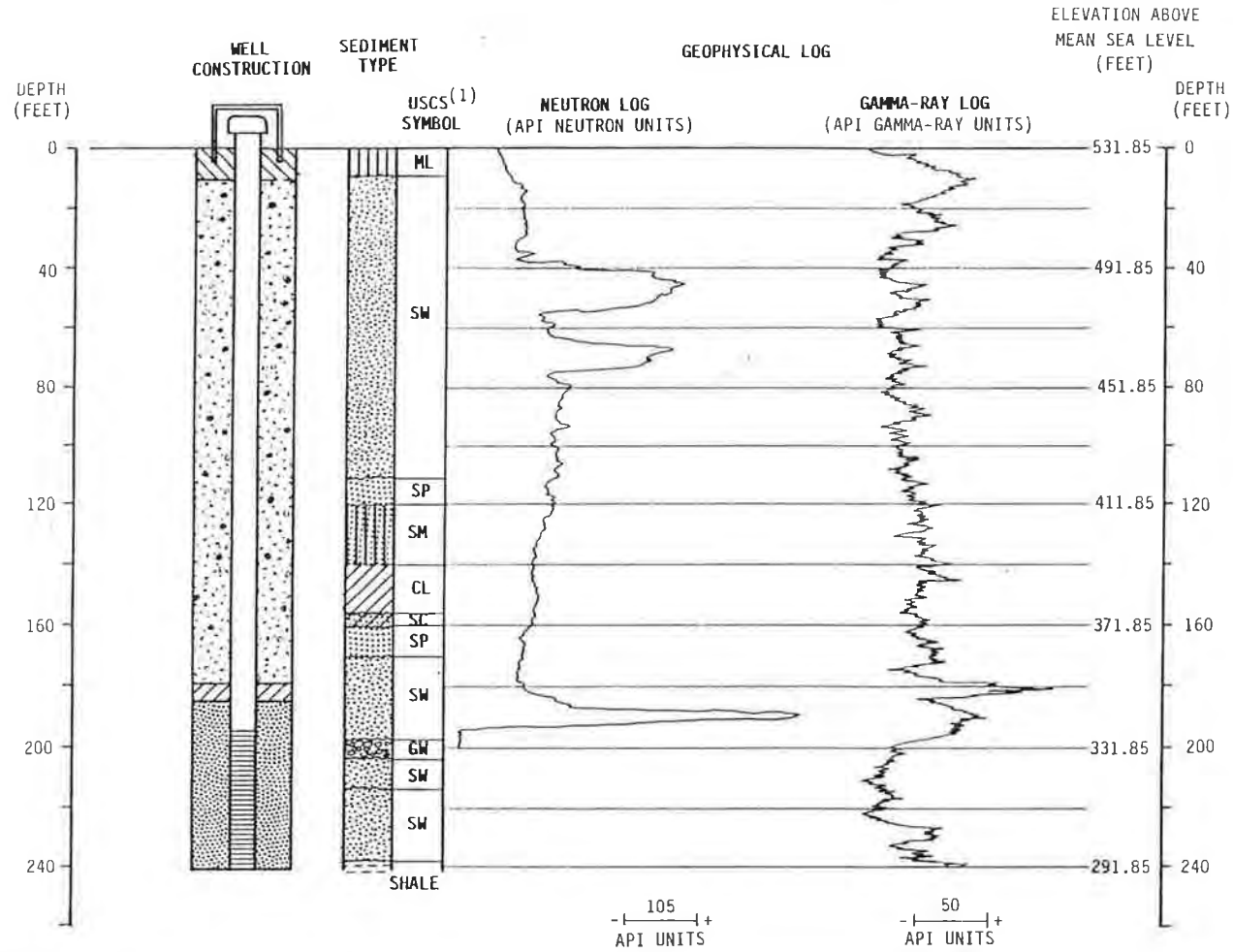
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL OB-3

FIGURE A.19



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

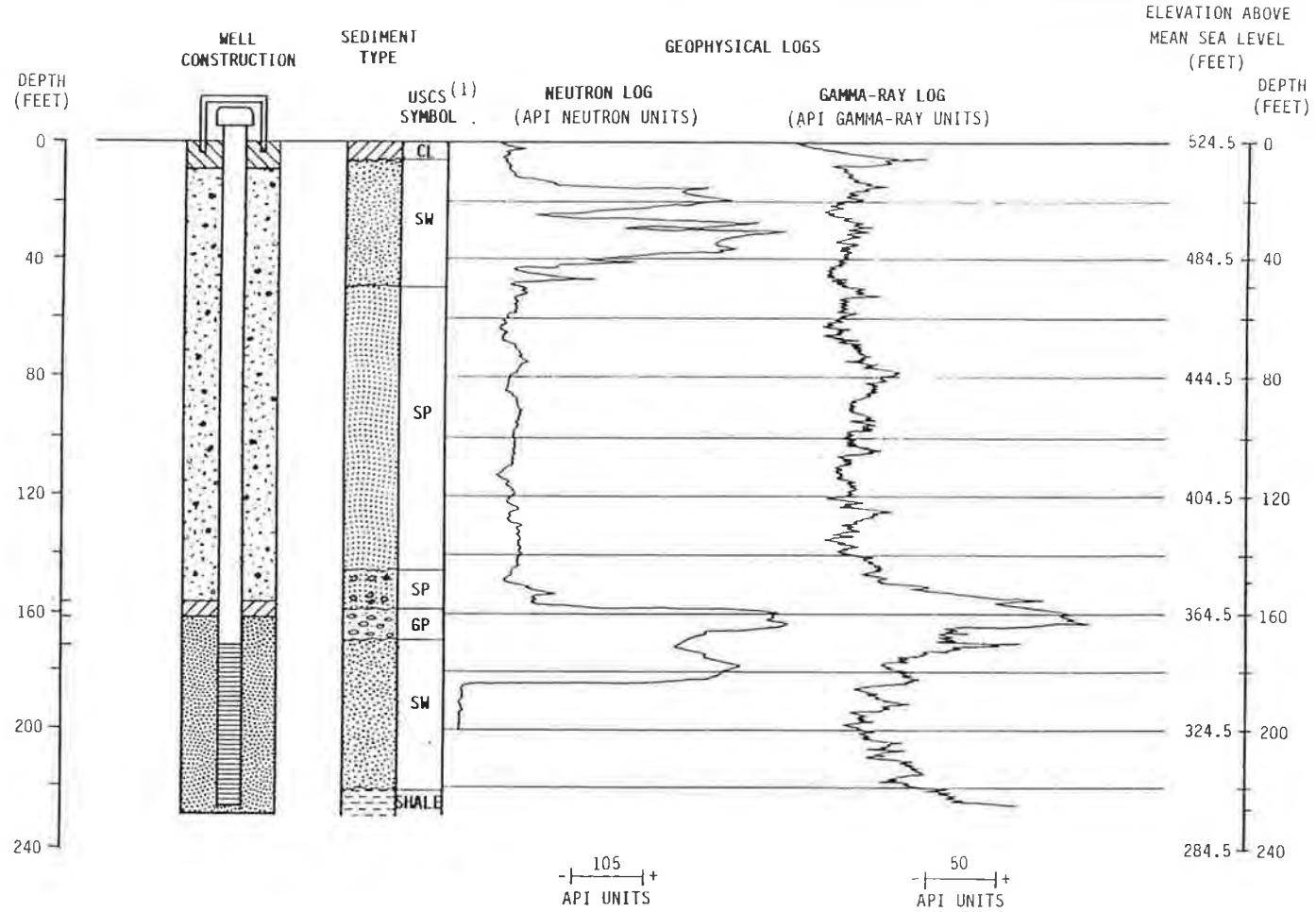
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL AP-1

FIGURE A.20

WJ007915



WJ007916

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

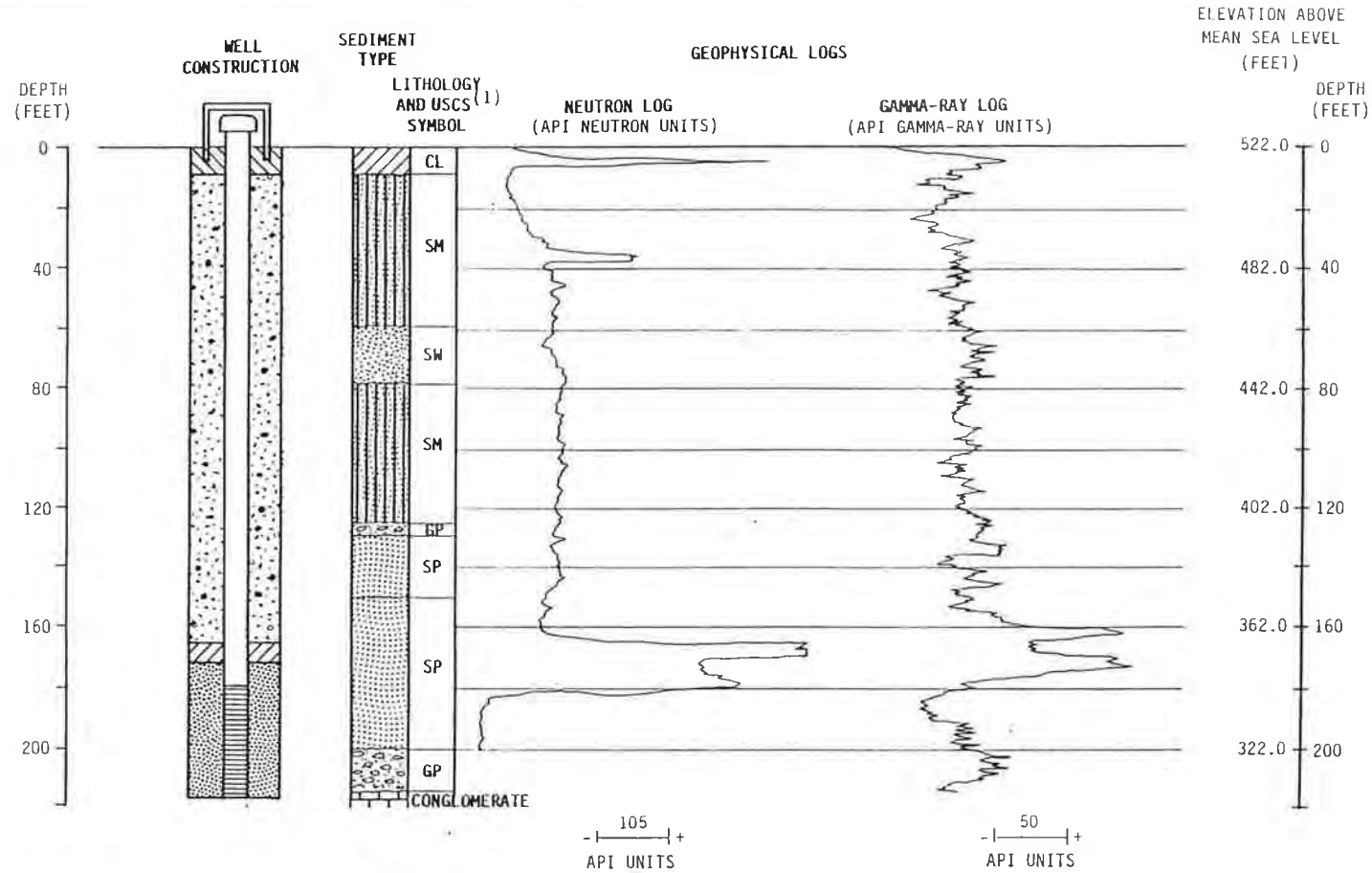
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL AP-2

FIGURE A.21



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

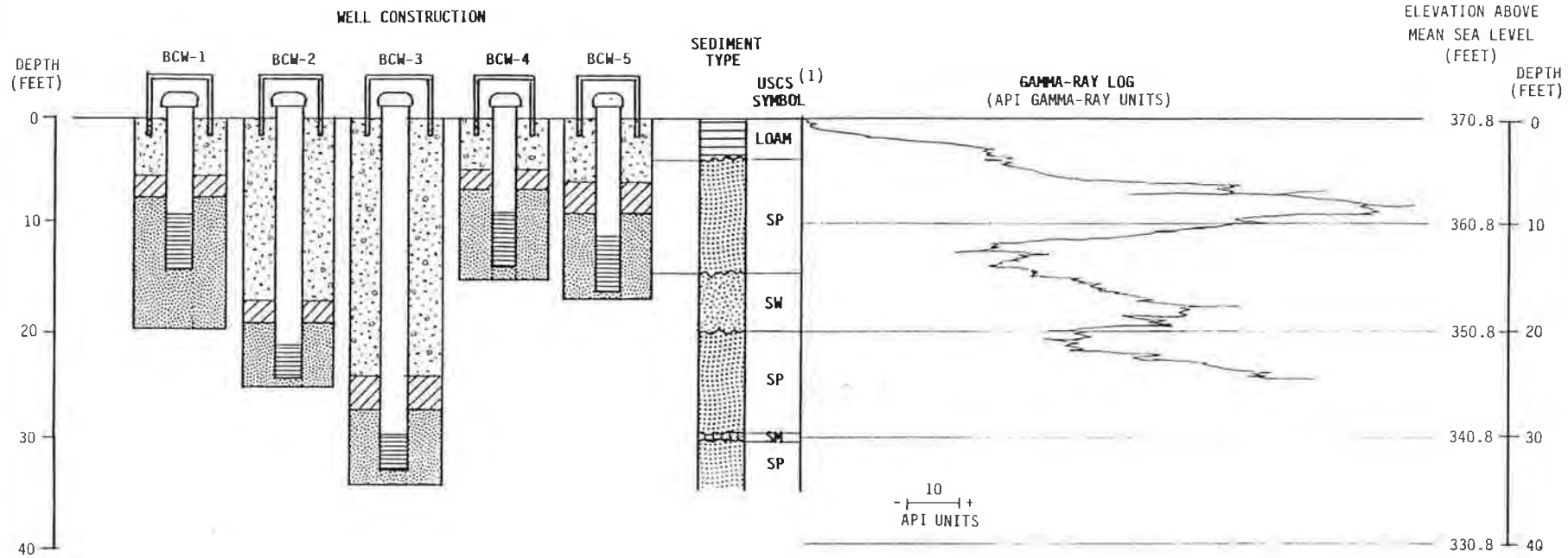
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL AP-3

FIGURE A.22

WJ007917



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

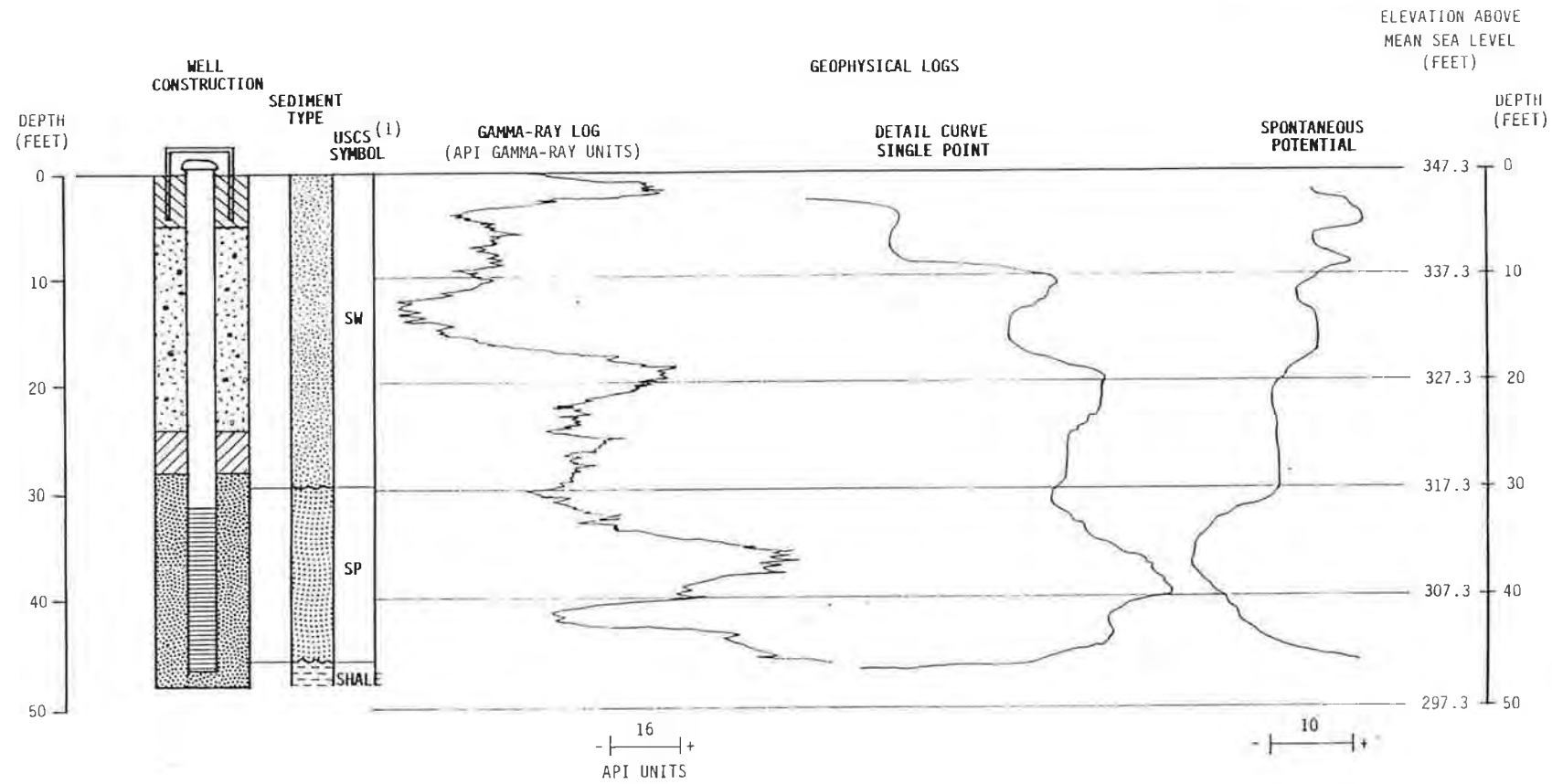
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS BCW-1, BCW-2, BCW-3, BCW-4 and BCW-5

FIGURE A.23

WJ007918



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

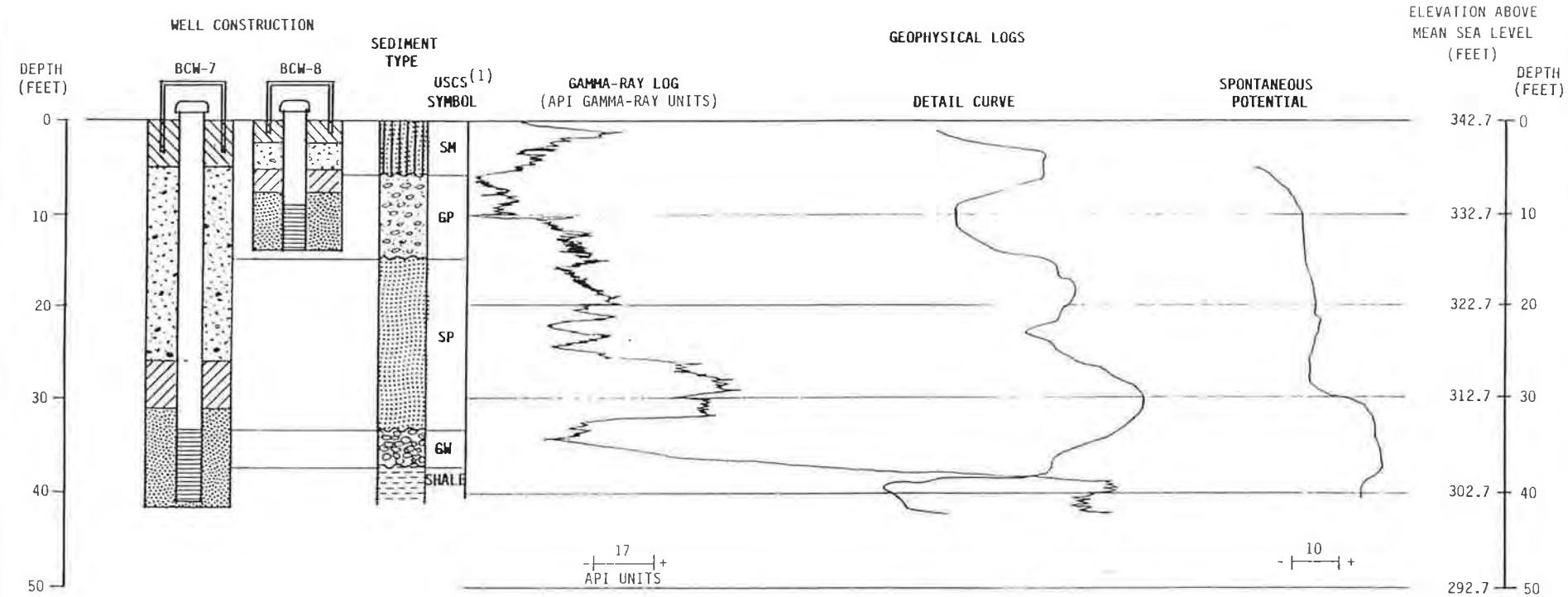
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL BCW-6

FIGURE A.24

WJ00079 19



WJ007920

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

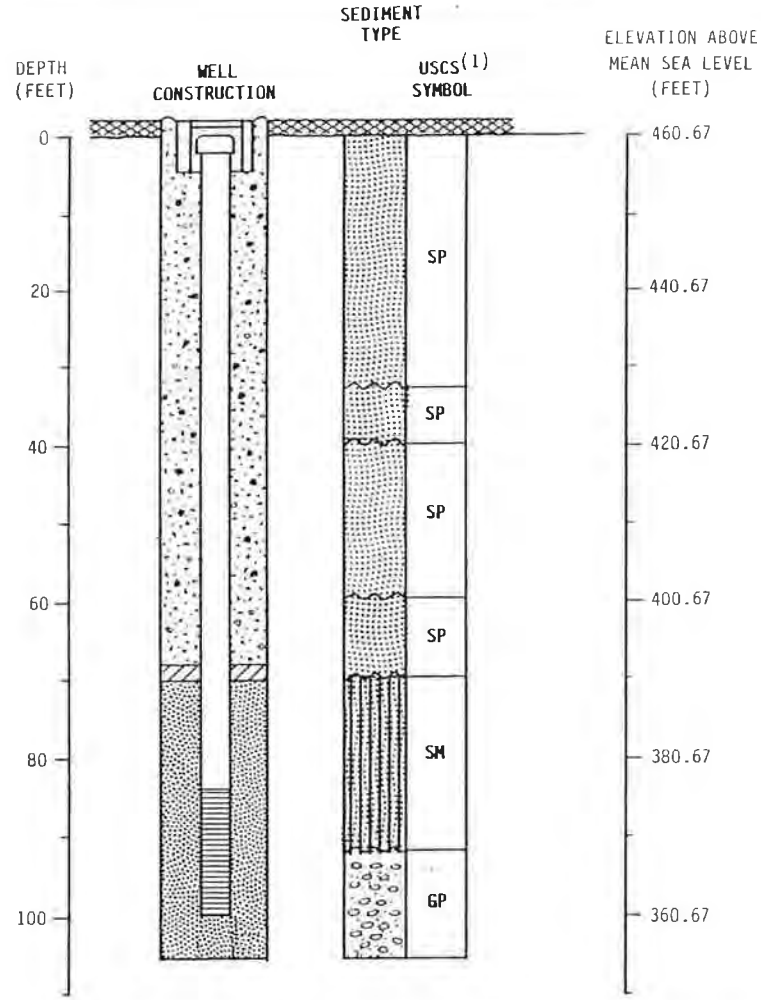
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS BCW-7 AND BCW-8

FIGURE A.25



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

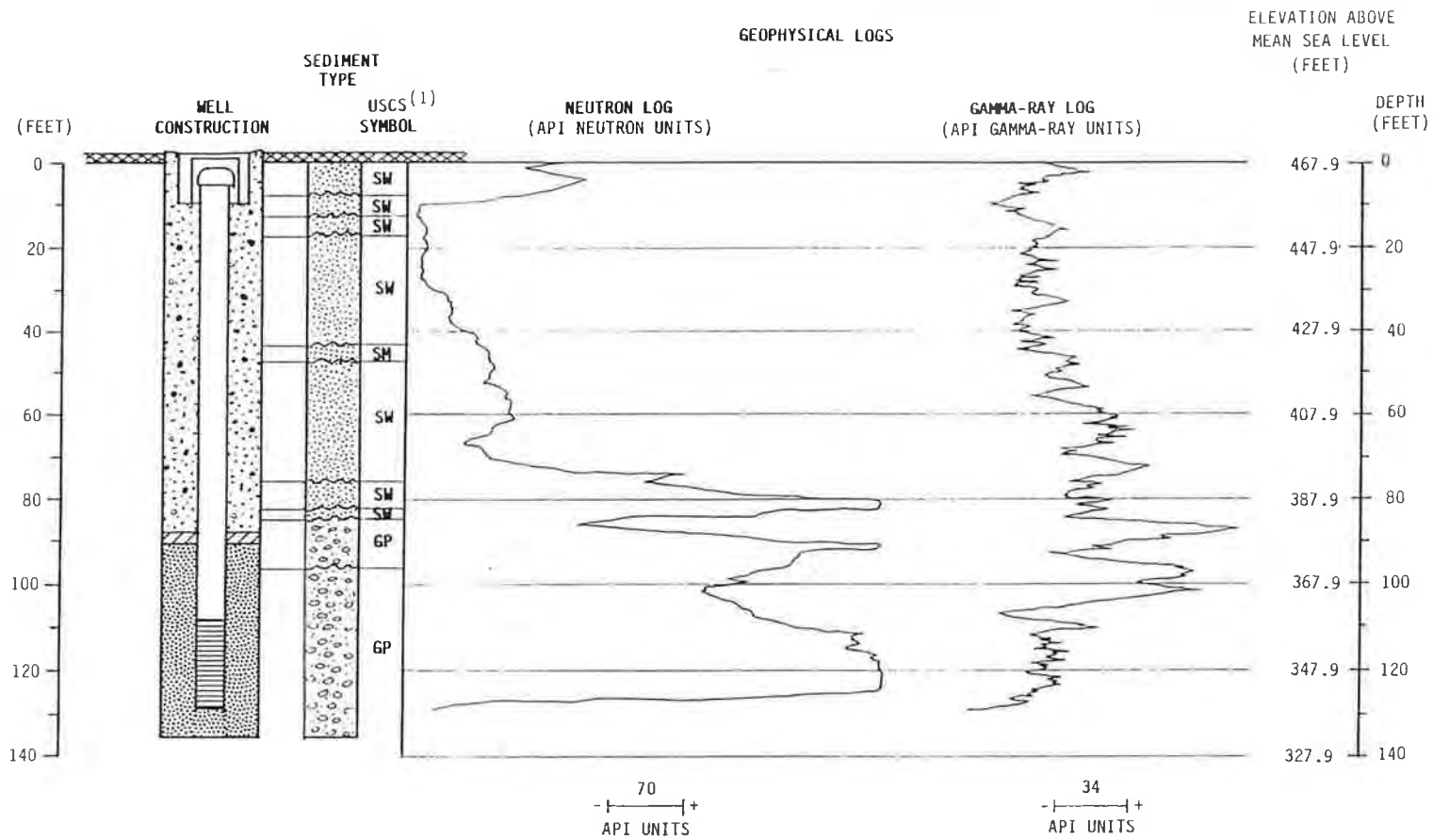
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-10

FIGURE A.26

WJ007921



WJ007922

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

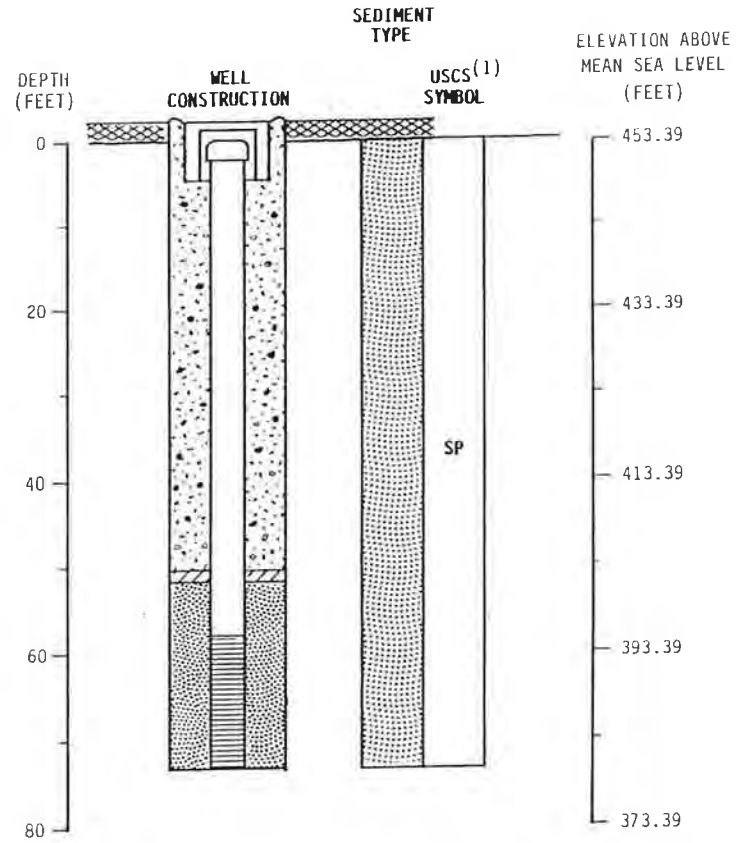
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-11

FIGURE A.27



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

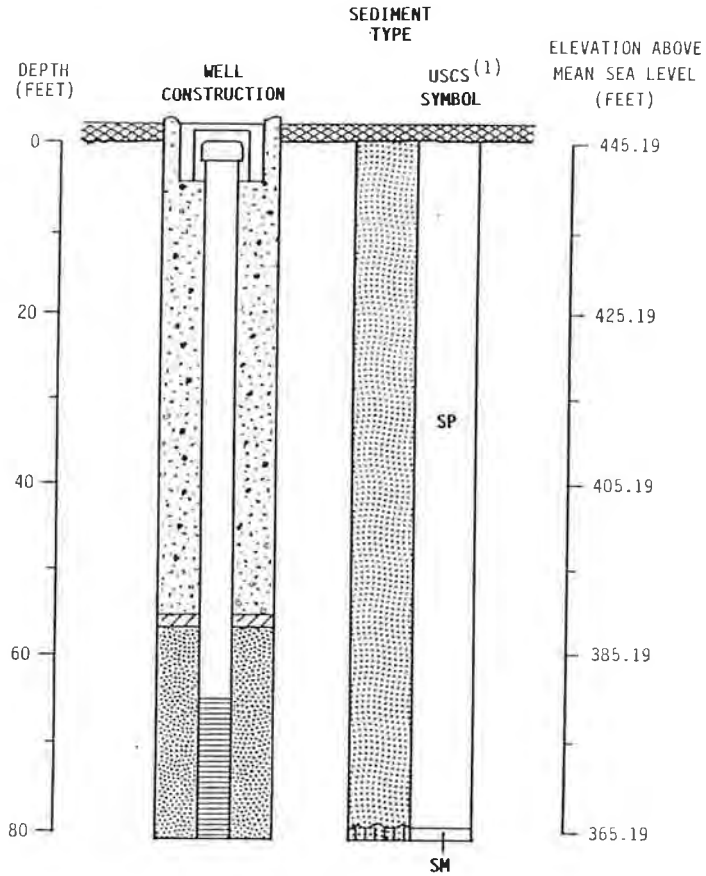
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-12

FIGURE A.28

WJ007923



WJ007924

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

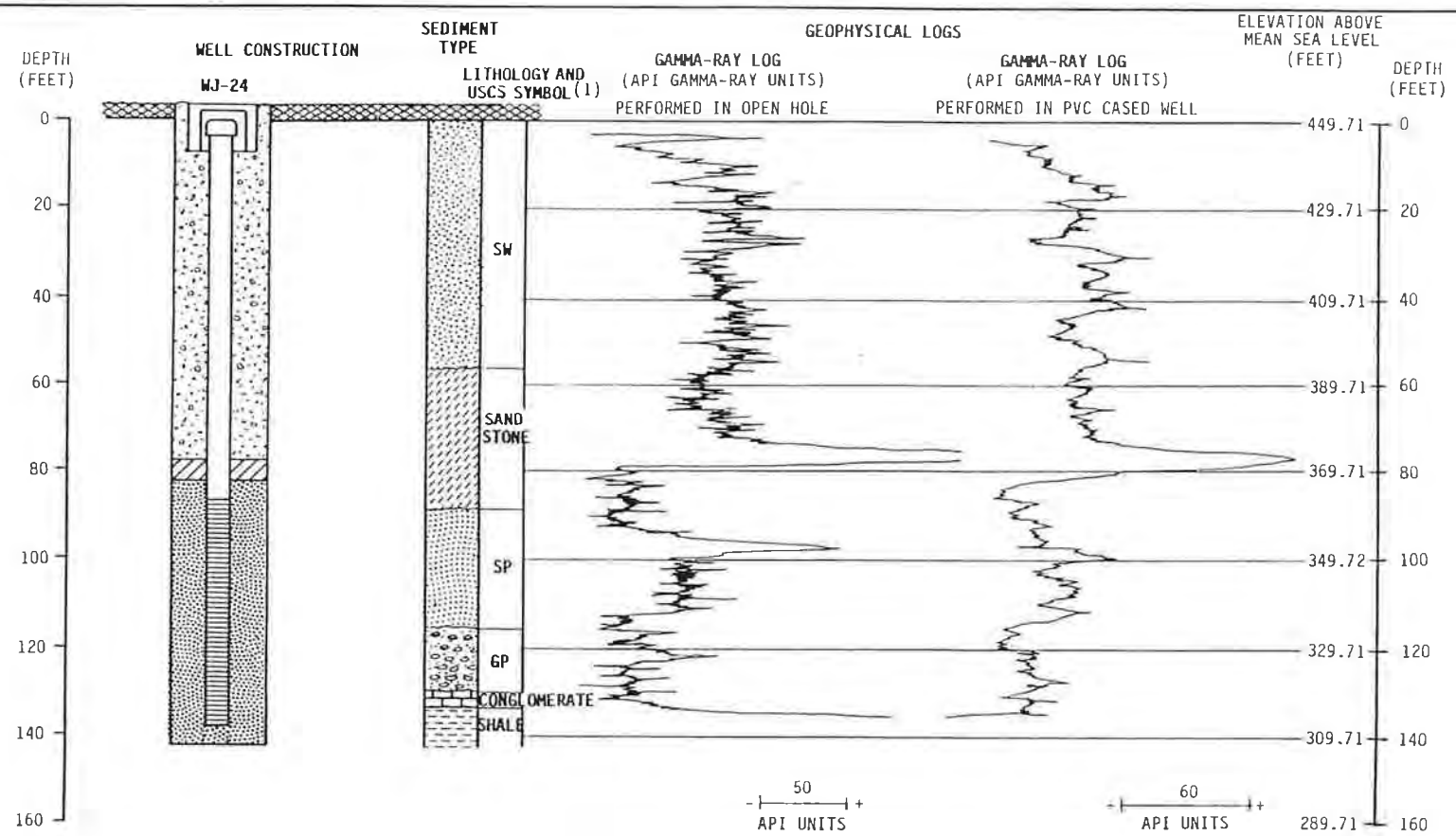
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-13

FIGURE A.29



WJ007925

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

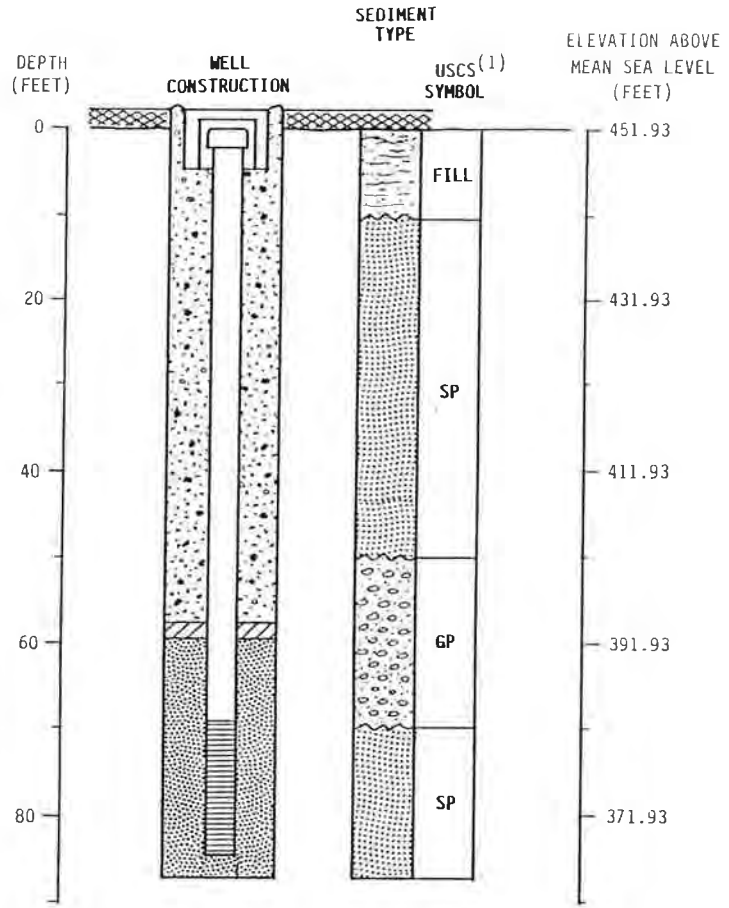
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-14 AND WJ-24

FIGURE A.30



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

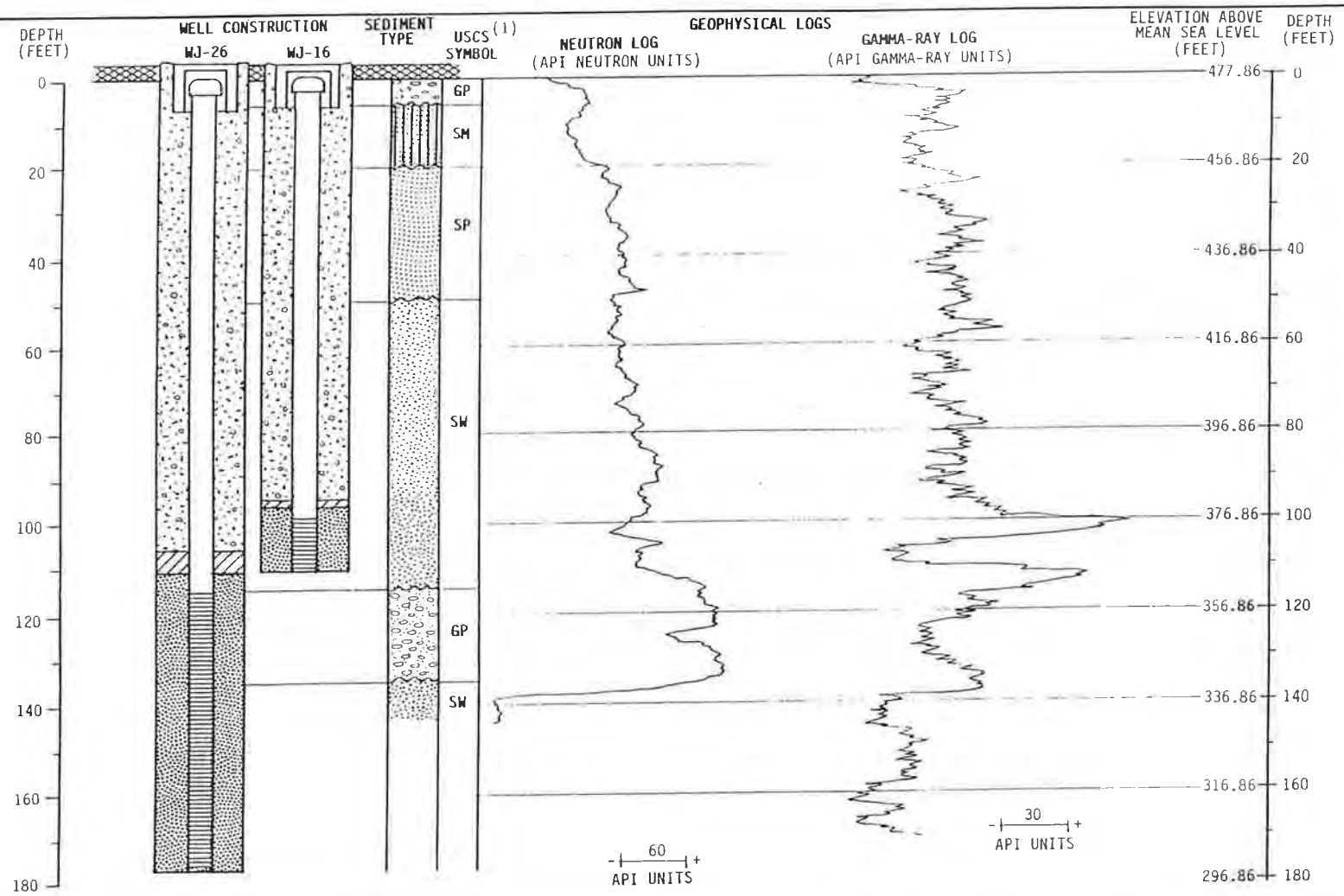
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-15

FIGURE A.31

WJ007926



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND; CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground Water Consultants

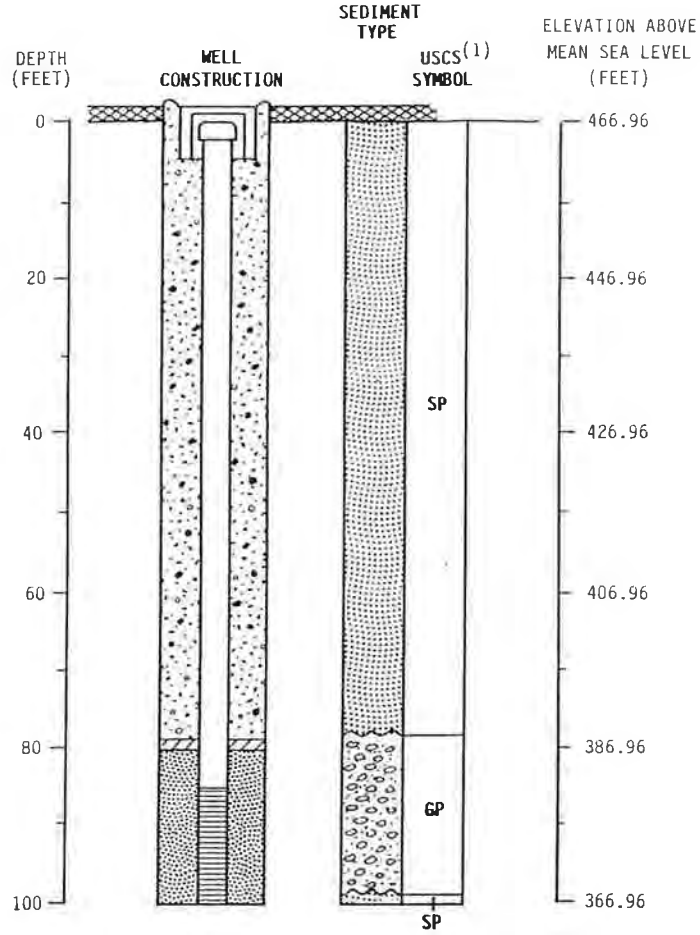
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-16 AND WJ-26

FIGURE A.32

WJ007927



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

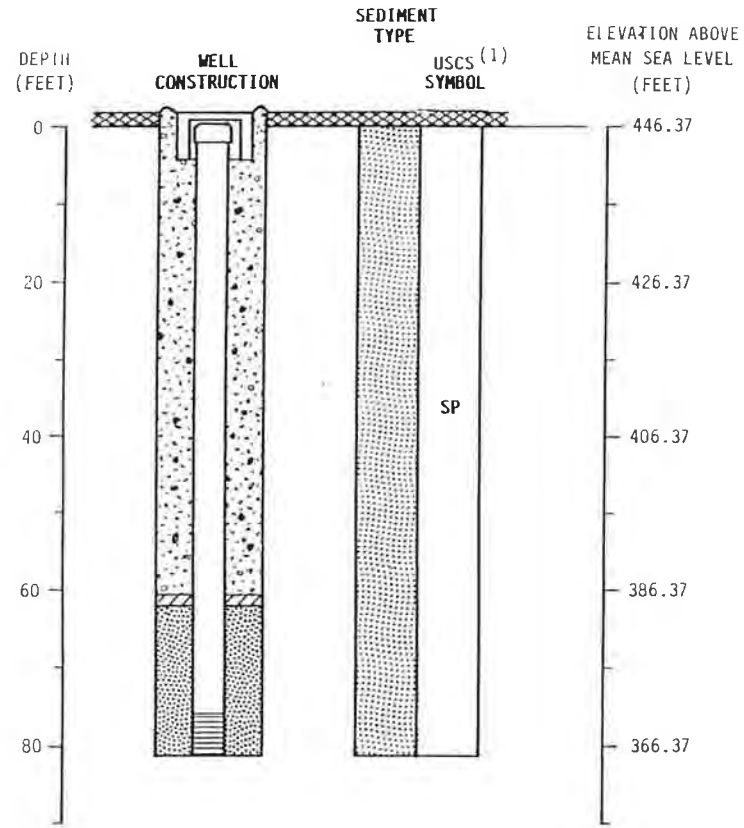
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-17

FIGURE A.33

WJ007928



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

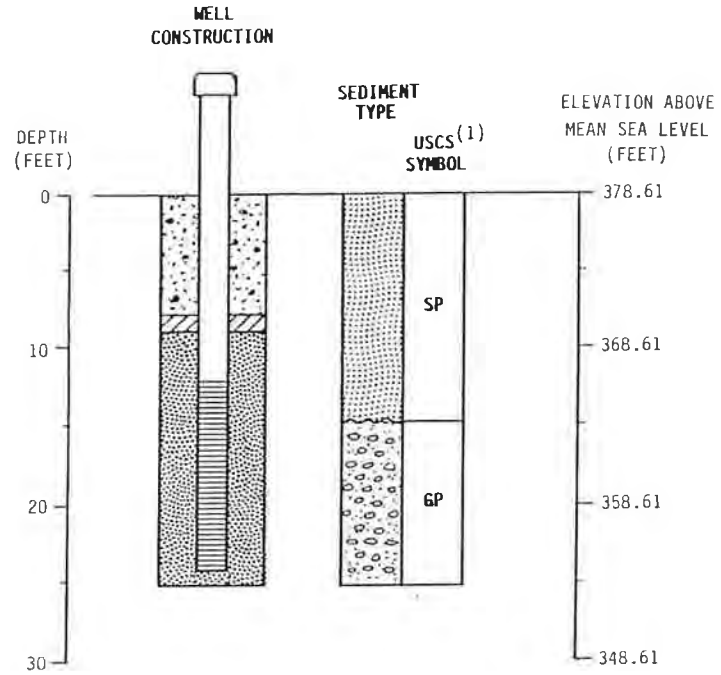
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-18

FIGURE A.34

WJ007929



WJ007930

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

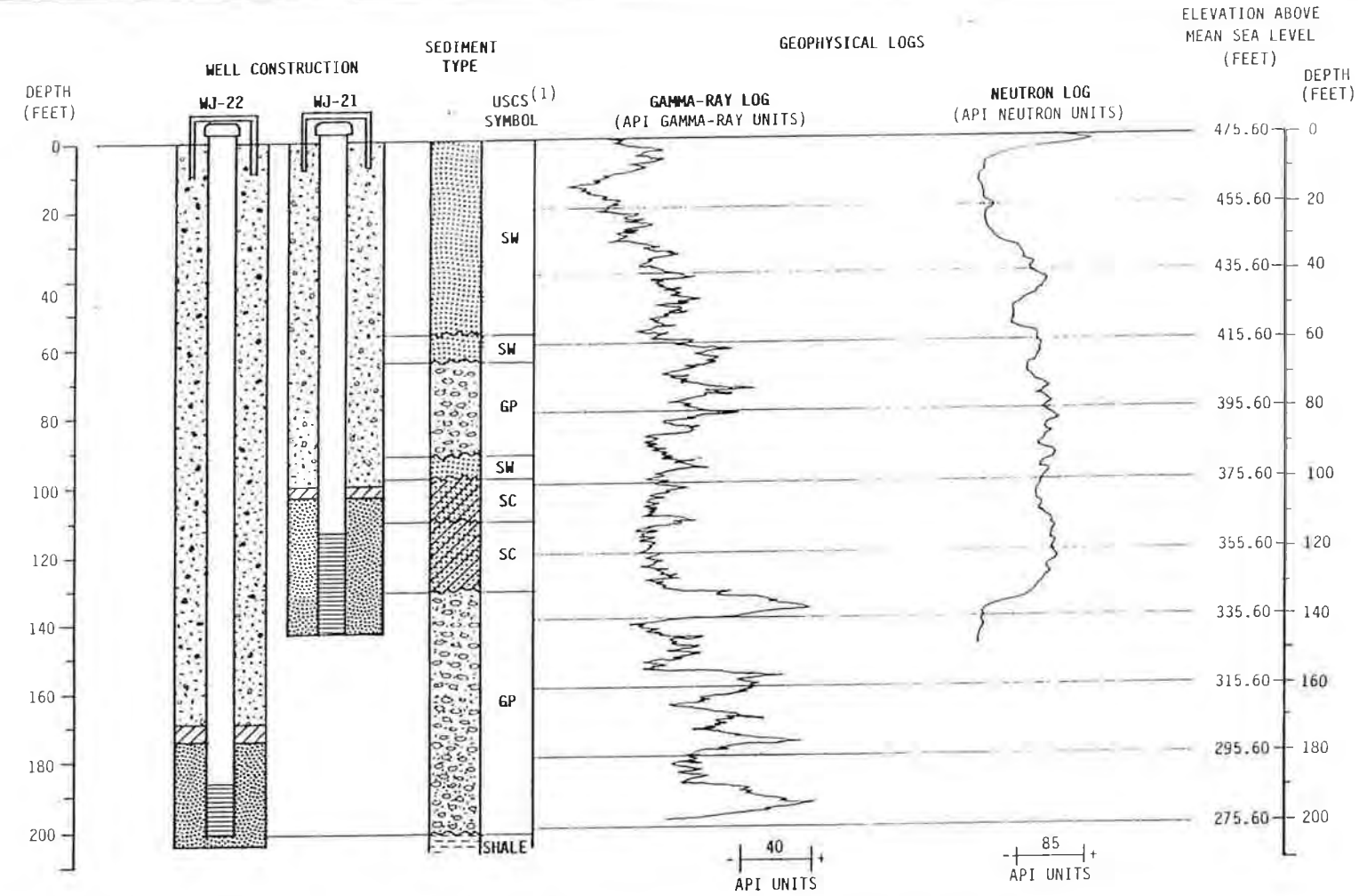
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION AND SEDIMENT TYPE LOG FOR WELL WJ-19

FIGURE A.35



WJ007931

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

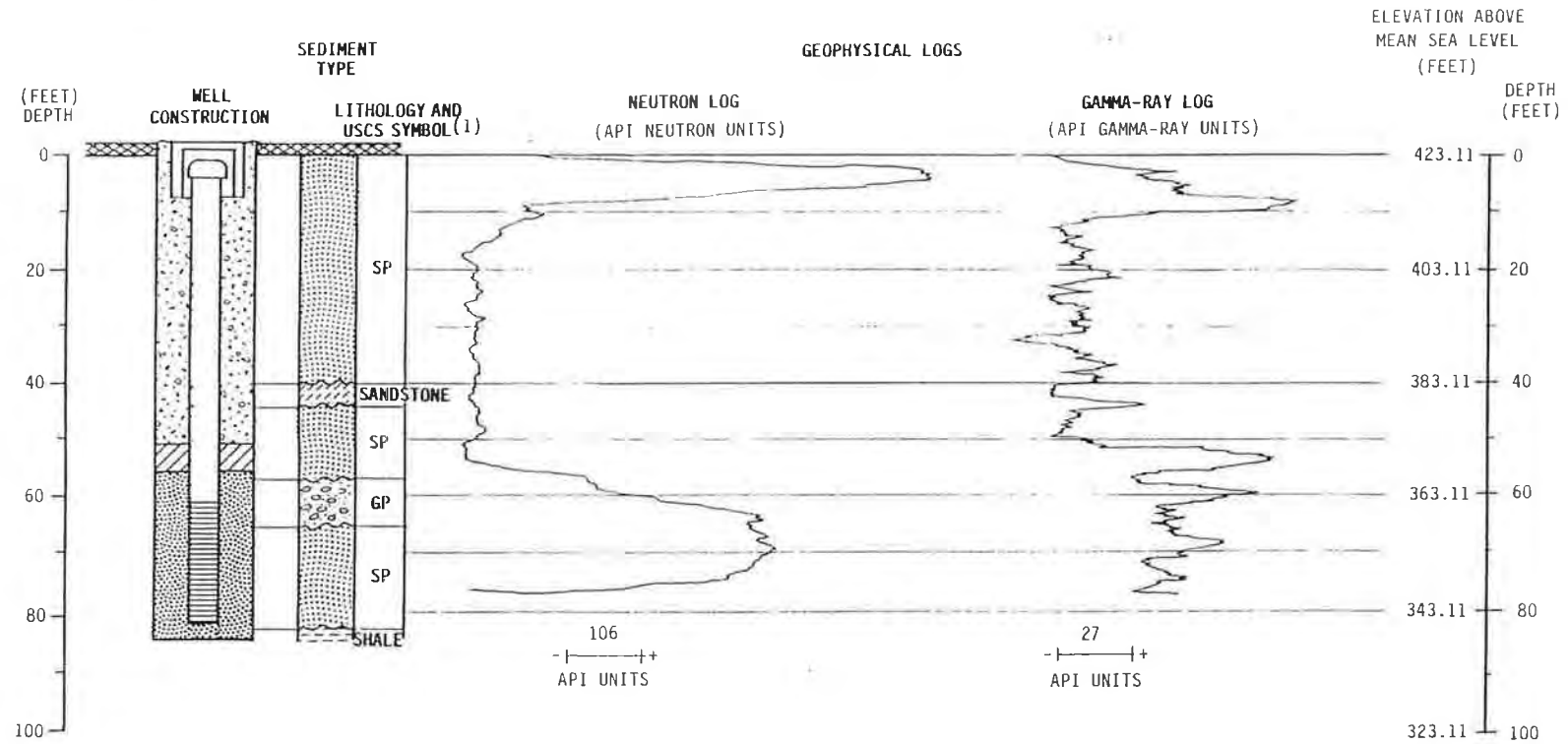
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-21 AND WJ-22

FIGURE A.36



WJ007932

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

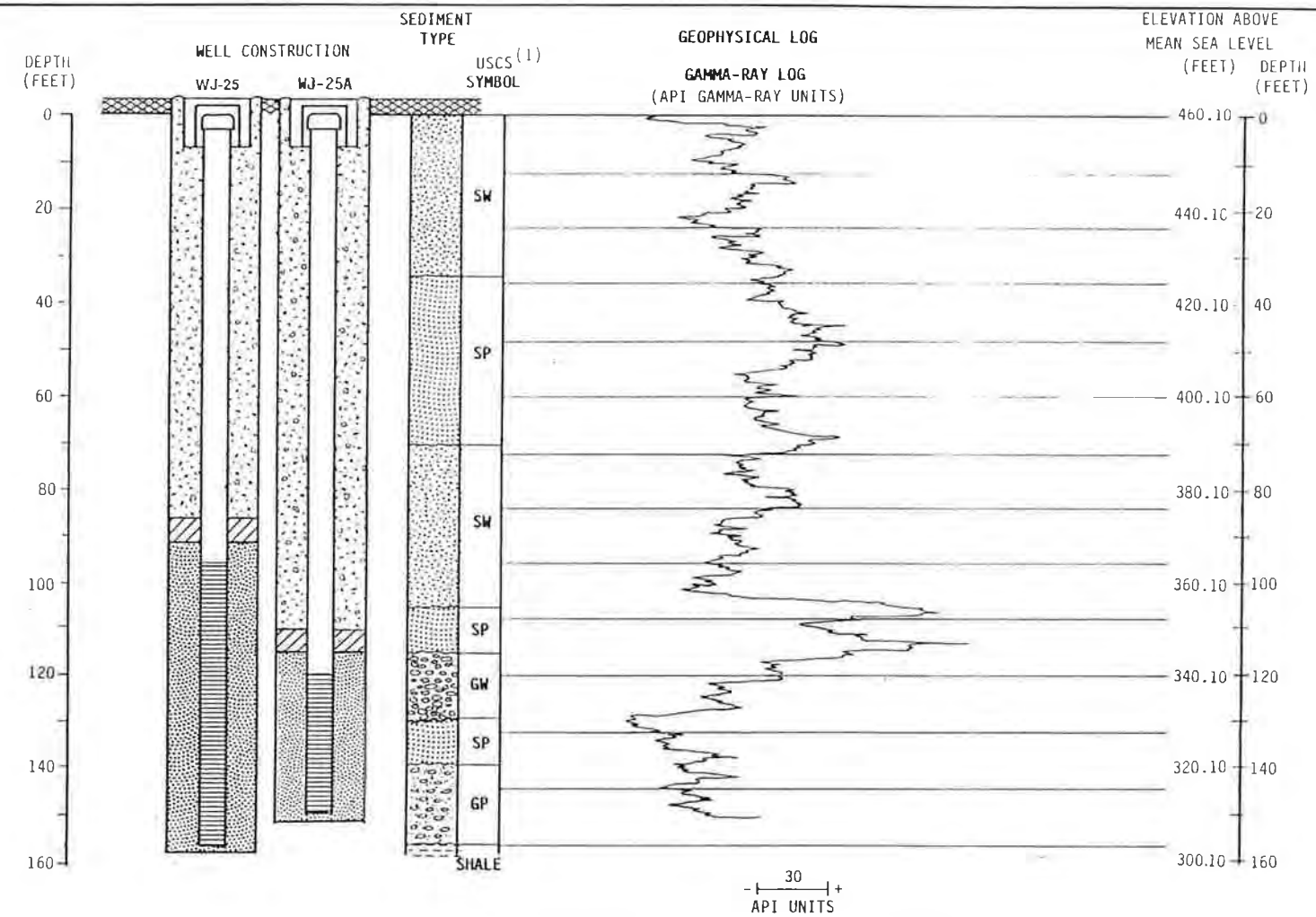
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-23

FIGURE A.37



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

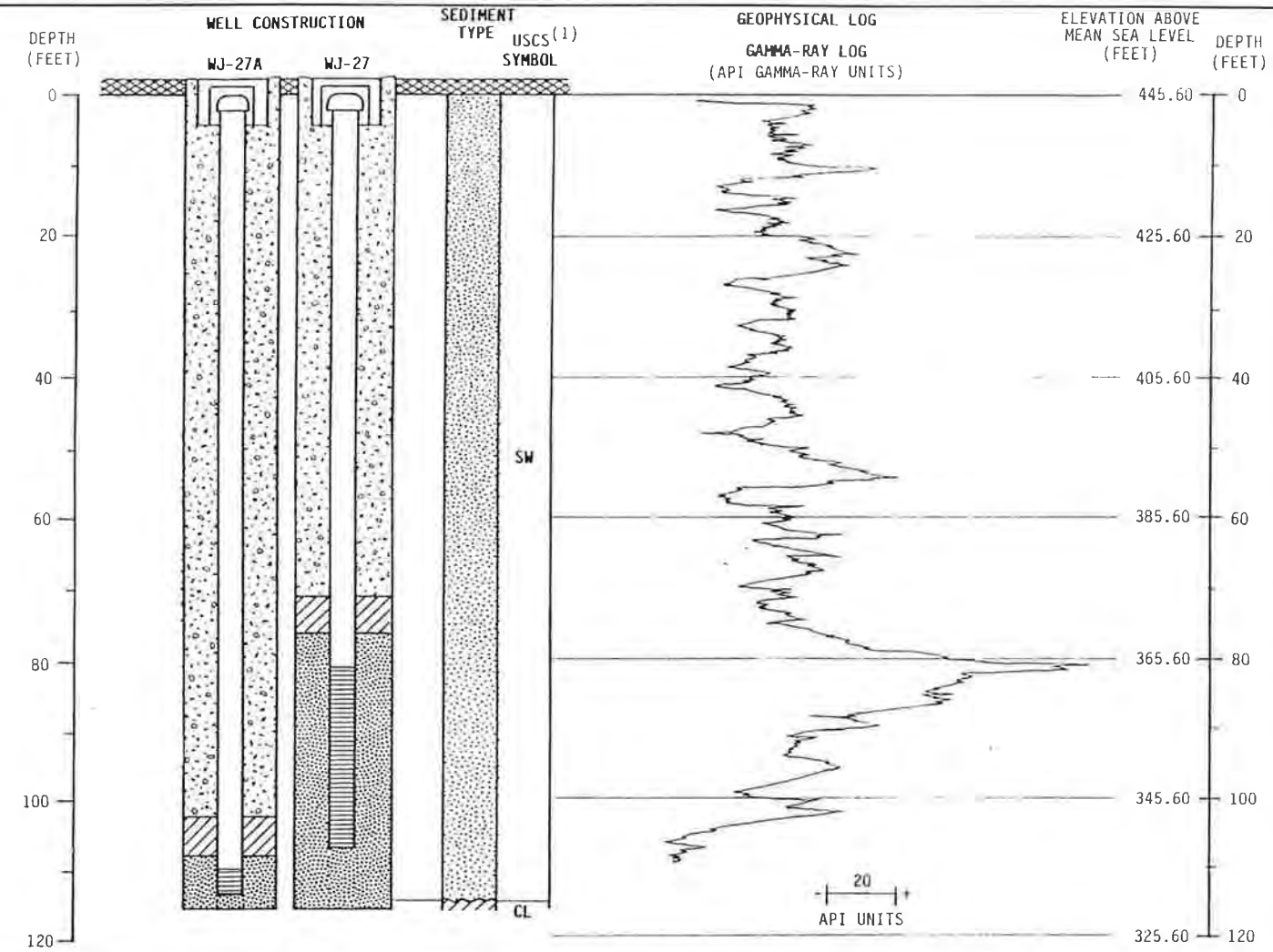
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-25 AND WJ-25A

FIGURE A.38

WJ007933



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

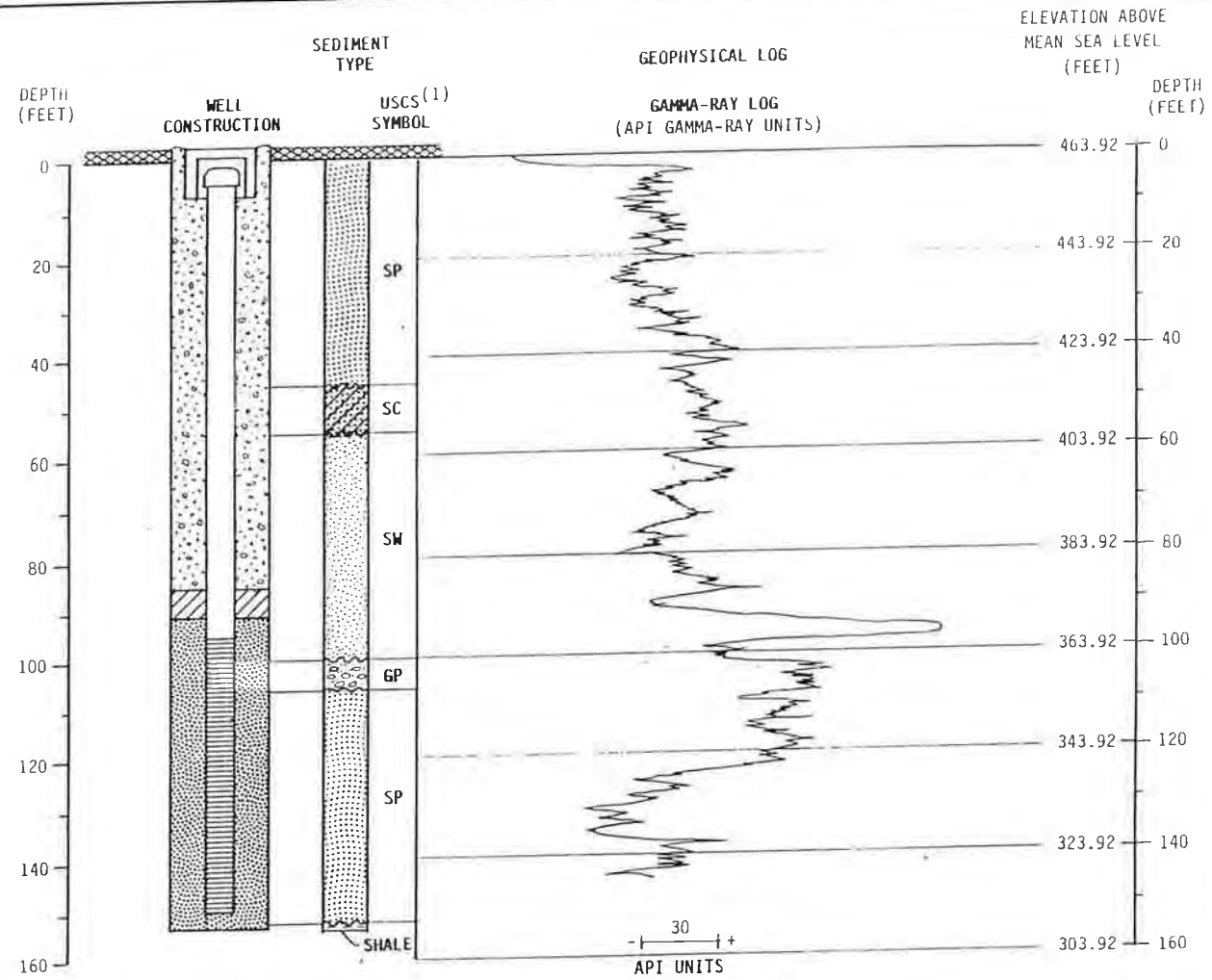
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-27 AND WJ-27A

FIGURE A.39

WJ007934



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

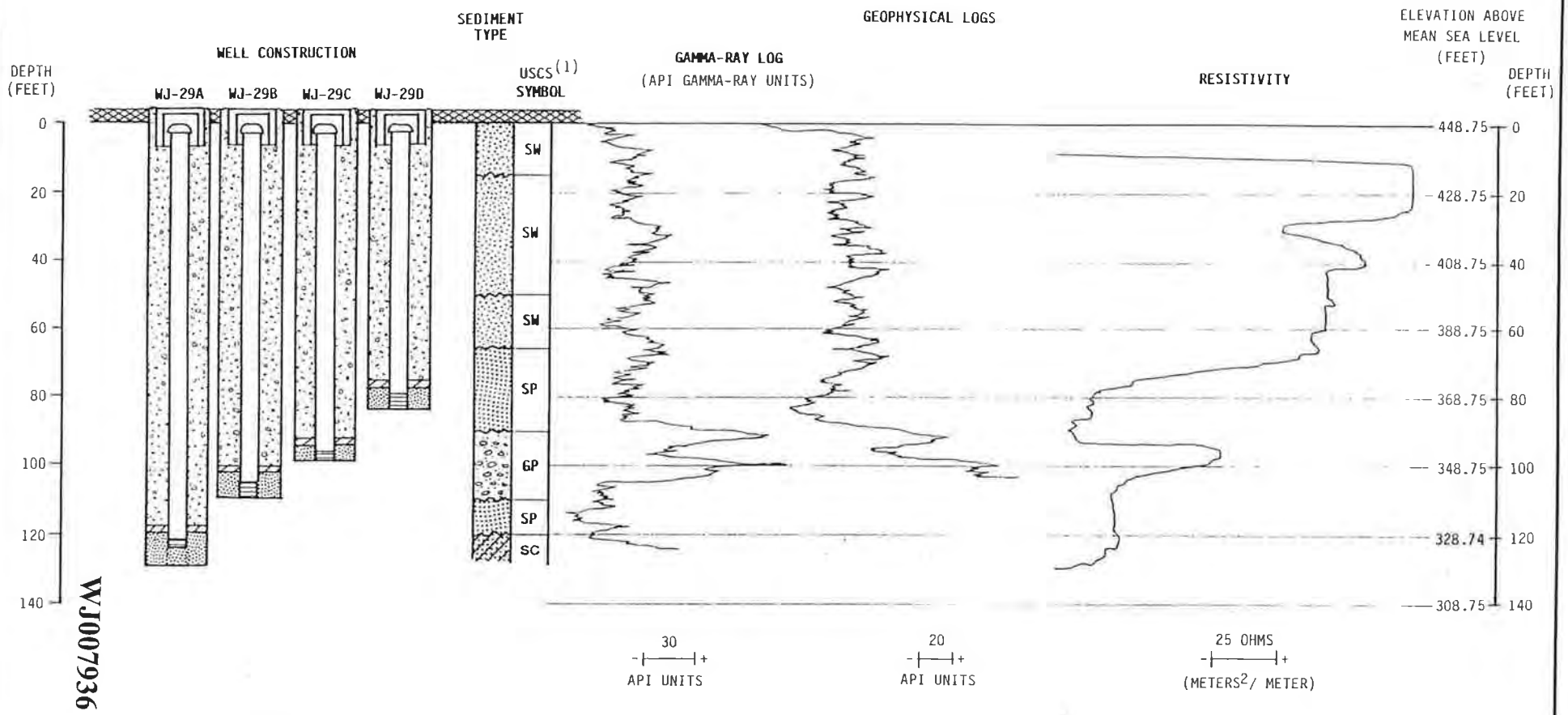
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-28

FIGURE A.40

WJ007935



WJ007936

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

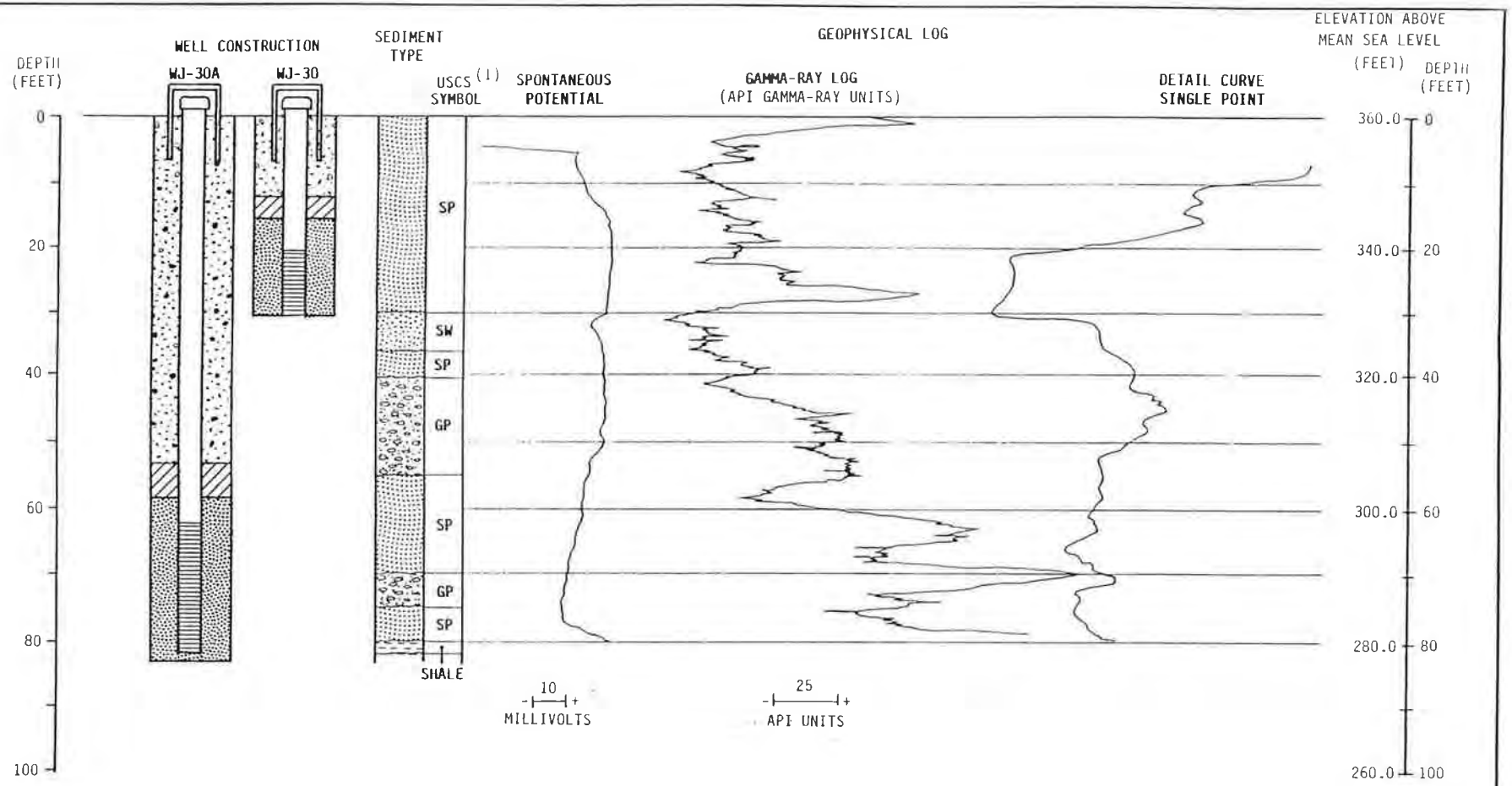
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-29A, WJ-29B, WJ-29C AND WJ-29D

FIGURE A.41



WJ007937

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

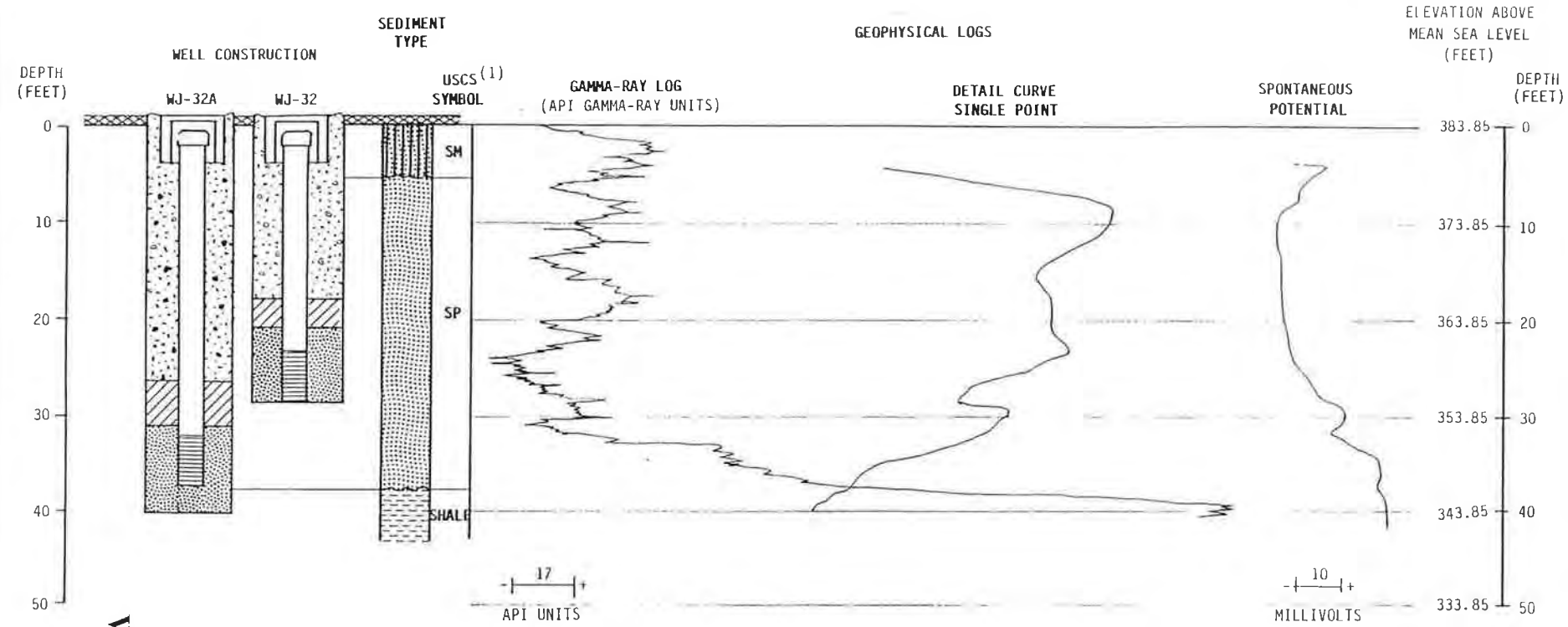
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-30 AND WJ-30A

FIGURE A.42



WJ007938

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

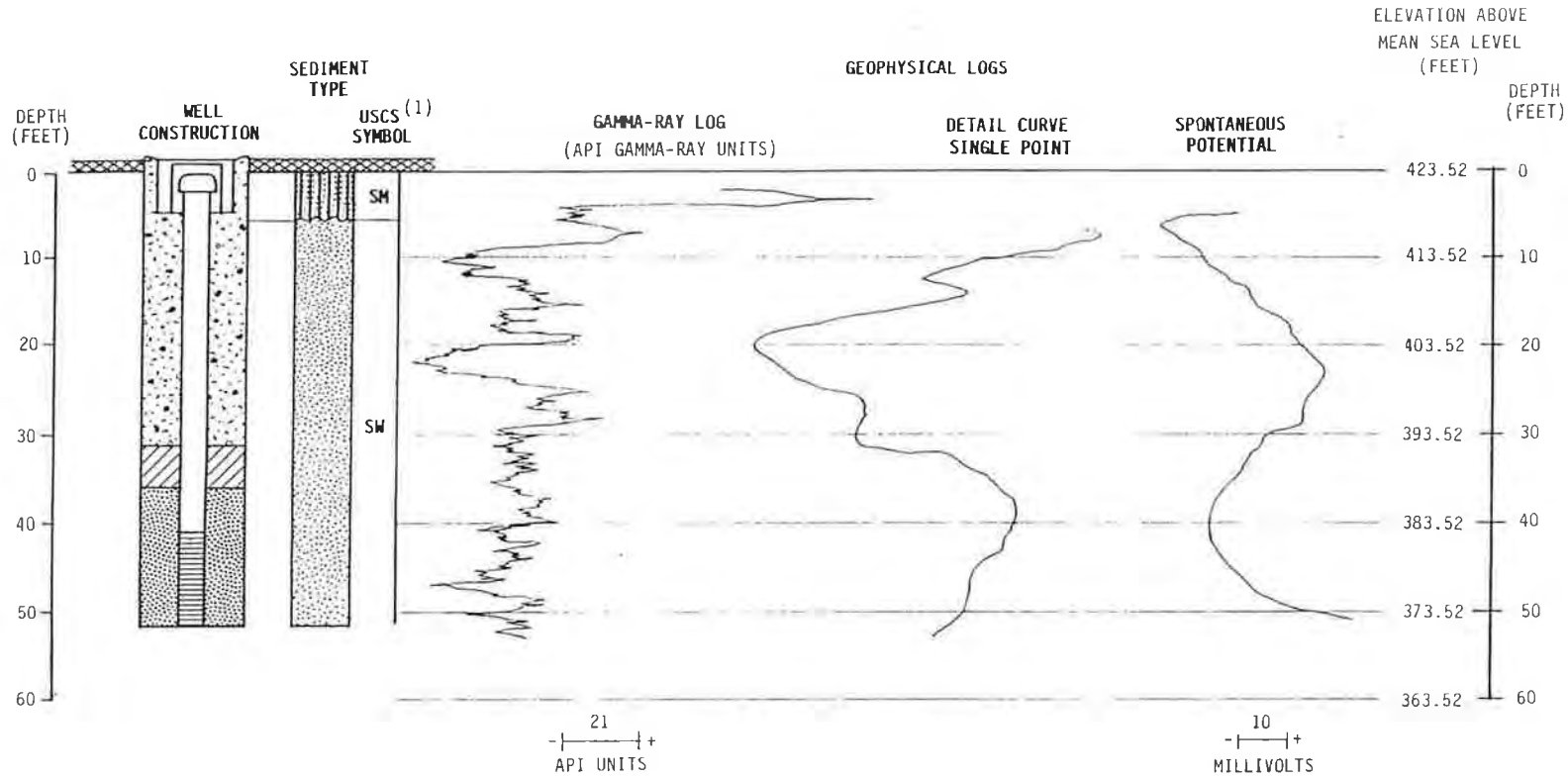
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-32 AND WJ-32A

FIGURE A.43



WJ007939

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

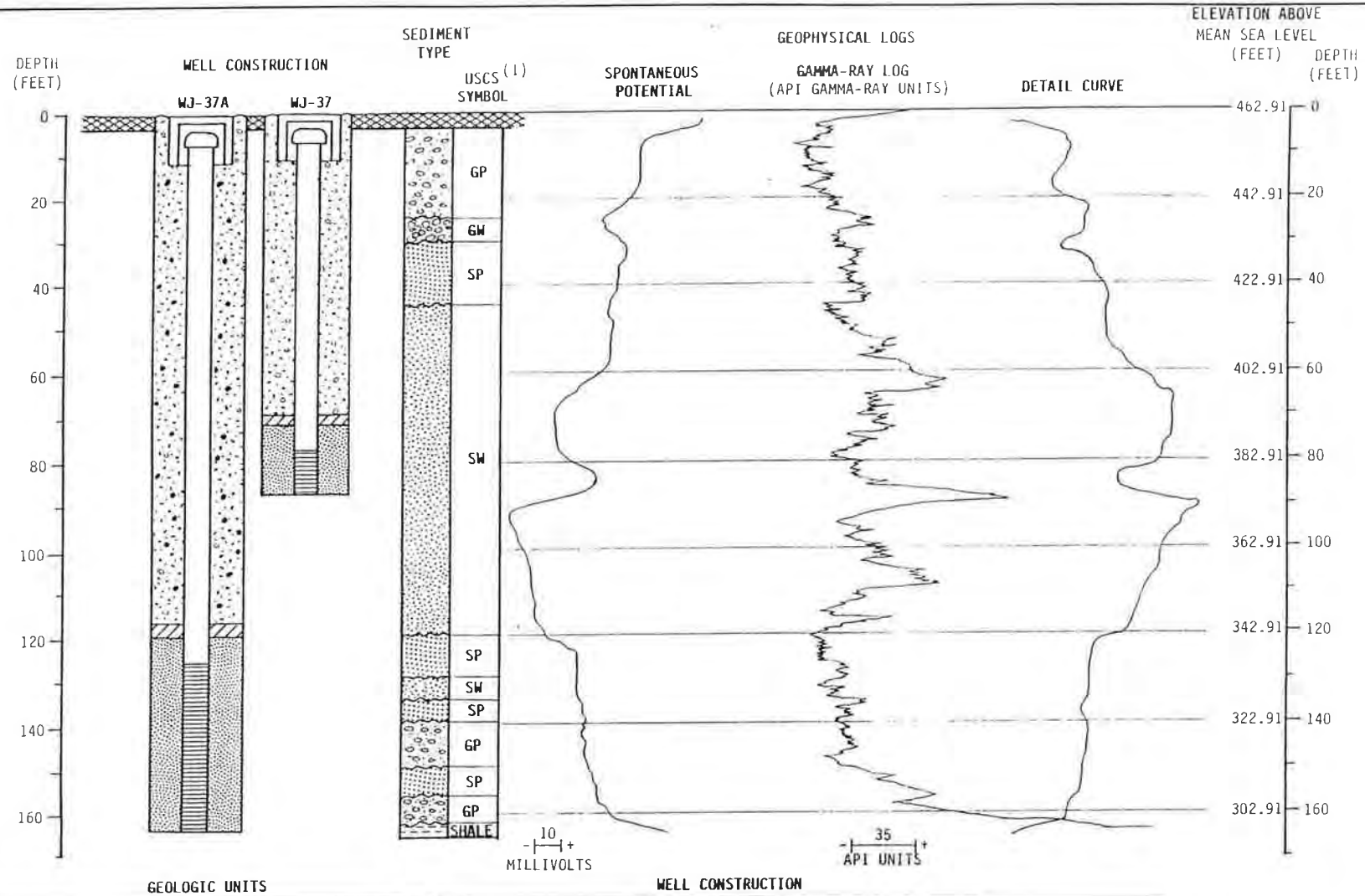
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-35

FIGURE A.44



WJ007940

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

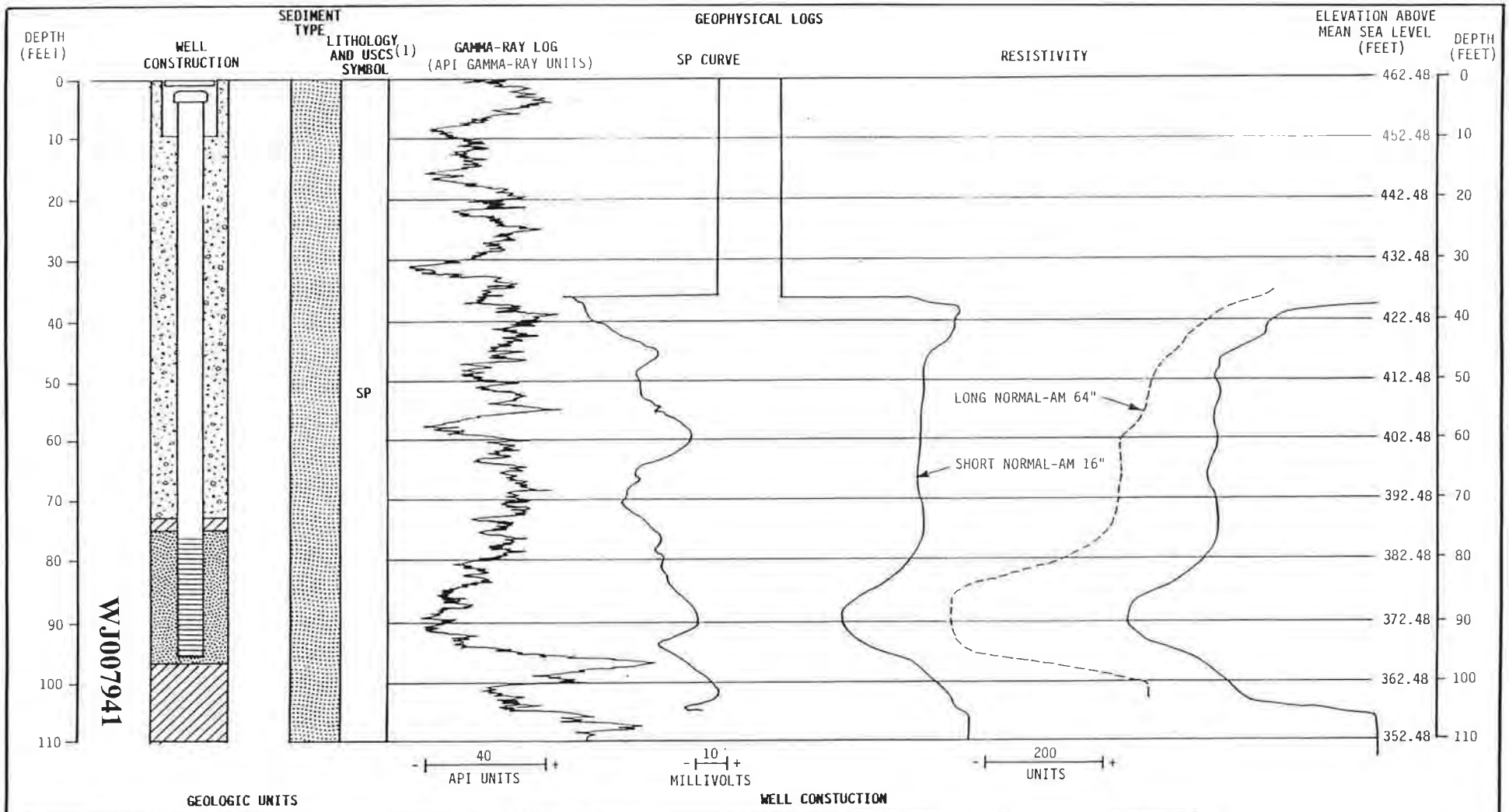
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELLS WJ-37 AND WJ-37A

FIGURE A.45



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

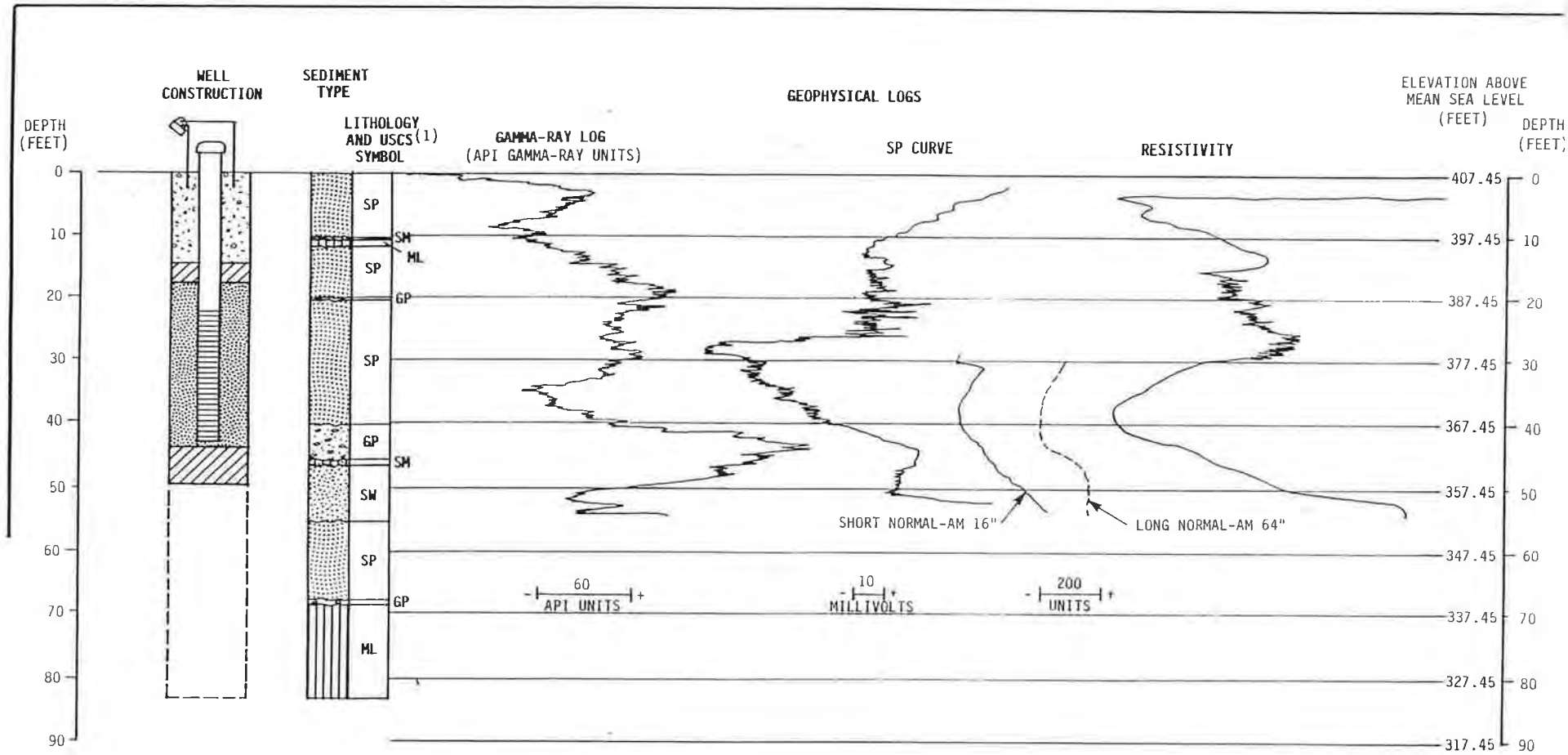
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-38

FIGURE A.46



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground Water-Consultants

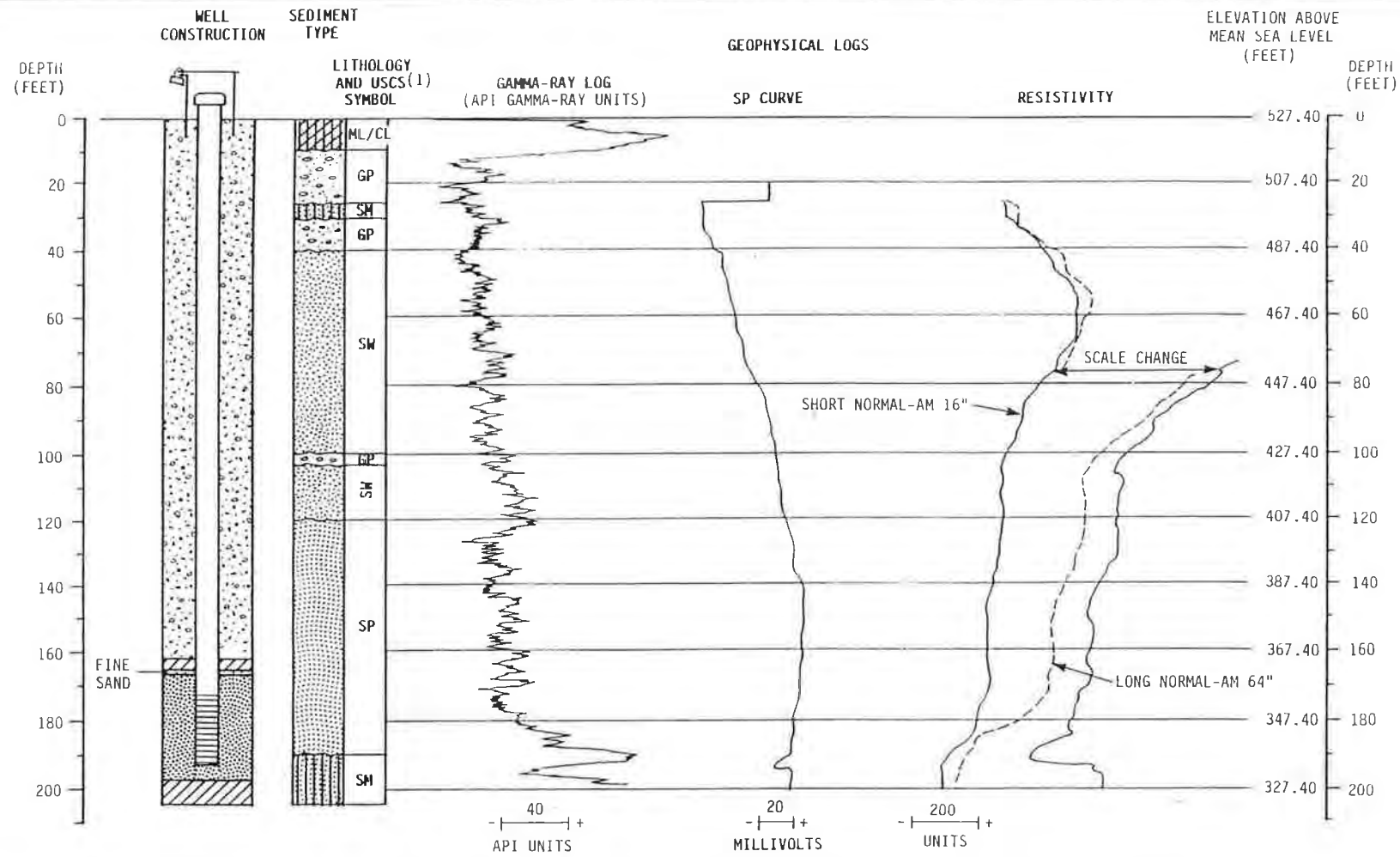
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-39

FIGURE A.47

WJ007942



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

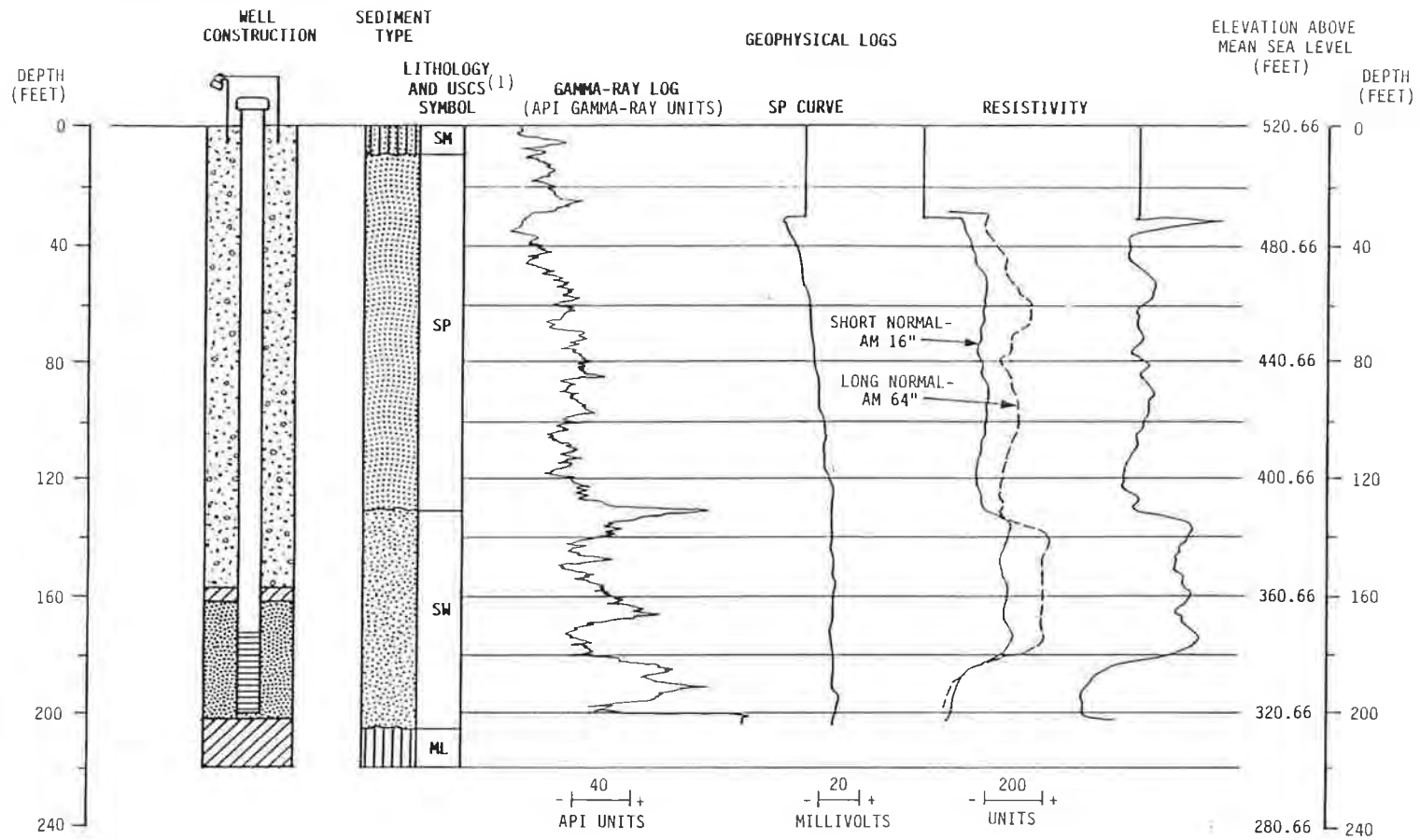
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-40

FIGURE A.48

WJ007943



WJ007944

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

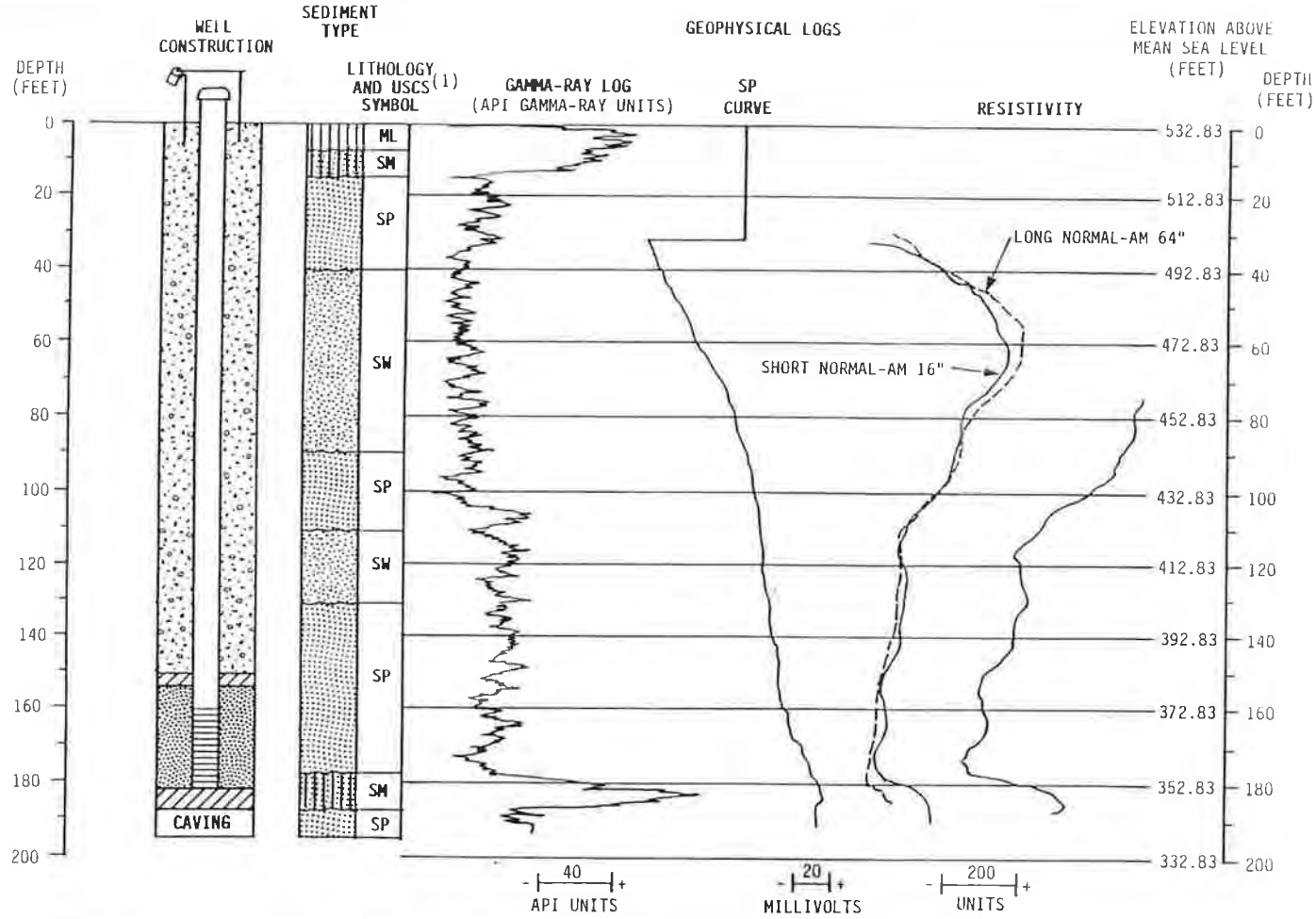
R.L. STOLLAR & ASSOCIATES INC.
Ground Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-41

FIGURE A.49



WJ007945

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

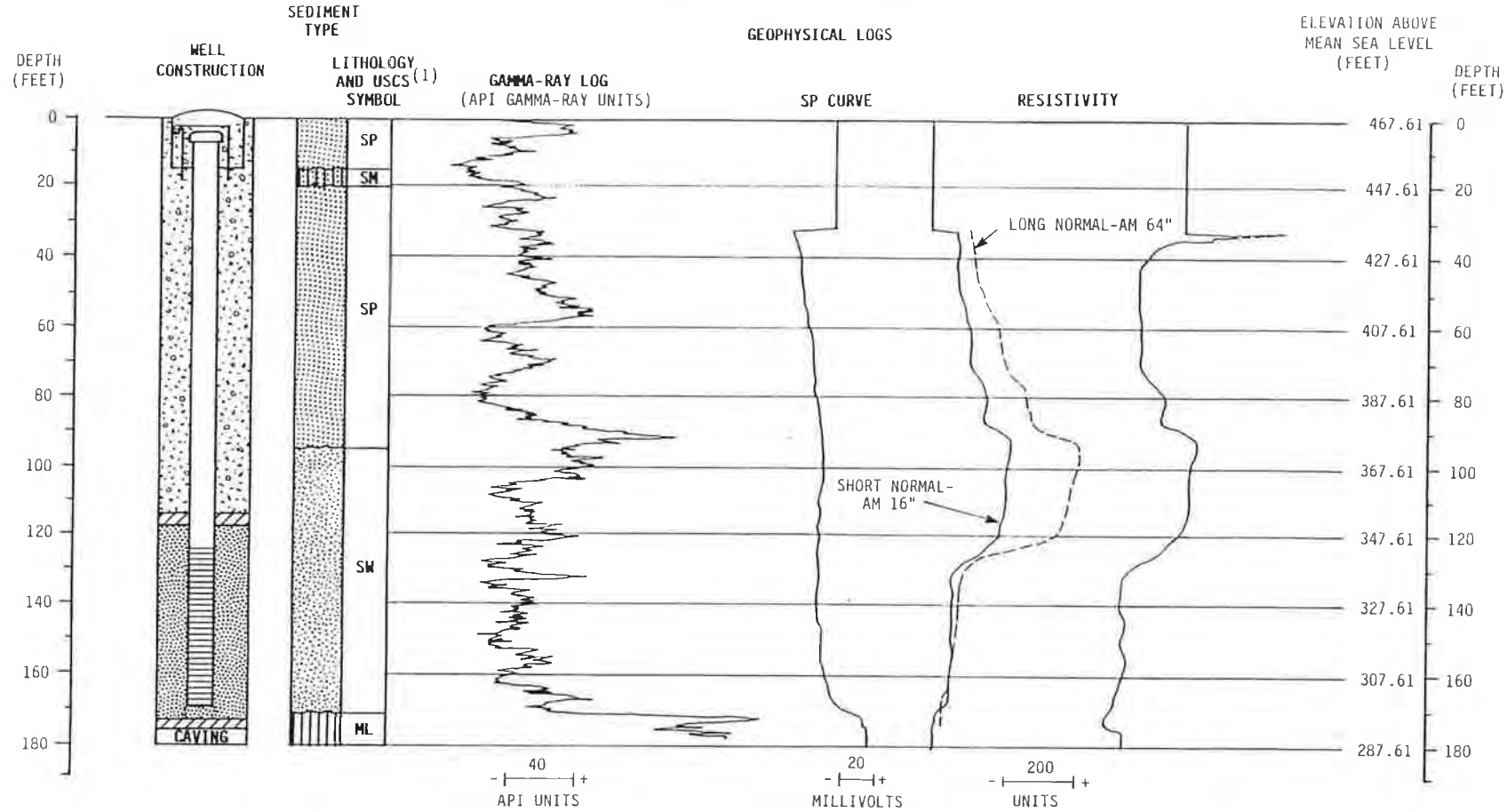
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water-Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-42

FIGURE A.50



WJ007946

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

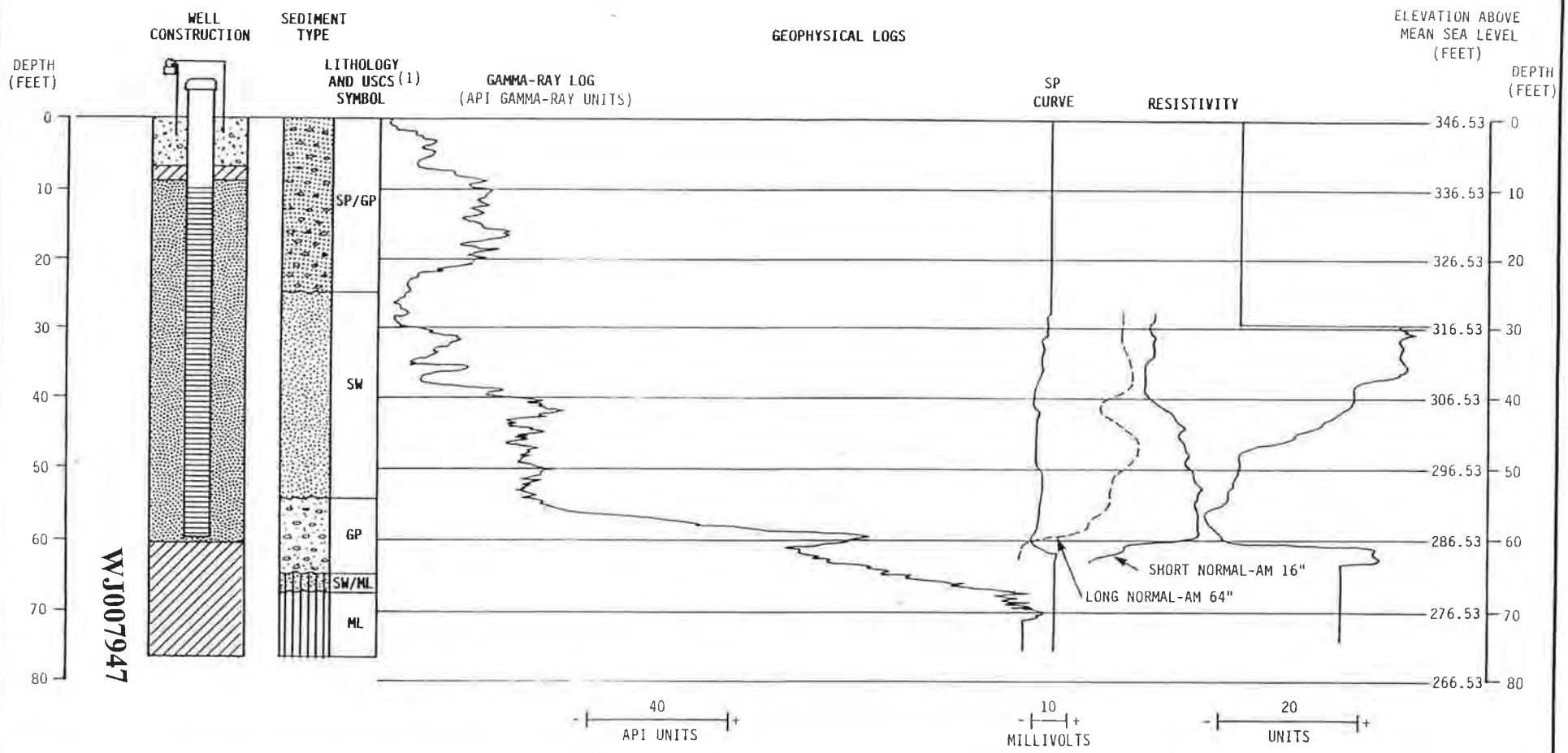
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-43

FIGURE A.51



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

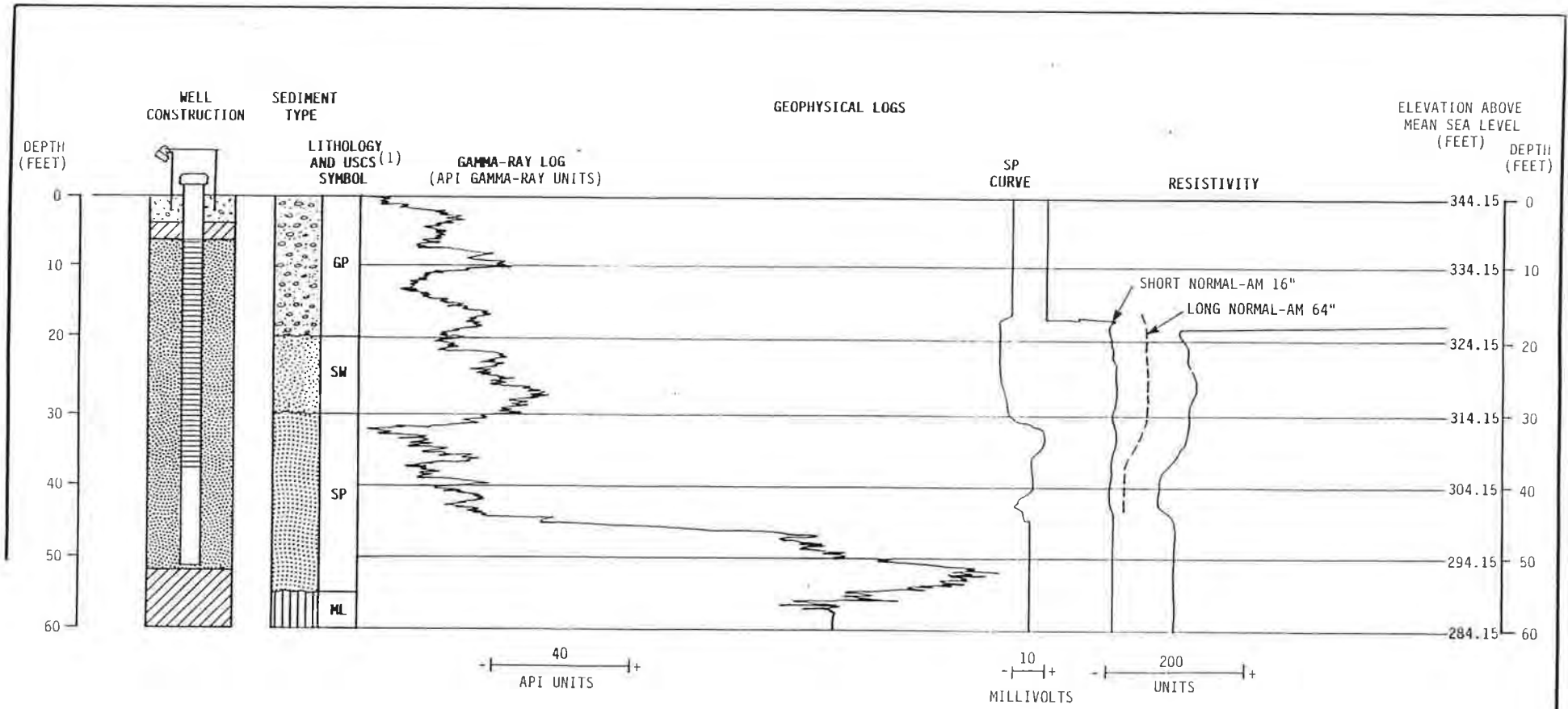
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-44

FIGURE A.52



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water-Consultants

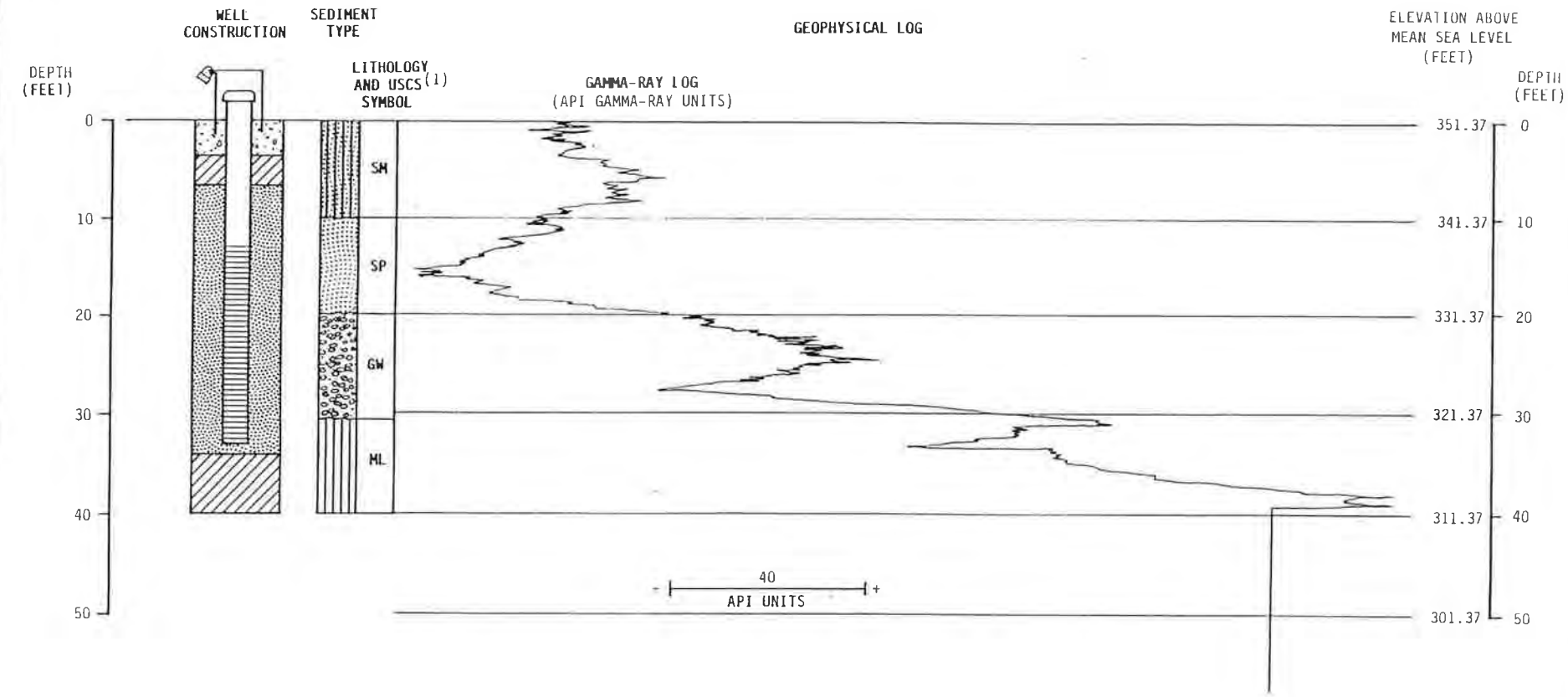
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-45

FIGURE A.53

WJ007948



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

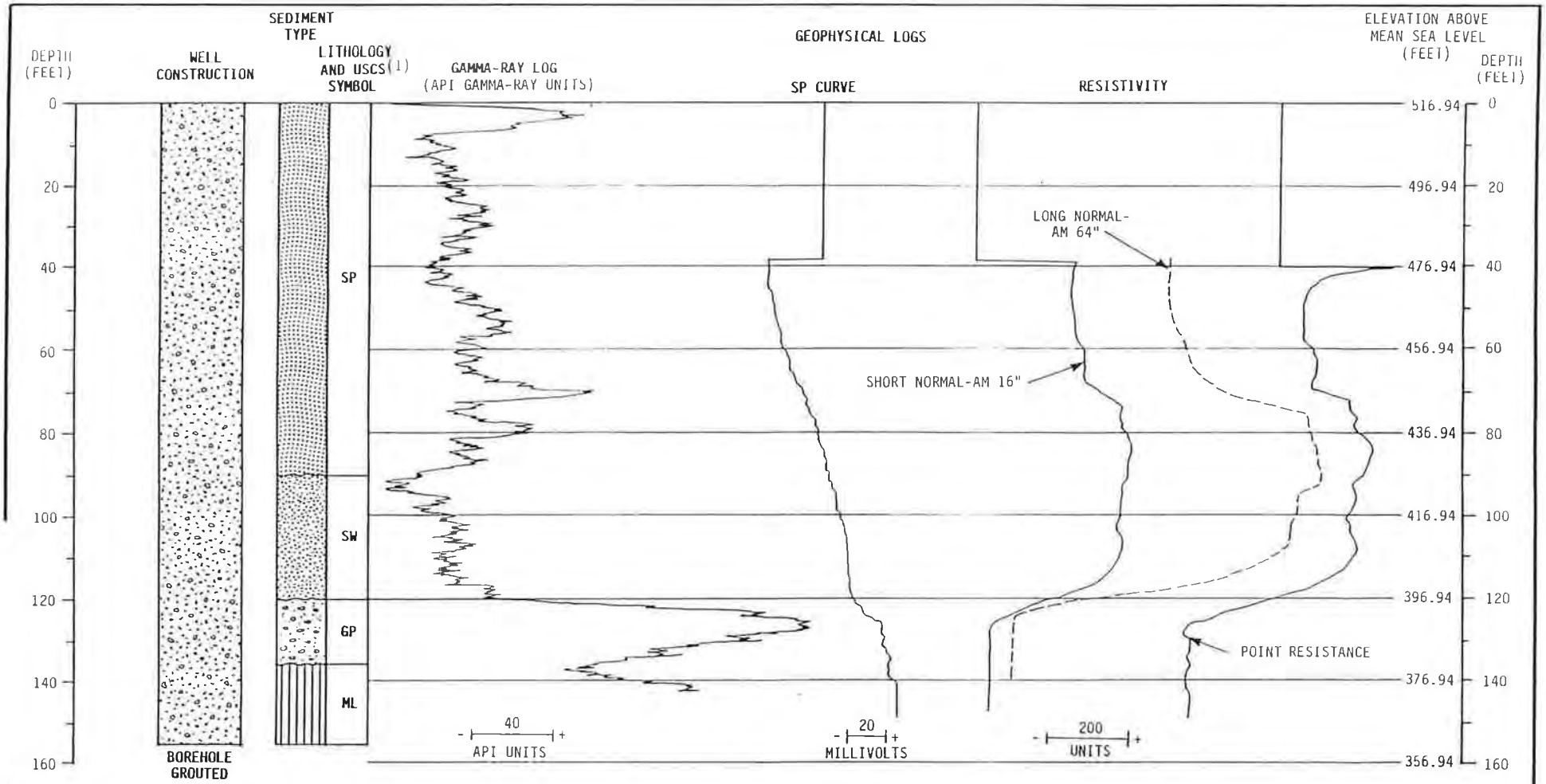
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOG FOR WELL WJ-46

FIGURE A.54

WJ007949



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

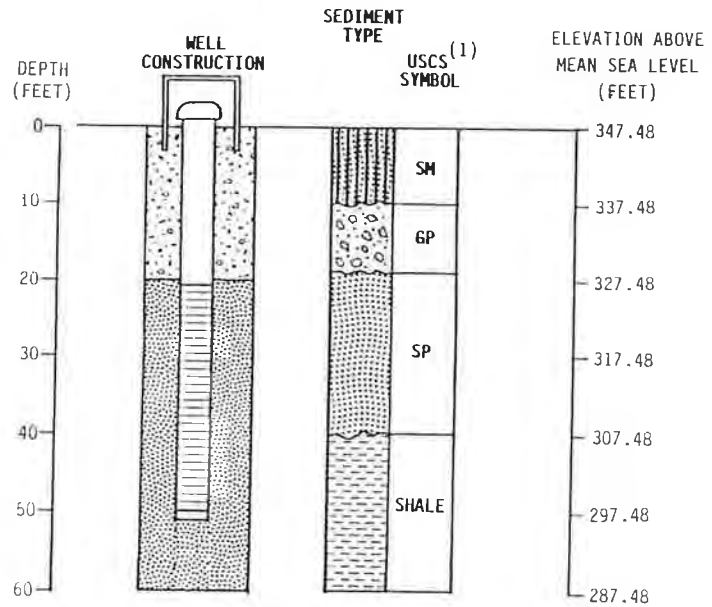
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL WJ-47

FIGURE A.55

WJ007950



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

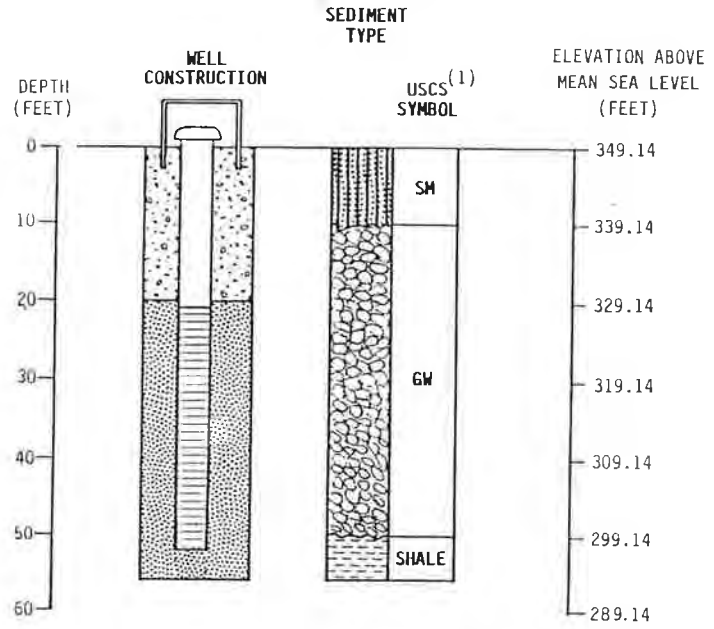
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL SK-1

FIGURE A.56

WJ007951



WJ007952

GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

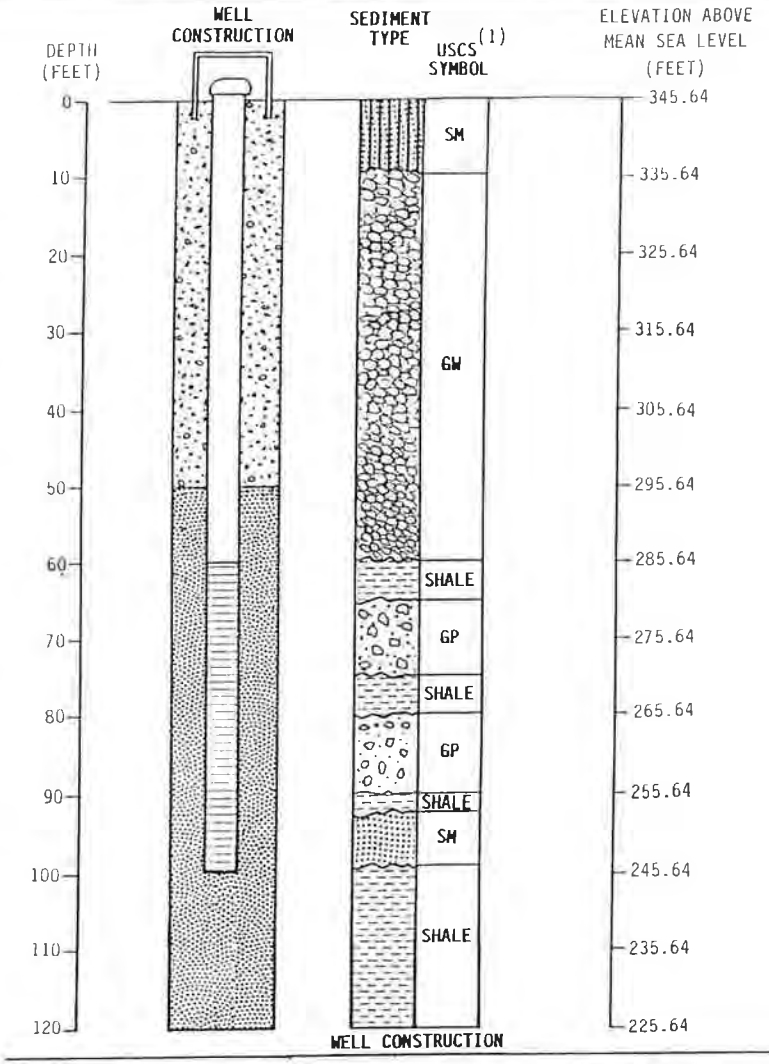
R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL SK-2

FIGURE A.57



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

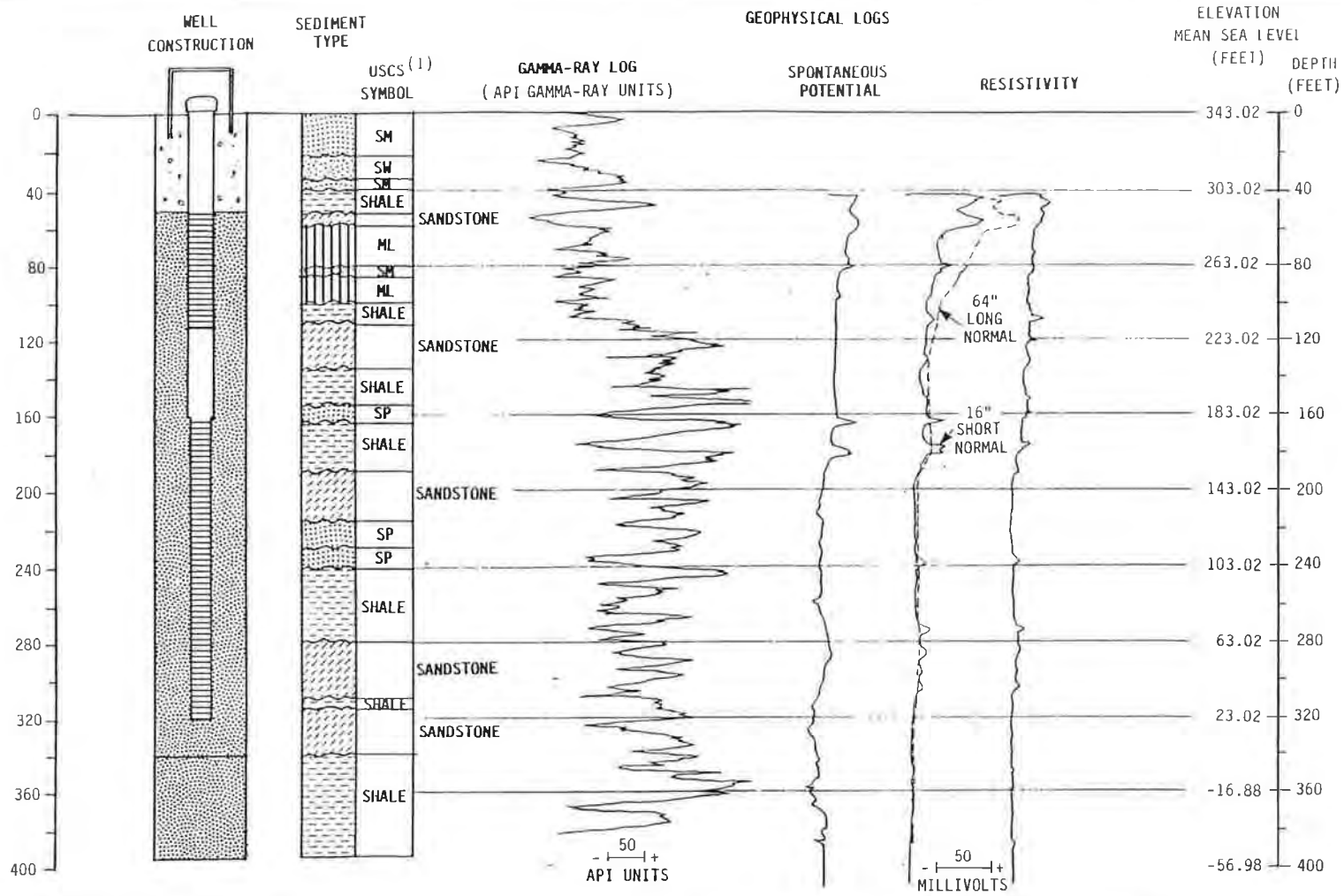
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL SK-3

FIGURE A.58

WJ007953



GEOLOGIC UNITS

- PAVEMENT
- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GW)
- GRAVEL (GM)
- GRAVEL (GP)
- GRAVEL, CLAYEY (GC)
- LOAM
- SHALE
- CEMENTED CONGLOMERATE
- SANDSTONE
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT

WELL CONSTRUCTION

- CEMENT PAD
- CEMENT GROUT
- CEMENT/BENTONITE GROUT
- BENTONITE SEAL
- GRAVEL PACK
- LOCKING PROTECTIVE CASING
- PVC BLANCK CASING
- PVC SCREEN

(1) SYMBOLS DESIGNATED BY UNIFIED SOIL CLASSIFICATION SYSTEM

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

WELL CONSTRUCTION, SEDIMENT TYPE AND GEOPHYSICAL LOGS FOR WELL SK-4

FIGURE A.59

WJ007954

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 201458

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. _____
Other Well No. _____

(1) OWNER: Name Silver King Oceanic Farms
Address P.O. Box 2184
City Santa Cruz Zip 95060

(2) LOCATION OF WELL (See instructions):
County Santa Cruz Owner's Well Number _____
Well address if different from above 125 Lockhart Gulch Rd. Scotts Valley
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. _____

APN 70-062-35

Re-drilling of SK-4

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☒
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☒

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 8 x 16 Monterey-sand
Diameter of bore 11¾
Packed from 50 to 340 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	160	8	SDR21	52	112	.040
160	320	8	SDR21	162	320	.040

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 0-50 ft.
Method of sealing grout

(10) WATER LEVELS:
Depth to first water, if known _____ ft.
Standing level after well completion flowing ft.

(11) WELL TESTS:
Was a well test made? Yes ☐ No ☒ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 395 ft. Depth of completed well 320 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
103	110	shale
110	112	sandstone
112	125	grey sandstone
125	155	coarse grey sandstone
155	180	sandstone
180	192	shale
192	215	sandstone
215	230	coarse sand
230	244	sandstone
244	260	shale
260	270	sand, shale
270	285	sand
285	395	fine sandy shale
		Fisheries
		and cap

This report made without warranty and subject to contract with owner.

Work started 8/4 19 87 Completed 8/11 19 87

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed _____ (Well Driller)
NAME Landino Const. & Well Drilling
(Person, firm, or corporation) (Typed or printed)
Address 5360 Coast Rd.
City Santa Cruz Zip 95060
License No. 201380 Date of this report _____

DWR 188 (REV. 7-78) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

WJ007955

ORIGINAL
File with DWR

THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

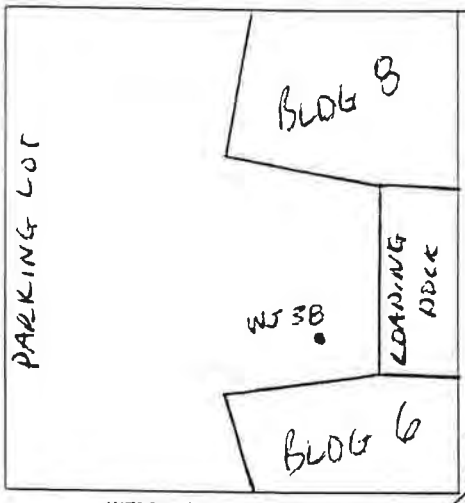
No. 266033

Notice of Intent No. 243438
Local Permit No. or Date _____

State Well No. _____
Other Well No. _____

(1) OWNER: Name WATKINS JOHNSON CO.
Address 440 KINGS VILLAGE RD
City SCOTTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ 38
Well address if different from above _____
Township 10S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.
AT PLANT FACILITY



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #3
Diameter of bore 10 INCH
Packed from 97 to 75 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
97	0	3"	SCH 40	97	77	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 73 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 75-73 ft.
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known 90' ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 110 ft. Completed depth 97 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	95	SAND, F. TO MED., LIGHT BROWN TO GREY & BROWN
95	98	GRAVEL, SANDY W/ SOME SILT
98	110	SAND, F. TO COARSE, SOME GRAVEL

Work started 5/20/88 19 88 Completed 5/21 19 88

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed [signature] (Well Driller)
NAME BEYLIK DRILLING (Person, firm, or corporation) (Typed or printed)
Address 591 SOUTH WALNUT ST
City LA HABRA CA ZIP 90631
License No. 524642 Date of this report 6/24/88

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

WJ007956

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

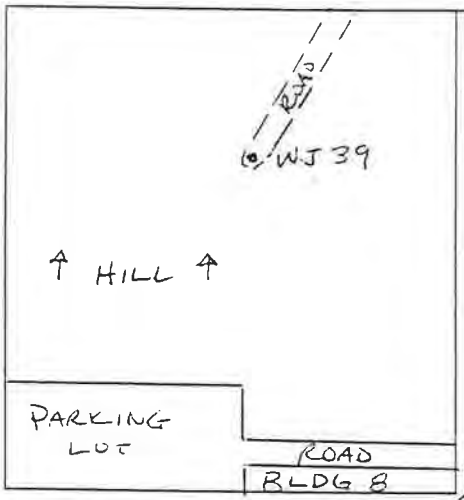
No. 266086

Notice of Intent No 243441
Local Permit No. or Date

State Well No
Other Well No

(1) OWNER: Name WATILINS JOHNSON CO
Address 440 KINGS VILLAGE ROAD
City SCOTTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ39
Well address if different from above
Township 10 S Range 2 W Section 24
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☒ Size #3
Diameter of bore 10 INCH
Packed from 44 to 18 ft

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
43	0	4"	SCH 40	43	23	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 15 ft
Were strata sealed against pollution? Yes ☐ No ☐ Interval 15-18 ft
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known ~33' ft
Standing level after well completion ft

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 83 ft Completed depth 43 ft

from ft	to ft	Formation (Describe by color, character, size or material)
0	20	SAND, F. TO COARSE
20	21	GRAVEL, SAND, SILT & CLAY
21	68	SAND, F. TO COARSE
68	69	GRAVEL
69	83	SILT, DARK OLIVE-BROWN (MONTEREY FRM).

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

WJ007957

Work started 4/29 1988 Completed 5/10 1988

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed Myron E Gutzman (Well Driller)
NAME BEYLIK DRILLING (Person, firm, or corporation) (Typed or printed)
Address 591 S WALNUT
City LA HABRA CA ZIP 90631
License No. 524642 Date of this report

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

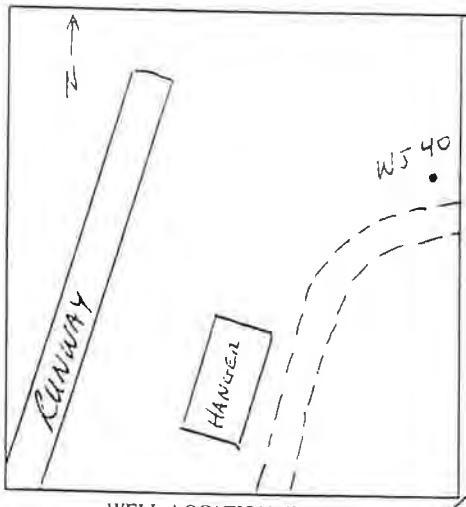
No. 266087

Notice of Intent No. 243442
Local Permit No. or Date

State Well No.
Other Well No.

(1) OWNER: Name WATKINS JOHNSON CO
Address 440 KINGS VILLAGE RD
City SCOTTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ40
Well address if different from above
Township 10S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #3
Diameter of bore 10 INCH
Packed from 194 to 167 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
193	0	4"	SCH 40

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
193	173	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 163 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 167 - 163 ft.
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known — ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 205 ft. Completed depth 194 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	SILT & CLAY, FINE SAND
5	25	GRAVEL, SAND, F. TO COARSE
25	30	SAND, FINE, SILTY
30	35	GRAVEL, SAND, F TO COARSE
35	95	SAND, F TO COARSE W/ SOME GRAVEL
95	105	GRAVEL, SAND, F TO COARSE
105	205	SAND F TO MED, & SILTY SAND

WJ007958

Work started 4/25 19 88 Completed 5/5 1988

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed (Well Driller)
NAME BEAUK DRILLING (Person, firm, or corporation) (Typed or printed)
Address 591 S WALNUT
City LA HABRA ZIP 90631
License No. 524642 Date of this report 6/24/88

VALID PRIOR TO 1/1/89 UNLESS REVOKED
CONFIDENTIAL PUBLIC USE
WATER CODE SEC. 13752

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

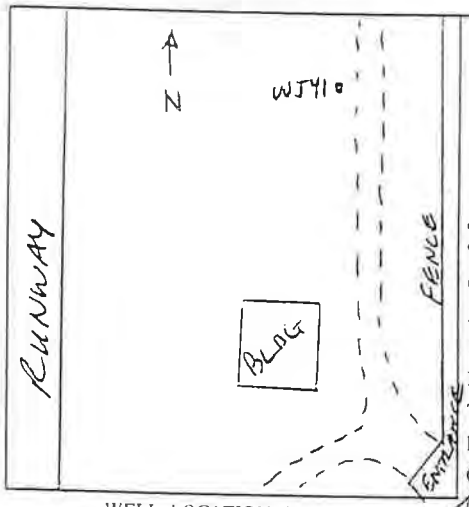
No. 266092

Notice of Intent No. 243447
Local Permit No. or Date _____

State Well No _____
Other Well No _____

(1) OWNER: Name WATKINS JOHNSON CO
Address 440 KINGS VILLAGE RD
City SCOTTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ41
Well address if different from above _____
Township 10S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.
~ 300' EAST OF RUNWAY



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #3
Diameter of bore 10 INCH
Packed from 202 to 161 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
202	0	4"	SCH80	202	172	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 158 ft
Were strata sealed against pollution? Yes ☒ No ☐ Interval 158-161 ft
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known _____ ft
Standing level after well completion _____ ft

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft At end of test _____ ft
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 220 ft Completed depth 202 ft

from ft	to ft	Formation (Describe by color, character, size or material)
0	130	SAND, F TO MED, GRAY-BROWN
130	170	SAND, F TO COARSE, SOME GRAVEL
170	180	GRAVEL, SANDY
180	200	SILTY SAND
200	205	SAND & GRAVEL
205	220	CLAYEY SILT, OLIVE-GRN (MONTEREY FRM)

WJ007959

Work started 5/11/88 19__ Completed 5/15 1988

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [signature] (Well Driller)
NAME BEYLIK DRILLING (Person, firm, or corporation) (Typed or printed)
Address 591 S WALNUT
City LA HABRA ZIP 90631
License No 524642 Date of this report 6/24/88

CONFIDENTIAL NOT FOR PUBLIC USE WATER CODE SEC. 13752

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

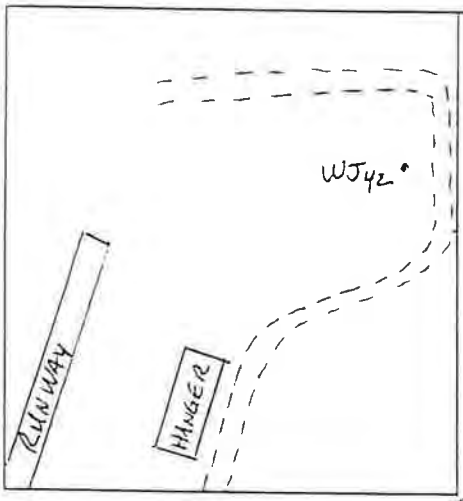
No. 266088

Notice of Intent No 243443
Local Permit No. or Date

State Well No
Other Well No

(1) OWNER: Name WATKINS JOHNSON CO
Address 440 KINGS VILLAGE RD
City SCOTTS VALLEY ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ42
Well address if different from above
Township 10S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.
AIRPORT RUNWAY 700' WEST



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #3
Diameter of bore 10 INCH
Packed from 182 to 156 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
182	0	4"	SCH 40	182	162	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 152 ft
Were strata sealed against pollution? Yes ☒ No ☐ Interval 152-156 ft
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known ft
Standing level after well completion ft

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 195 ft Completed depth 182 ft

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	7	CLAYEY SILT, DARK BROWN
7	10	SAND, COARSE, SILTY
10	195	SAND, F. TO COARSE WITH SOME SILT

WJ007960

Work started 4/21 1988 Completed 4/26 1988

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed (Well Driller)
NAME BEYLIK DRILLING (Person, firm, or corporation) (Typed or printed)
Address 591 S WRIGHT
City LA HABRA ZIP 90631
License No 524642 Date of this report 6/24/88

VOIDED ORIGINAL

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

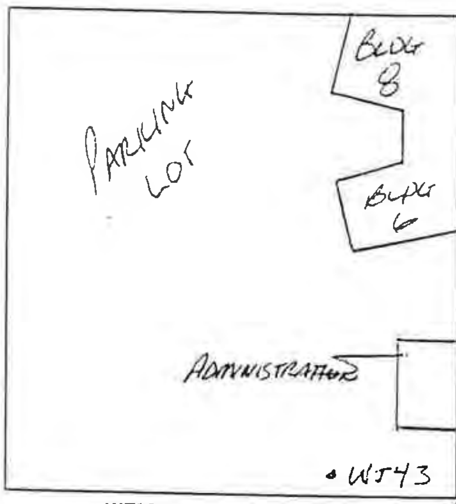
No. 266069

Notice of Intent No 243444
Local Permit No or Date ______

State Well No ______
Other Well No ______

(1) OWNER: Name WATKINS JOHNSON CO
Address 440 KINGS VILLAGE RD
City SCOTTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ43
Well address if different from above ______
Township 10S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc.
IN PLANT PARKING LOT



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [X]
Municipal [ ]
Other [ ]
(Describe)

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size #3
Diameter of bore 10 INCH
Packed from 173 to 117 ft.

(7) CASING INSTALLED:
Steel [ ] Plastic [X] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
170	0	4"	SCH 40	170	125	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 114 ft
Were strata sealed against pollution? Yes [X] No [ ] Interval 114-117 ft.
Method of sealing ______

(10) WATER LEVELS:
Depth of first water, if known ______ ft
Standing level after well completion ______ ft

(11) WELL TESTS:
Was well test made? Yes [ ] No [X] If yes, by whom? ______
Type of test Pump [ ] Bailer [ ] Air lift [ ]
Depth to water at start of test ______ ft At end of test ______ ft
Discharge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes [ ] No [X] If yes, by whom? ______
Was electric log made Yes [X] No [ ] If yes, attach copy to this report

(12) WELL LOG: Total depth 180 ft Completed depth 170 ft

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	100	SAND, FINE TO MED.
100	120	SAND, F. TO COARSE, SOME GRAVEL
120	170	SAND, F TO COARSE
170	175	SAND, F TO COARSE, SILT AND CLAY
175	180	DARK OLIVE GREEN CLAYEY SILT

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC 13752

WJ007961

Work started 5/20 1988 Completed 5/22 1988

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [signature]
(Well Driller)

NAME PAULIK DRILLING
(Person, firm, or corporation) (Typed or printed)
Address 591 SOUTH WALNUT
City LA HABRA CA ZIP 90631
License No. 524642 Date of this report 6/24/88

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 266084

Notice of Intent No. 243439

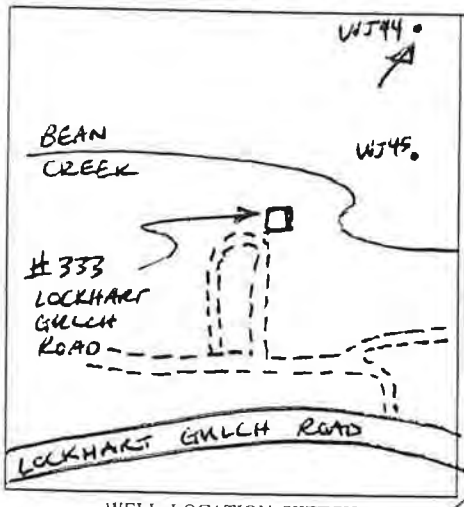
Local Permit No. or Date

State Well No.

Other Well No.

(1) OWNER: Name WATKINS - JOHNSON CO.
Address 440 KINGS VILLAGE RD
City SCOTTS VALLEY ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ 44
Well address if different from above SEE MAP
Township 10 S Range 2 W Section 13
Distance from cities, roads, railroads, fences, etc. APPROX 1000' N. OF LOCKHART GULCH ROAD



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #3
Diameter of bore 10 INCH
Packed from 60 to 8 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
60	+2	4"	SCH 40	60	70	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ft.
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known ~12 FT ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 77 ft. Completed depth 60.5 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	17	SAND, F. TO COARSE, SOME GRAVEL
17	67	GRAVEL & F TO COARSE SAND
67	77	SILT, OLIVE-BROWN (MONTEREY FRM).

WJ007962

Work started 5/23 1988 Completed 5/27 1988

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed (Well Driller)

NAME BEALE DRILLING (Person, firm, or corporation) (Typed or printed)

Address 591 SOUTH WALNUT ST

City LA HABRA CA ZIP 90631

License No. 524642 Date of this report 6/24/88

VALID WITHOUT PUBLIC USE SEAL
VALID WITHOUT PUBLIC USE SEAL
WATER CODE SEC.

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

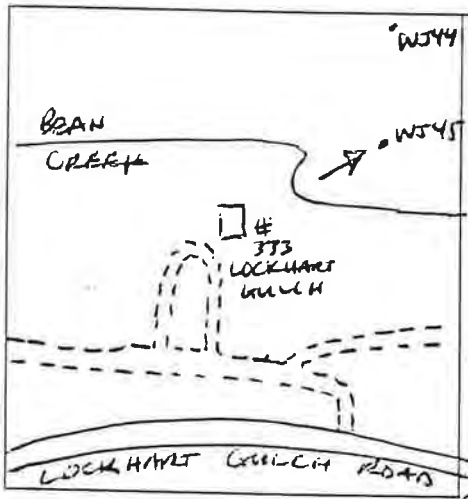
No. 266085

Notice of Intent No 243440
Local Permit No or Date

State Well No
Other Well No

(1) OWNER: Name WATKINS JOHNSON CO
Address 440 KINGS VILLAGE
City SCOTTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ45
Well address if different from above
Township 10S Range 2W Section 13
Distance from cities, roads, railroads, fences, etc.
APPROX 800' N OF LOCKHART GULCH ROAD



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #3
Diameter of bore 10 INCH
Packed from 52 to 7 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
52	+2	4"	SCH 40	52	7	0.020

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 5 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 5 - 7 ft
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known 12 ft
Standing level after well completion ft

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 60 ft Completed depth 52 ft

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	14	GRAVEL & SAND SOME SILT/CLAY
14	53	SAND F. TO COARSE, MINOR GRAVEL
53	60	SILT, DARK OLIVE BROWN (MONTEREY FORMATION)

ORIGINAL

WJ007963

Work started 5/17 1988 Completed 5/19 1988

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed (Well Driller)
NAME BENNIK DRILLING (Person, firm, or corporation) (Typed or printed)
Address 591 SOUTH WALNUT ST.
City LA HABRA CA ZIP 90631
License No 524642 Date of this report 6/24/88

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

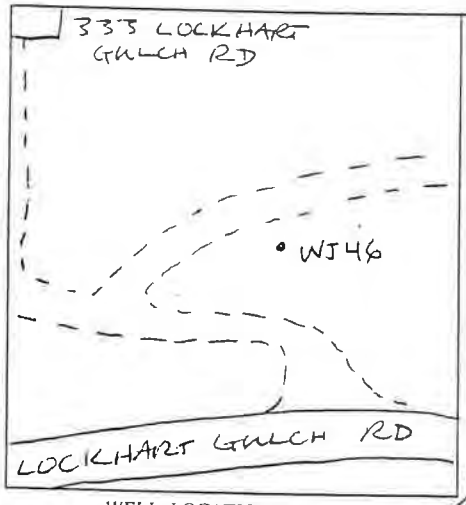
No. 266090

Notice of Intent No 243445
Local Permit No or Date

State Well No
Other Well No

(1) OWNER: Name WATKINS JOHNSON CO
Address 440 KINGS VILLAGE RD
City SCOTS VALLEY CA ZIP 95066

(2) LOCATION OF WELL (See instructions):
County SANTA CRUZ Owner's Well Number WJ46
Well address if different from above
Township 10S Range 2W Section 13
Distance from cities, roads, railroads, fences, etc.
100' NORTH OF LOCKHART GULCH RD



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☒
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 8X12
Diameter of bore 13 INCH
Packed from 6 to 34 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
33	0	8"	SCH 40

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 3.5 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 6-3.5 ft.
Method of sealing BENTONITE

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 40 ft Completed depth 33 ft.

from ft	to ft	Formation (Describe by color, character, size or material)
0	10	SILTY SAND
10	20	SAND, FINE
20	31	SANDY GRAVEL
31	40	CLAYEY SILT & GRAVEL
40		MONTEREY FORM - OLIVE-GREEN SILT

WJ007964

Work started 5/25 1988 Completed 5/28 1988

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed (Well Driller)
NAME BAHLIK DRILLING
(Person, firm, or corporation) (Typed or printed)
Address 591 S WALNUT
City LA HABRA CA ZIP 90631
License No 524642 Date of this report 6/24/88

ORIGINAL

APPENDIX B

LIST OF CHEMICALS USED AT SITE

APPENDIX B

General List of Chemicals Reportedly Used
by Watkins-Johnson Plant in Scotts Valley, CA
Since Initiating Activities

Acetic Acid	
Acetone	
Acetylene	
Acrylic Adhesive	
Acryloid Resin	
Acrylnitrile	
Alkylaryl Sulfonic Acid	
Alumina	
Alumina Silica	
Aluminum Oxide	
Aluminum Sulfate	
Ammonia	
Ammonium Fluoride	
Ammonium Hydroxide	
Ammonium Silicofluoride	
Ammonium Thiocyanate	
Ammonium Thiosulfate	
Anhydride Catalyst	
Antimony Oxide	
Argon	
Arsenic Trioxide	
Asbestos	
Barium Nitrate	
Barium Acetate	
Benzotriazole	
2-Benzyl-4-chlorophenol	aka Clorophene, a disinfectant
Beryllium Oxide	
Bismuth	
Bisphenol A	
Bisphenol A Diglicidyl (Ether?)	
Bisulfite	
Boric Acid	
Borofluoric Acid	
Boron	
Brass	
Bronze	
Butyl Acetate	
4-Butyrolacetone	
Butyl Alcohol	
2-Butoxyethanol	aka. Butyl Cellosolve
Butylethonoate	

n-Butylglycidyl Ether
Butylstearate
Cadmium Sulfoselenide
Carbon
Carbon Dioxide
Carbonic Acid
Ceramic Fiber
Chloroethane
Chloromethane
Chromic Acid
Chromium
Chromium Trioxide
Cobalt
Colophony Rosin
Copper
Cyanoacrylate Adhesive
Cyclized Polyisoprene
Cyclohexanone
Diacetone Alcohol
Diborane
Dibutylphathalate
Dibutyl Tin Dilaurate
Dichlorobenzene (ortho)
Dichlorodifluoromethane aka. Freon 12
Dicyandiamide
Diethylenetriamine
Dimethylacrylate Esters
Dimethylacetimide
Dimethyl Polysiloxane
Dimethylsiloxane
Dimethylurea
Dimethyltin Dichloride
Dimethylphthalate
Disilane
Epichlorohydrin
Epoxy Adhesive
Epoxy Resin
Ethanol
Ethanolamine
2-Ethoxyethyl Acetate
Ethyl Acetate
Ethyl Silicate
Ethylene Glycol
Ferric Chloride
Formaldehyde
Formic Acid
Freon TE 4% Ethanol in Freon 113
Freon TF
Freon TMS 6% Methanol in Freon 113
stabil.
Gold
Graphite

Helium
Hexane
Hexamethyldisilazane
Hydrochloric Acid
Hydrofluoboric Acid
Hydrofluoric Acid
Hydrogen
Hydrogen Fluoride
Hydrogen Nitrate
Hydrogen Peroxide
Hydrogen Tetrafluoroborate
Hydroquinone
2-Hydroxyethyl-5-triazine
Indium Trichloride
Indium Tribromide
Iridium
Iorn
Isobutyl Alcohol
Isopropyl Alcohol
Lead
Lead Chromate
Lead Sulfate
m-Phenylenediamine
Magnesium
Magnesium Oxide
Manganese
Methylethyl Ketone
Mercuryberyllium Oxide
Methanol
2-Methoxyethanol
Methylisobutyl Ketone
Methyltoluene
Methylene Chloride
Mineral Oil
Molybdenum
Naptha
Neodymium
Nickel
Nickel Sulfate
Niobium
Niobiumsamarium
Nitric Acid
Nitrogen
Nitrogen Trifuoride
Nitromethane
Nitrous Oxide
Nonane
Nonylphenol Ethoxylate
Organo Phosphanate
Oxalic Acid
Oxyethylene
Oxygen

Palladium
Phenol
Phenol-Formaldehyde Resin
Phenolic Catalyst
Phenylglycidyl Ether
Phenyl-3-pyrazolidone photographic developer
Phosphine
Poly Aklylene Glycol
Polyethylene Amine
Polyglycoldiamine
Polysiloxane Rubber
Potassium Arsenate
Potassium Bromide
Potassium Cyanide
Potassium Dicyanoaureate
Potassium Ferricyanide
Potassium Fluoride
Potassium Fluoborate
Potassium Fluozirconate
Potassium Hydroxide
Potassium Iodide
Potassium Permanganate
Potassium Sodium Tartate
Propane
Propanol
Propyleneglycolmethyl Ether Acetate
Resorcinoldiglycidyl Ether
Saran
Silane
Silica
Silica Detergent
Silicon Carbide
Silicon Hexahydride
Silver
Sodium
Sodium Acetate
Sodium Bicarbonate
Sodium Bisulfate
Sodium Borate
Sodium Carbonate
Sodium Fluoride
Sodium Formaldehyde
Sodium Hydroxide
Sodium Metasilicate
Sodium Nitrite
Sodium Silicate
Sodium Silicofluoride
Sodium Sulfite
Sodium Cyanide
Sodium Tetraphosphate
Stannic Chloride
Stannous Chloride, Dihydrate

Stannous Fluoborate	
Stearic Acid	
Styrene Polymer	
Talc	
Tantalum	
Teflon	
Tetrachloroethene	PCE
Tetramethyl Tin	
Tetraisopropyl Titanate	
Thallium Nitrate	
Thiourea	
Thorium	
Tin	
Titanium	
Titanium Dioxide	
Titanium Isopropoxide	
Toluene	
Tributyl Phosphate	
1,1,1-Trichloroethane	
Trichloroethylene	
Trichlorofluoromethane	Freon 11
Trichlorotrifluoromethane	Freon 113
Triethanolammonium	
Trimethylbenzene	
Triphenyl Antimony	
Trisodium Phosphate	
Tungsten	
Tungsten Hexafluoride	
Turpentine	
Urethane Catalyst	
Vanadium	
Vinycyclohexane Dioxide	
Xylene	
Yittrium	
Zinc	
Zinc Chloride	
Zinc Chromate	
Zinc Nitrate	
Zinc Oxide	
Zinc Phosphate	
Zirconia	
Zirconium Oxide	

Unknowns or inaccurate nomenclature:

2,4,6-Tri(dimethylaminomethyl)
Aliphatic Amine
Aliphatic Amine Catalyst
Alkali Metal Phosphate
Alkyl Phenyl Ethoxylate

Alkylaryl
Amidoimidazoline
Amosite
Adhesives
Butyl Ester
Cadmium Salt
Carborandum
Chlorohydric Acid
Columbium
Dialkyl Toluidine
Dipotassium salt
Ether
Isophorone
Lead Salt
Methyltriacetoxysilane
Monoethyl Ether
Nickel Salt
Phthalate
Polyaliphatic Amine
Polyamine
Sodium 2-Pyridinethion-1-oxide
Sulfonic Acids
Tetra Sodium Salt
Thallium Salt
Zinc Dihydrogen

APPENDIX C

SOIL DATA

FOOTNOTES

Soil

CUT = Cuttings

D = Duplicate sample

NA = Not analyzed

ND = Not detected (no laboratory detection limits provided)

B = Analyte detected in quantity above instrument detection limit but below contract-required detection limit

J = Estimated quantity

R = Unusable data

U = Undetected

UJ = Analyte may or may not have been detected; sample quantitation limits adjusted or estimated

/A/ = Atomic absorption method

/C/ = Total and amenable cyanide

/CV/ = Atomic absorption, cold vapor method

/F/ = Atomic absorption, graphite furnace method

/P/ = Induced coupled plasma method

a - For organic analytes, Acurex, Enseco, and Soil Control reported values in micrograms per kilogram (ug/kg). Data from other laboratories have been converted to ug/kg. Multi-Tech reported values in milligrams per kilogram (mg/kg). Stoner reported values for DH-1 in parts per billion (ppb); the remainder of the Stoner analytical results and all of the Sequoia data from 1987 were reported in parts per million (ppm). Sequoia data for borings SB6-5 and WJ-38 were reported in ug/kg; all other 1988 data from this laboratory were reported in ppb.

b - The site identification number consists of the number of the boring at which the sample was collected, followed by a period and the depth (in feet) of sample collection. For example, the site identification number DH-1.10.5 indicates that the sample was collected from boring DH-1 at a depth of 10.5 feet.

c - The sample identification number consists of a six-digit number representing the sampling date (MMDDYY), followed by a hyphen and a two- to three-digit number expressing the sequence in which sampling points were visited on a given day. In many of the sampling records predating 1988, no sample identification number was used; in these cases, the sample collection date has been recorded in the database.

d - A = Acurex Laboratory

EC = Enseco Incorporated - California Analytical Laboratory

MT = Multi-Tech Laboratories, Inc.

SC = Soil Control Lab

SQ = Sequoia Analytical Laboratory

ST = Stoner Laboratories

e - E/S = EPA subcontractor validation, spot-checked by RLSA

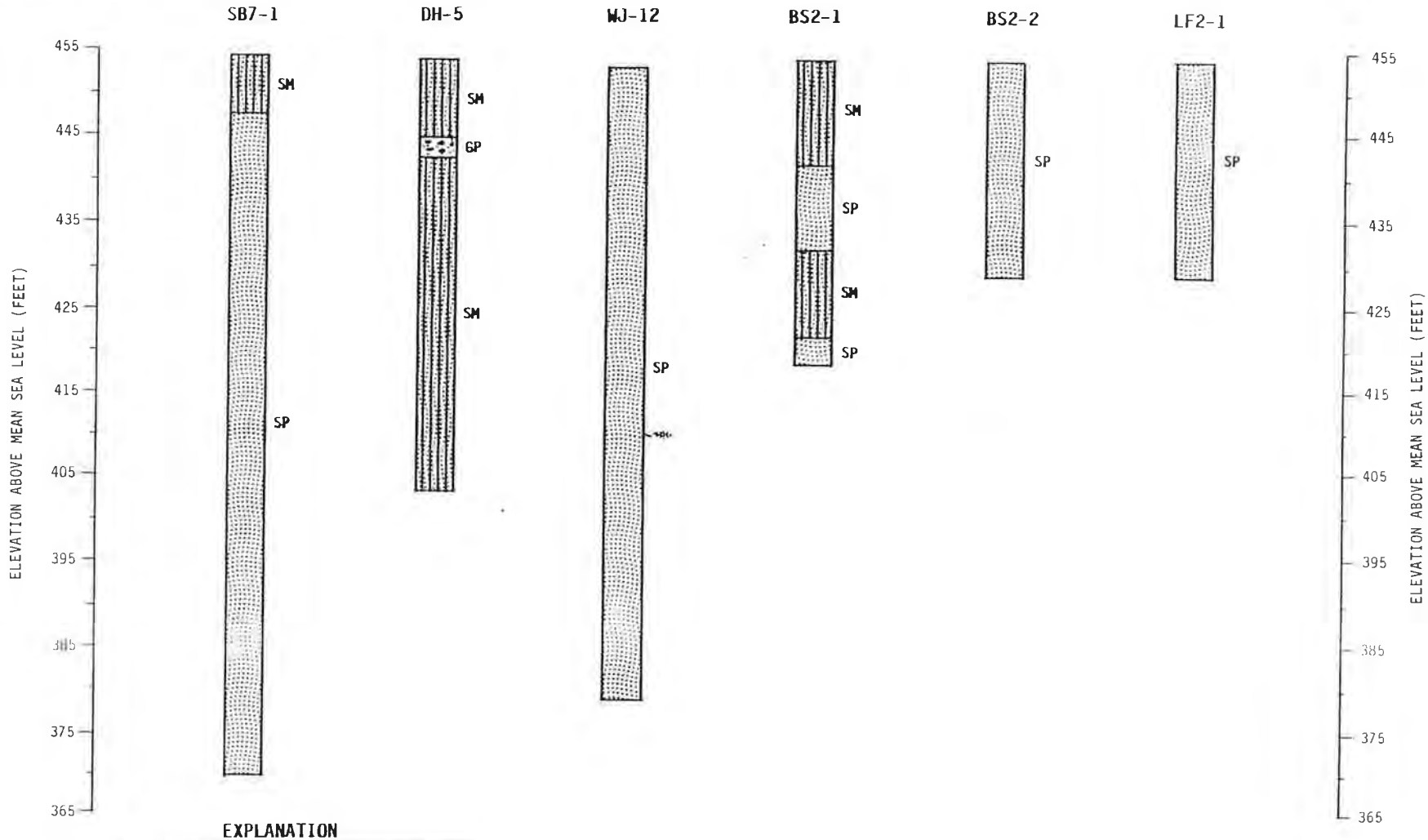
S = RLSA validation

N = No validation

f - Combined cis/trans analysis

g - These values were reported under the heading "TLA" on laboratory analytical data sheets; they are assumed to be analytical results for 1,1,1-trichloroethane.

LITHOLOGIC LOGS OF SOIL BORINGS



EXPLANATION

SB7-1 BORING NUMBER

——— APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

- SAND (SP)
- SAND, SILTY (SM)
- GRAVEL (GP)

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

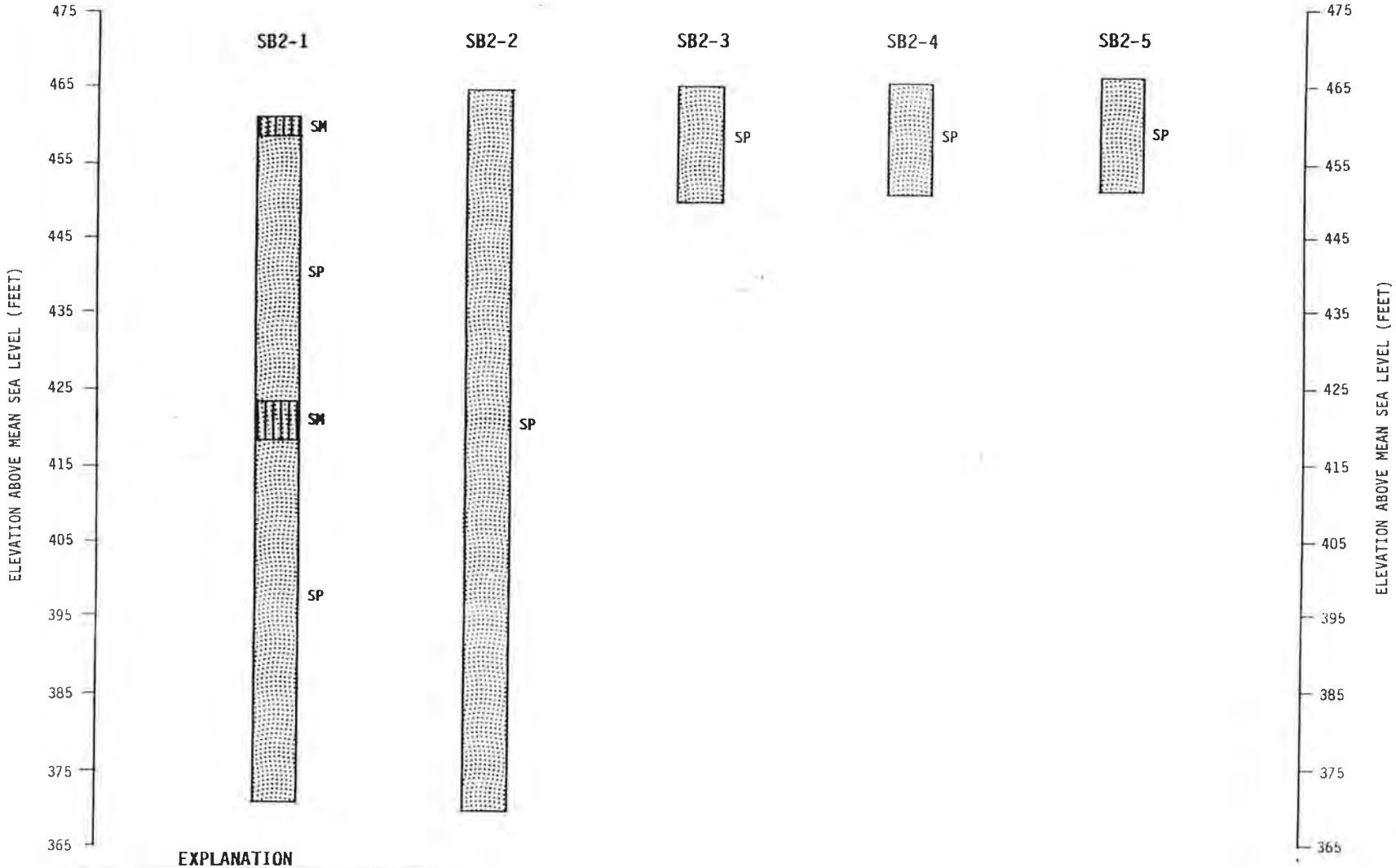
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF SOIL BORINGS NEAR BUILDING 2 DILUTION TANK

FIGURE C.1

WJ007978



EXPLANATION

SB2-1 BORING NUMBER

—— APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

SAND (SP)

SAND, SILTY (SM)

R.L. STOLLAR & ASSOCIATES INC.
Ground Water Consultants

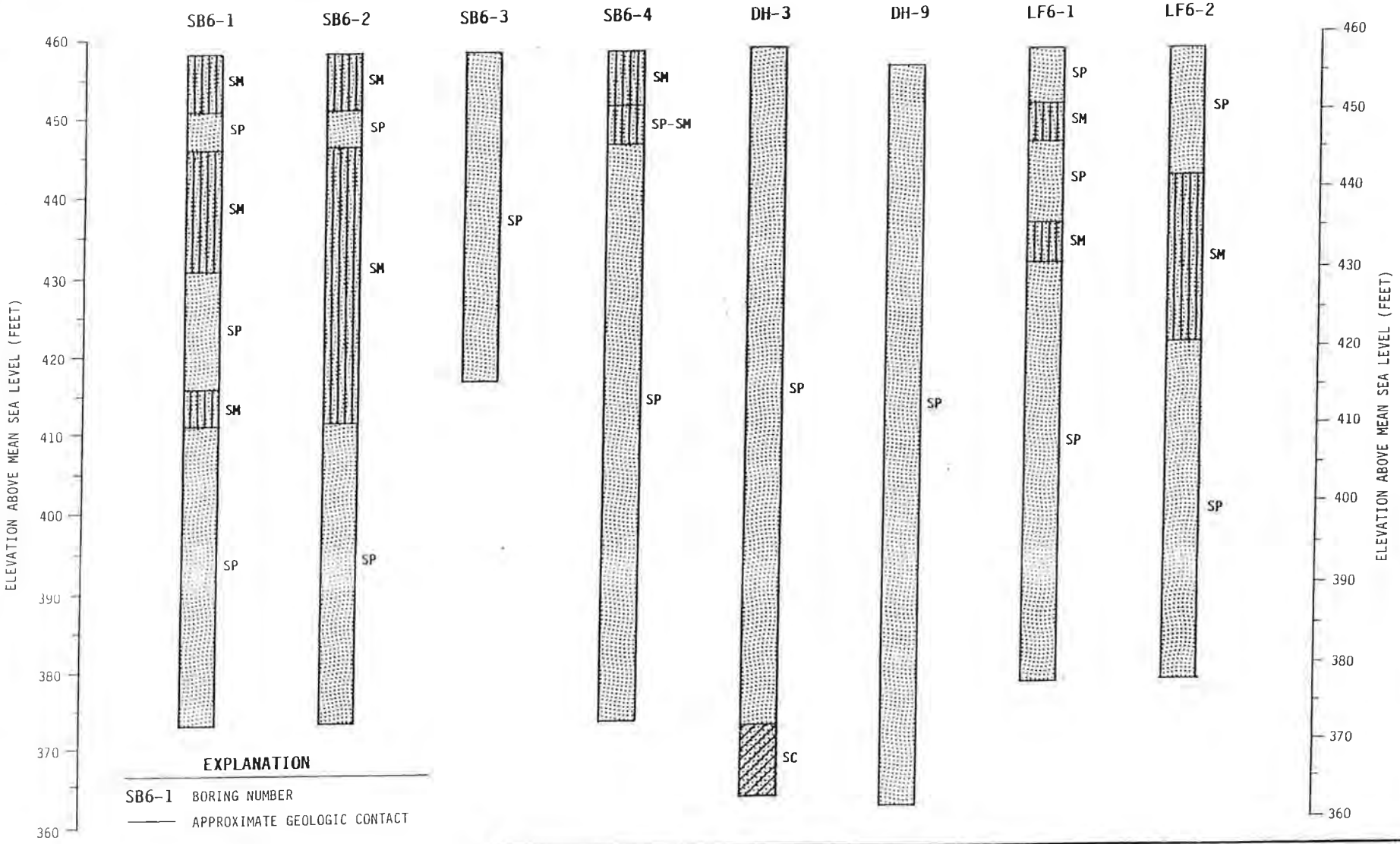
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF SOIL BORINGS NEAR BUILDING 2

FIGURE C.2

VJ007979



EXPLANATION

SB6-1 BORING NUMBER

——— APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

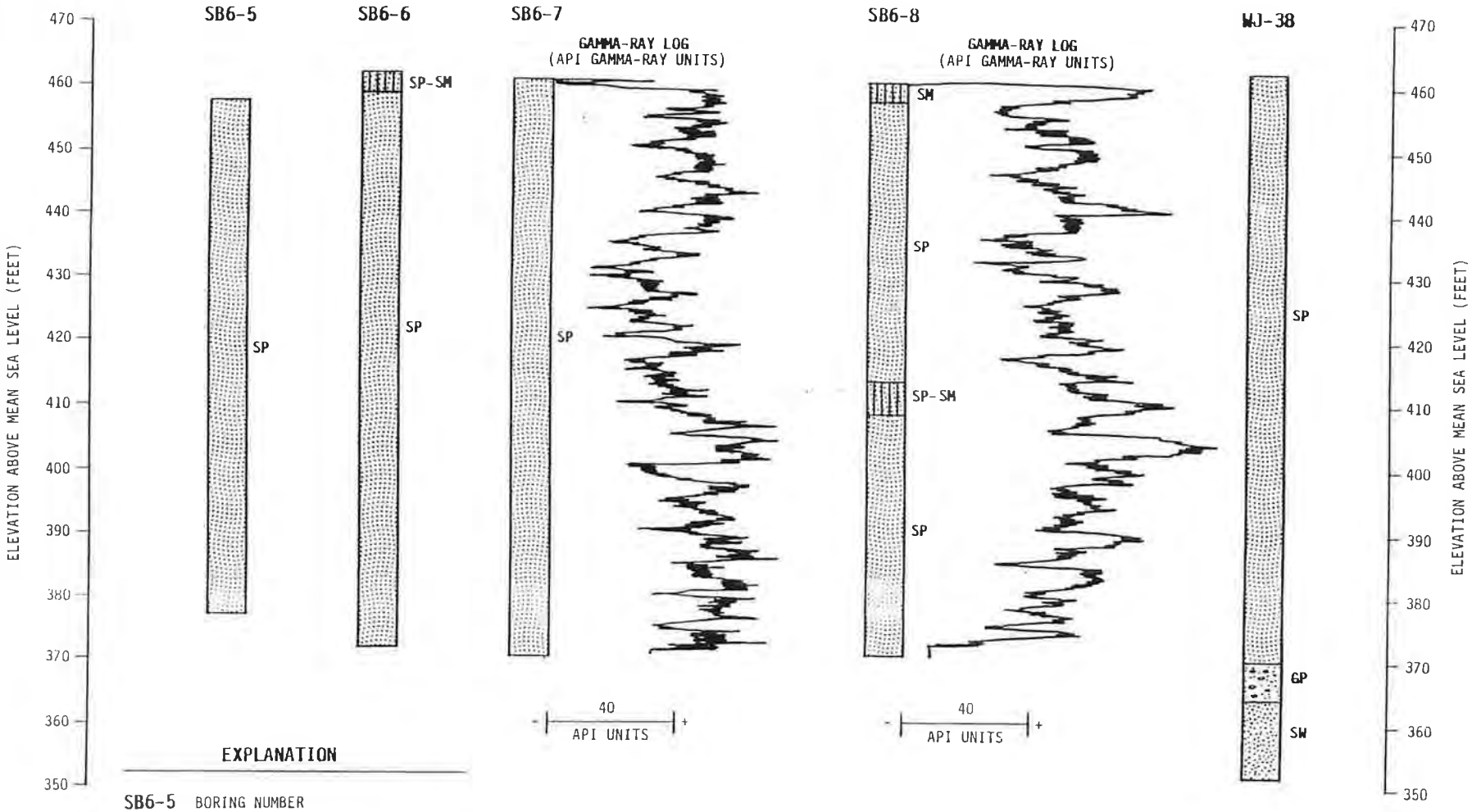
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF SOIL BORINGS NEAR BUILDING 6 DILUTION TANK

FIGURE C.3

WJ007980



EXPLANATION

SB6-5 BORING NUMBER

APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

- SAND (SW)
- SAND, (SP)
- SAND, SILTY (SM)
- GRAVEL (GP)

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

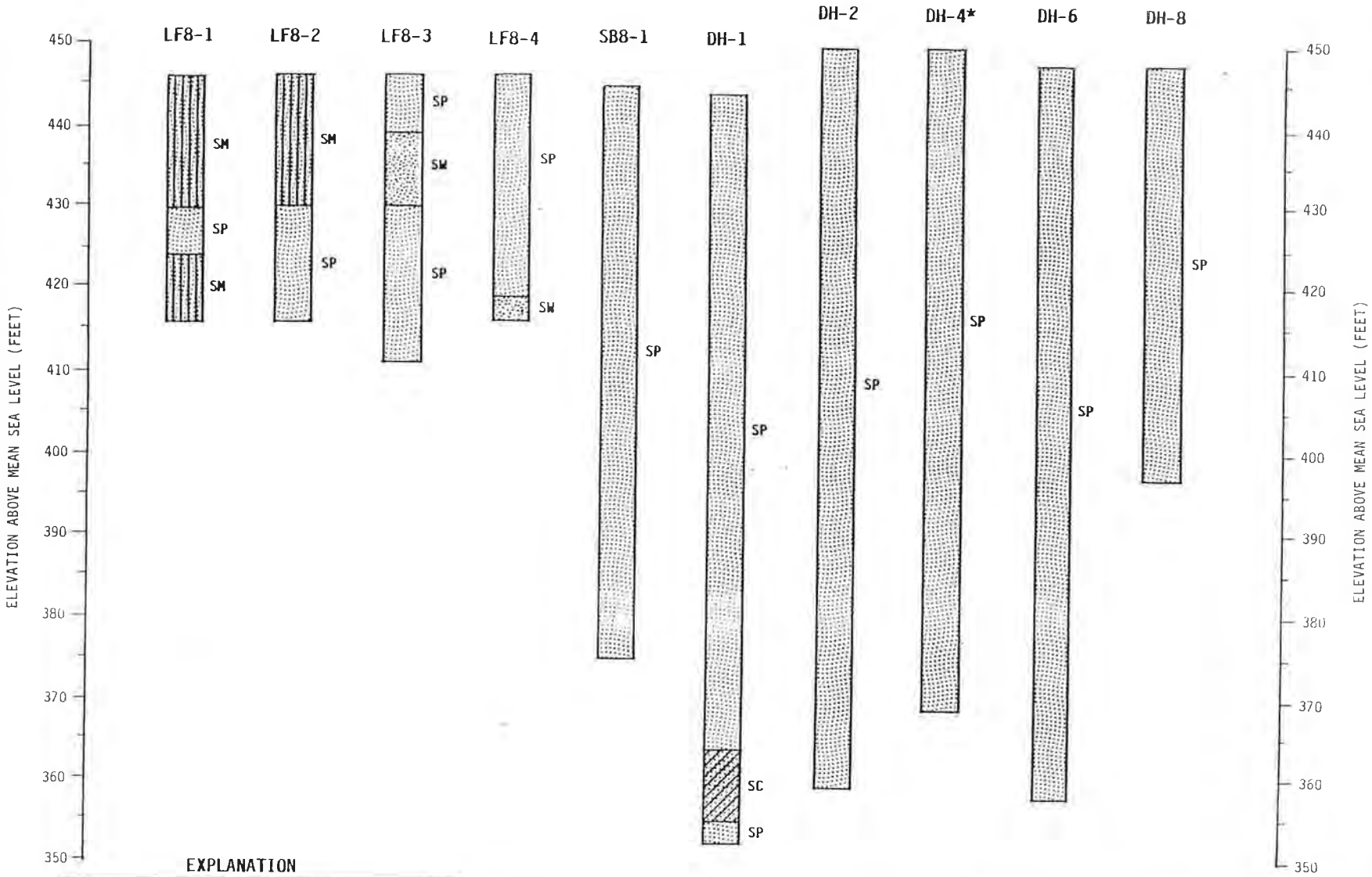
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF SOIL BORINGS NEAR BULDING 6

FIGURE C.4

WJ007981



EXPLANATION

LF8-1 BORING NUMBER

—— APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- SAND, CLAYEY (SC)

* GROUND SURFACE ELEVATION AT DH-4 NOT AVAILABLE

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

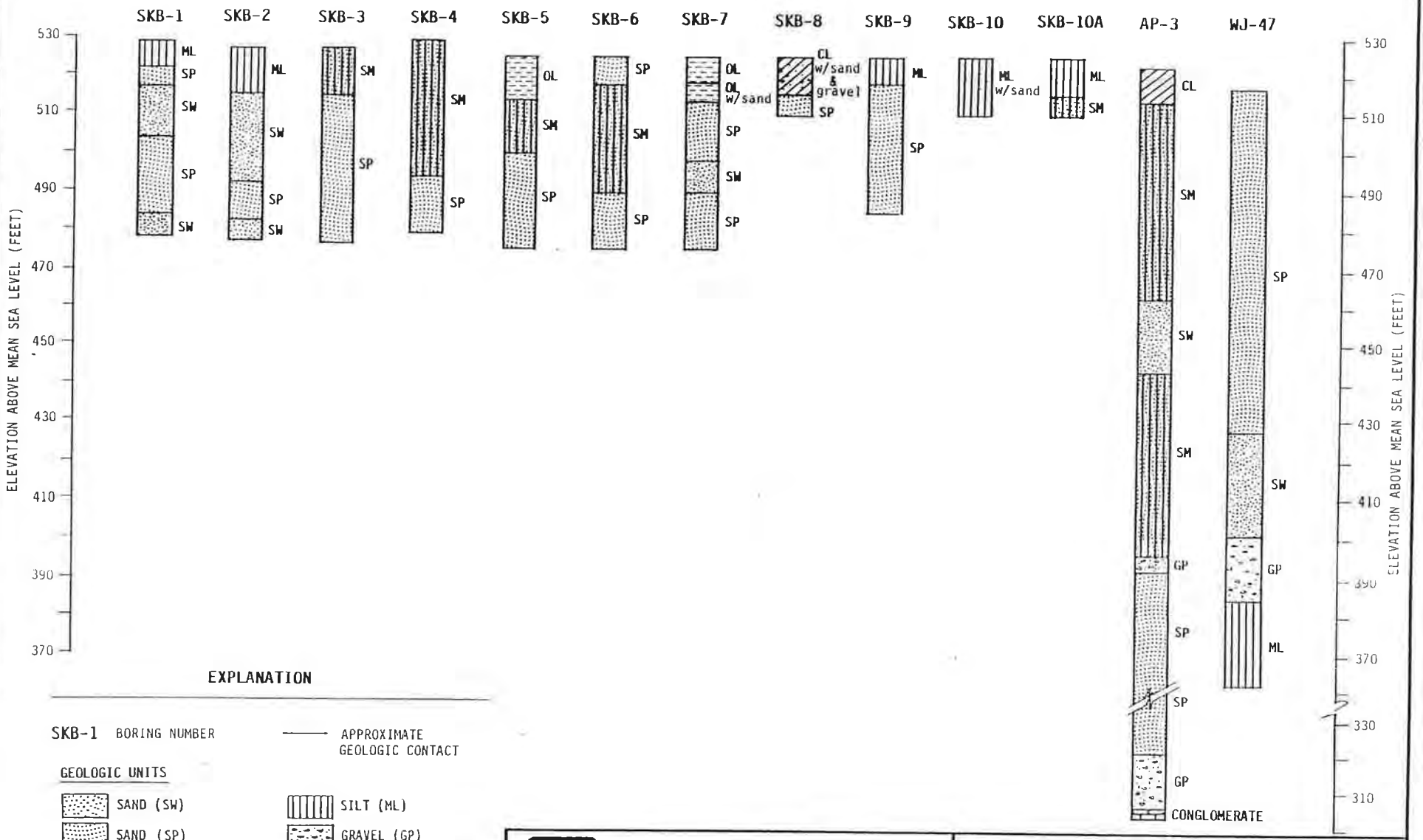
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF SOIL BORINGS NEAR BUILDING 8 LEACH FIELD AND VICINITY

FIGURE C.5

WJ007982



EXPLANATION

SKB-1 BORING NUMBER

APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

- SAND (SW)
- SAND (SP)
- SAND, SILTY (SM)
- CLAY, SILTY (CL)
- SILT (ML)
- GRAVEL (GP)
- ORGANIC SILT-CLAY (OL)
- CEMENTED CONGLOMERATE

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

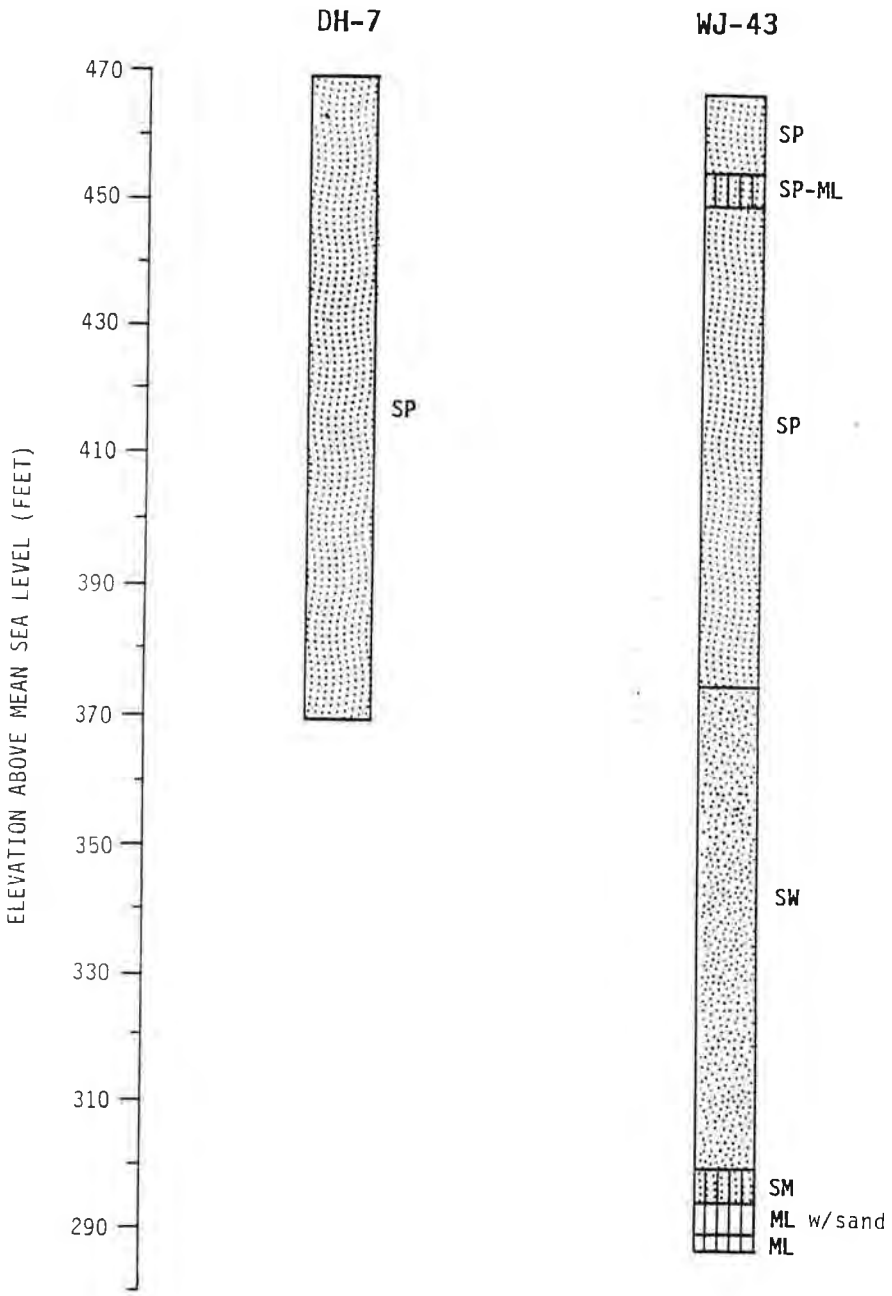
PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF SOIL BORINGS AT SKYPARK AIRPORT

FIGURE C.6

WJ007983



EXPLANATION

DH-7 BORING NUMBER

APPROXIMATE GEOLOGIC CONTACT

GEOLOGIC UNITS

SAND (SW)

SAND (SP)

SAND, SILTY (SM)

SILT (ML)

R.L. STOLLAR & ASSOCIATES INC.
Ground-Water Consultants

PROJECT NAME: WATKINS-JOHNSON CO., SCOTTS VALLEY, CA

PROJECT NO.: 87200-27 | DATE: SEPTEMBER 16, 1988

LITHOLOGIC LOGS OF BACKGROUND SOIL BORINGS

FIGURE C.7

WJ007984

SOIL ANALYSES

PURGEABLE HALOCARBONS - SOIL

(EPA METHOD 8010)

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
DH-6.04	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.09	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.13.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.19	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.24	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.29	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.33.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.38.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.43.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.48.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.53.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.58.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.63.5	07/05/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-6.68.5	07/05/84	NA	NA	NA	U 10	NA	NA	50	NA	NA	NA
DH-7.04.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.09.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.14.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.19.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.24.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.29	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.33.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.38.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.43.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.49	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.53.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.58.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.63.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.68.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.73.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.78.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-7.83.5	07/06/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-8.06	07/17/84	NA	U 1000 (f)	NA	U 10	NA	NA	30	NA	NA	NA
DH-8.11	07/17/84	NA	U 1000 (f)	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-8.16	07/17/84	NA	U 1000 (f)	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-8.21	07/17/84	NA	U 1000 (f)	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-8.26	07/17/84	NA	U 1000 (f)	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.09.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.14.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.18.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.23.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.28.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.33.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.38.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.43.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.48.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA

WJ007987

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
DH-9.53.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.58.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.63.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.68.5	07/09/84	NA	NA	NA	U 10	NA	NA	U 10	NA	NA	NA
DH-9.73.5	07/09/84	NA	NA	NA	U 10	NA	NA	20	NA	NA	NA
LF2-1.05	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF2-1.10	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF2-1.15	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF2-1.20	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF2-1.25	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.05	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.10	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.15	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	290	U 100	NA	U 100
LF6-1.20	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.25	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.30	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.35	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.40	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.45	05/04/87	U 50	89 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.50	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.55	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.60	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.65	05/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.75	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-1.80	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.05	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.10	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.15	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	64	U 100	NA	U 100
LF6-2.20	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.25	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.30	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.35	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.40	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.45	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.50	05/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.55	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.60	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.65	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.70	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.75	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF6-2.80	05/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-1.05	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-1.10	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-1.15	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-1.20	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100

WJ007988

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
LF8-1.25	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-1.30	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-2.05	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-2.10	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-2.15	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-2.20	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-2.25	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-2.30	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-3.05	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	53	U 100	NA	U 100
LF8-3.10	05/08/87	U 50	U 50 (f)	100	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-3.15	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-3.20	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	63	U 100	NA	U 100
LF8-3.25	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-3.30	05/08/87	U 50	U 50 (f)	71	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-3.35	05/08/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-4.05	05/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-4.10	05/11/87	U 50	U 50 (f)	230	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-4.15	05/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-4.20	05/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-4.25	05/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
LF8-4.30	05/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB2-1.01	050388-15	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-1.05	050388-20	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.10	050388-21	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.15	050388-22	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.20	050388-23	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.25	050388-24	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.30	050388-16	U 1	U 1	U 1	U 1	U 1	U 1	33	U 1	U 1	U 1
SB2-1.40	050388-25	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.50	050388-17	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-1.50 D	050388-18	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-1.60	050388-26	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.70	050388-27	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.80	050388-28	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-1.85	050388-19	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-2.01	050588-06	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-2.05	050588-19	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.10	050588-20	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.15	050588-21	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.20	050588-22	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.25	050588-23	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.30	050588-07	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-2.40	050588-25	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.50	050588-26	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.60	050588-27	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50

WJ007989

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
SB2-2.65	050588-08	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-2.70	050588-28	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.80	050588-29	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB2-2.90	050588-09	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-3.05	052988-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-3.10	052988-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-3.15	052988-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-4.05	052988-05	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-4.10	052988-06	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-4.15	052988-07	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-5.01	042188-01	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-5.05	053088-01	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-5.10	053088-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB2-5.15	053088-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-1.05	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	560	U 100	NA	U 100
SB6-1.10	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.15	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	1600	U 100	NA	U 100
SB6-1.20	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.25	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.30	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.35	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.40	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.45	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.50	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.55	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.60	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.65	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.70	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.75	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.80	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-1.85	03/18/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.05	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	650	U 100	NA	U 100
SB6-2.10	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.15	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	120	U 100	NA	U 100
SB6-2.20	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.25	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.30	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.35	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.40	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.45	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.50	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.55	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.60	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.65	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.70	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
SB6-2.75	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.80	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-2.85	03/19/87	U 50	NA	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-3.15	05/12/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-3.20	05/12/87	U 100	U 100 (f)	U 100	U 100	U 100	U 200	5500	U 200	NA	U 200
SB6-3.25	05/12/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	2200	U 100	NA	U 100
SB6-3.30	05/12/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-3.40	05/12/87	U 50	U 50 (f)	U 50	U 50	U 50	U 100	U 50	U 100	NA	U 100
SB6-4.05	050588-01	U 1	U 1	U 1	U 1	U 1	U 1	46	U 1	U 1	U 1
SB6-4.10	050588-12	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.15	050588-13	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.20	050588-14	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.25	050588-02	U 1	U 1	U 1	U 1	U 1	U 1	J 1	U 1	U 1	U 1
SB6-4.25 D	050588-03	U 1	U 1	U 1	U 1	U 1	U 1	J 1	U 1	U 1	U 1
SB6-4.30	050588-15	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.40	050588-16	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.50	050588-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-4.60	050588-17	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.70	050588-18	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-4.80	050588-05	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-5.10	050788-15	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-5.15	050788-19	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.20	050788-20	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.25	050788-21	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.35	050788-16	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-5.40	050788-23	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.50	050788-24	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.55	050788-17	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-5.60	050788-25	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.70	050788-26	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
SB6-5.75	050788-18	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-6.01	042988-01	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-6.05	042988-06	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.10	042988-07	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.15	042988-08	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.20	042988-09	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.25	042988-10	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.30	042988-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-6.30 D	042988-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-6.50	042988-14	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.60	042988-16	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-6.70	042988-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-6.85	042988-05	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-7.01	042788-05	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-7.05	042788-09	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
SB6-7.10	042788-10	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.15	042788-11	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.20	042788-12	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.25	042788-06	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-7.30	042788-13	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.40	042788-15	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.50	042788-17	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.60	042788-19	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.70	042788-07	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-7.80	042788-22	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB6-7.85	042788-08	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-8.05	042788-01	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-8.30	042788-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-8.50	042788-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB6-8.85	042788-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB7-1.01	050288-01	U 1	U 1	U 1	U 1	U 1	U 1	1	U 1	U 1	U 1
SB7-1.05	050288-05	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.10	050288-06	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.15	050288-07	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.25	050288-08	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.26	050288-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB7-1.30	050288-09	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.40	050288-11	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.50	050288-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB7-1.60	050288-14	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.70	050288-16	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB7-1.80	050288-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB8-1.01	050388-01	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB8-1.05	050388-06	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.10	050388-07	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.15	050388-08	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.20	050388-09	U 50	NA	52	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.25	050388-10	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.30	050388-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB8-1.30 D	050388-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB8-1.40	050388-11	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.45	050388-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SB8-1.50	050388-12	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.60	050388-14	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SB8-1.65	050388-05	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
SKB-01.05	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-01.10	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-01.15	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-01.20	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-01.30	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
SKB-01.40	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-01.50	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.05	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.10	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.15	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.20	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.30	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.40	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-02.50	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.05	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.10	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.15	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.20	02/04/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.30	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.40	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-03.50	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.05	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.10	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.15	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.20	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.30	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.40	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-04.50	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.05	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.10	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.15	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.20	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.30	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.40	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-05.50	02/05/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.05	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.10	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.15	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.20	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.30	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.40	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-06.50	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.05	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.10	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.15	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.25	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.30	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.40	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-07.50	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-08.05	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1-DI-CHLORO-ETHANE	CIS-1,2-DICHLORO-ETHENE	CHLORO-FORM	1,1,1-TRI-CHLORO-ETHANE	CARBON TETRA-CHLORIDE	1,2-DICHLORO-ETHANE	TRI-CHLORO-ETHENE	1,2-DICHLORO-PROPANE	DI-BROMO-METHANE	BROMO-DICHLORO-METHANE
SKB-08.10	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-08.15	02/06/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-09.05	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-09.10	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-09.15	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-09.20	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-09.30	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-09.40	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-10.05	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-10A.10	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
SKB-10A.15	02/11/87	U 50	NA	U 50	U 50	U 50	U 50	U 50	U 50	NA	U 50
WJ-12.05	12/10/84	NA	NA	NA	U 100	NA	NA	U 100	NA	NA	NA
WJ-12.09.5	12/10/84	NA	NA	NA	100	NA	NA	100	NA	NA	NA
WJ-12.14.5	12/10/84	NA	NA	NA	100	NA	NA	100	NA	NA	NA
WJ-12.19.5	12/10/84	NA	NA	NA	U 100	NA	NA	9300	NA	NA	NA
WJ-12.24.5	12/10/84	NA	NA	NA	100	NA	NA	100	NA	NA	NA
WJ-12.29.5	12/10/84	NA	NA	NA	U 100	NA	NA	U 100	NA	NA	NA
WJ-24.135	10/29/85	NA	NA	NA	NA	NA	NA	U 1	NA	NA	NA
WJ-27.75	10/30/85	NA	NA	NA	NA	NA	NA	U 1	NA	NA	NA
WJ-38.01	050786-01	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-38.05	050788-05	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.10	050788-06	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.15	050788-07	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.20	050788-08	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.25	050788-09	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.30	050788-02	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-38.40	050788-10	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.50	050788-11	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.60	050788-12	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.65	050788-03	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-38.70	050788-13	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.80	050788-14	U 5.0	NA	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	U 5.0
WJ-38.90	050788-04	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-43.05	050688-10	U 1	U 1	U 1	1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-43.25	050688-11	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-43.25 D	050688-12	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-43.60	050688-13	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1
WJ-43.90	050688-14	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 1

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
AP-3.10	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
AP-3.20	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
AP-3.30	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
AP-3.40	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
AP-3.50	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
BS-1.05	03/27/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS-2.10	03/27/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS-3.11	03/27/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.05	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.10	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.15	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.20	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.25	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.30	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-1.35	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-2.05	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-2.10	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-2.15	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-2.20	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-2.25	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
BS2-2.30	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
DH-1.06	06/11/84	NA	NA	NA	10	NA	NA	NA	NA	NA	NA
DH-1.10.5	06/11/84	NA	NA	NA	10	NA	NA	NA	NA	NA	NA
DH-1.10.5 D	06/11/84	NA	NA	NA	10	NA	NA	NA	NA	NA	NA
DH-1.16	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.21	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.26	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.31	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.36	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.41	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.46	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.51	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.55.5	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.66	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.66 D	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.70.5	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.75.5	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.80	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-1.90	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.05.5	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.10.5	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.15.5	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.25	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.30	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.35	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
DH-2.35 D	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.40	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.45	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.55	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.60	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.65	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.70	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.75	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-2.80	06/11/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.06	06/12/84	NA	NA	NA	13	NA	NA	NA	NA	NA	NA
DH-3.11	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.15.5	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.20.5	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.25.5	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.30.5	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.35.5	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.40.5	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.50	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.55	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.60	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-3.65	06/12/84	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
DH-4.05	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.10	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.15	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.20	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.25	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.30	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.35	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.40	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.45	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.50	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.55	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.60	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.65	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.70	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-4.75	06/01/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-5.05.5	06/15/84	NA	NA	NA	1300	NA	NA	NA	NA	NA	NA
DH-5.06	06/15/84	NA	NA	NA	1400	NA	NA	NA	NA	NA	NA
DH-5.10.5	06/15/84	NA	NA	NA	210	NA	NA	NA	NA	NA	NA
DH-5.11	06/15/84	NA	NA	NA	350	NA	NA	NA	NA	NA	NA
DH-5.15	06/15/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-5.20	06/15/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-5.40	06/15/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-5.45	06/15/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-5.50	06/15/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
DH-6.04	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.09	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.13.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.19	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.24	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.29	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.33.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.38.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.43.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.48.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.53.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.58.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.63.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-6.68.5	07/05/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.04.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.09.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.14.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.19.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.24.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.29	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.33.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.38.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.43.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.49	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.53.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.58.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.63.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.68.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.73.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.78.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-7.83.5	07/06/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-8.06	07/17/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-8.11	07/17/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-8.16	07/17/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-8.21	07/17/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-8.26	07/17/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.09.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.14.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.18.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.23.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.28.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.33.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.38.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.43.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.48.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
DH-9.53.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.58.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.63.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.68.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
DH-9.73.5	07/09/84	NA	NA	NA	U 10	NA	NA	NA	NA	NA	NA
LF2-1.05	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF2-1.10	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF2-1.15	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF2-1.20	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF2-1.25	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.05	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.10	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.15	05/04/87	NA	U 100	U 100	150	U 100	U 200	NA	NA	U 500	NA
LF6-1.20	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.25	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.30	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.35	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.40	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.45	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.50	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.55	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.60	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.65	05/04/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.75	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-1.80	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.05	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.10	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.15	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.20	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.25	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.30	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.35	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.40	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.45	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.50	05/05/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.55	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.60	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.65	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.70	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.75	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF6-2.80	05/06/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-1.05	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-1.10	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-1.15	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-1.20	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA

WJ007998

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
LF8-1.25	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-1.30	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-2.05	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-2.10	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-2.15	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-2.20	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-2.25	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-2.30	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.05	05/08/87	NA	U 100	U. 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.10	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.15	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.20	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.25	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.30	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-3.35	05/08/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-4.05	05/11/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-4.10	05/11/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-4.15	05/11/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-4.20	05/11/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-4.25	05/11/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
LF8-4.30	05/11/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB2-1.01	050388-15	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-1.05	050388-20	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.10	050388-21	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.15	050388-22	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.20	050388-23	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.25	050388-24	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.30	050388-16	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-1.40	050388-25	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.50	050388-17	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-1.50 D	050388-18	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-1.60	050388-26	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.70	050388-27	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.80	050388-28	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-1.85	050388-19	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-2.01	050588-06	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-2.05	050588-19	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.10	050588-20	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.15	050588-21	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.20	050588-22	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.25	050588-23	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.30	050588-07	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-2.40	050588-25	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.50	050588-26	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.60	050588-27	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA

WJ007999

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
SB2-2.65	050588-08	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-2.70	050588-28	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.80	050588-29	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB2-2.90	050588-09	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-3.05	052988-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-3.10	052988-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-3.15	052988-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-4.05	052988-05	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-4.10	052988-06	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-4.15	052988-07	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-5.01	042188-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-5.05	053088-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-5.10	053088-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB2-5.15	053088-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-1.05	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.10	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.15	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.20	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.25	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.30	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.35	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.40	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.45	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.50	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.55	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.60	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.65	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.70	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.75	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.80	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-1.85	03/18/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.05	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.10	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.15	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.20	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.25	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.30	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.35	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.40	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.45	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.50	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.55	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.60	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.65	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.70	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA

VJ008000

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
SB6-2.75	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.80	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-2.85	03/19/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-3.15	05/12/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-3.20	05/12/87	NA	U 200	U 200	U 100	U 200	U 400	NA	NA	U 1000	NA
SB6-3.25	05/12/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-3.30	05/12/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-3.40	05/12/87	NA	U 100	U 100	U 50	U 100	U 200	NA	NA	U 500	NA
SB6-4.05	050588-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-4.10	050588-12	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.15	050588-13	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.20	050588-14	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.25	050588-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-4.25 D	050588-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-4.30	050588-15	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.40	050588-16	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.50	050588-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-4.60	050588-17	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.70	050588-18	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-4.80	050588-05	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-5.10	050788-15	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-5.15	050788-19	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.20	050788-20	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.25	050788-21	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.35	050788-16	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-5.40	050788-23	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.50	050788-24	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.55	050788-17	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-5.60	050788-25	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.70	050788-26	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
SB6-5.75	050788-18	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-6.01	042988-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-6.05	042988-06	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.10	042988-07	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.15	042988-08	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.20	042988-09	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.25	042988-10	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.30	042988-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-6.30 D	042988-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-6.50	042988-14	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.60	042988-16	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-6.70	042988-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-6.85	042988-05	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-7.01	042788-05	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-7.05	042788-09	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA

WJ008001

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
SB6-7.10	042788-10	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.15	042788-11	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.20	042788-12	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.25	042788-06	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-7.30	042788-13	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.40	042788-15	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.50	042788-17	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.60	042788-19	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.70	042788-07	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-7.80	042788-22	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB6-7.85	042788-08	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-8.05	042788-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-8.30	042788-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-8.50	042788-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB6-8.85	042788-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB7-1.01	050288-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB7-1.05	050288-05	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.10	050288-06	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.15	050288-07	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.25	050288-08	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.26	050288-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB7-1.30	050288-09	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.40	050288-11	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.50	050288-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB7-1.60	050288-14	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.70	050288-16	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB7-1.80	050288-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB8-1.01	050388-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB8-1.05	050388-06	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.10	050388-07	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.15	050388-08	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.20	050388-09	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.25	050388-10	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.30	050388-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB8-1.30 D	050388-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB8-1.40	050388-11	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.45	050388-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SB8-1.50	050388-12	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.60	050388-14	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SB8-1.65	050388-05	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
SKB-01.05	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SKB-01.10	02/04/87	U 50.	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SKB-01.15	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SKB-01.20	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA
SKB-01.30	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	NA	NA	NA	U 50	NA

WJ008002

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
SKB-01.40	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-01.50	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.05	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.10	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.15	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.20	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.30	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.40	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-02.50	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.05	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.10	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.15	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.20	02/04/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.30	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.40	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-03.50	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.05	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.10	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.15	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.20	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.30	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.40	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-04.50	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.05	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.10	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.15	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.20	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.30	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.40	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-05.50	02/05/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.05	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.10	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.15	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.20	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.30	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.40	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-06.50	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.05	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.10	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.15	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.25	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.30	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.40	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-07.50	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-08.05	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA

WJ008003

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	2-CHLORO-ETHYL-VINYL-ETHER	TRANS-1,3-DICHLORO-PROPENE	1,1,2-TRI-CHLORO-ETHANE	TETRA-CHLORO-ETHENE	DIBROMO-CHLORO-METHANE	CHLORO-BENZENE	1-CHLORO-HEXANE	1,1,1,2-TETRA-CHLORO-ETHANE	BROMO-FORM	BROMO-BENZENE
SKB-08.10	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-08.15	02/06/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-09.05	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-09.10	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-09.15	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-09.20	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-09.30	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-09.40	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-10.05	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-10A.10	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
SKB-10A.15	02/11/87	U 50	U 50 (f)	U 50	U 50	U 50	U 50	NA	NA	U 50	NA
WJ-12.05	12/10/84	NA	NA	U 100	U 100	NA	NA	NA	NA	NA	NA
WJ-12.09.5	12/10/84	NA	NA	100	100	NA	NA	NA	NA	NA	NA
WJ-12.14.5	12/10/84	NA	NA	100	100	NA	NA	NA	NA	NA	NA
WJ-12.19.5	12/10/84	NA	NA	U 100	U 100	NA	NA	NA	NA	NA	NA
WJ-12.24.5	12/10/84	NA	NA	100	100	NA	NA	NA	NA	NA	NA
WJ-12.29.5	12/10/84	NA	NA	U 100	U 100	NA	NA	NA	NA	NA	NA
WJ-24.135	10/29/85	NA	NA	U 1	NA	NA	NA	NA	NA	NA	NA
WJ-27.75	10/30/85	NA	NA	U 1	NA	NA	NA	NA	NA	NA	NA
WJ-38.01	050788-01	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-38.05	050788-05	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.10	050788-06	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.15	050788-07	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.20	050788-08	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.25	050788-09	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.30	050788-02	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-38.40	050788-10	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.50	050788-11	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.60	050788-12	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.65	050788-03	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-38.70	050788-13	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.80	050788-14	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	NA	NA	U 5.0	NA
WJ-38.90	050788-04	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-43.05	050688-10	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-43.25	050688-11	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-43.25 D	050688-12	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-43.60	050688-13	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2
WJ-43.90	050688-14	U 2	U 2	U 1	U 1	U 1	U 1	U 1	U 1	U 1	U 2

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
SKB-01.40	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-01.50	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.05	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.10	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.15	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.20	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.30	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.40	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-02.50	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.05	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.10	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.15	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.20	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.30	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.40	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-03.50	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.05	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.10	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.15	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.20	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.30	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.40	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-04.50	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.05	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.10	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.15	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.20	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.30	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.40	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-05.50	02/05/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.05	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.10	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.15	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.20	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.30	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.40	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-06.50	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.05	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.10	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.15	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.25	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.30	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.40	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-07.50	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-08.05	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
AP-3.10	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
AP-3.20	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
AP-3.30	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
AP-3.40	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
AP-3.50	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
BS-1.05	03/27/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS-2.10	03/27/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS-3.11	03/27/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.05	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.10	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.15	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.20	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.25	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.30	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-1.35	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-2.05	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-2.10	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-2.15	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-2.20	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-2.25	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
BS2-2.30	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
DH-1.06	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.10.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.10.5 D	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.16	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.21	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.26	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.31	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.36	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.41	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.46	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.51	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.55.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.66	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.66 D	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.70.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.75.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.80	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-1.90	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.05.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.10.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.15.5	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.25	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.30	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.35	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA

WJ008006

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
DH-2.35 D	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.40	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.45	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.55	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.60	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.65	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.70	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.75	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-2.80	06/11/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.06	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.11	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.15.5	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.20.5	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.25.5	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.30.5	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.35.5	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.40.5	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.50	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.55	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.60	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-3.65	06/12/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.05	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.10	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.15	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.20	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.25	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.30	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.35	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.40	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.45	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.50	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.55	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.60	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.65	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.70	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-4.75	06/01/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.05.5	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.06	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.10.5	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.11	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.15	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.20	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.40	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.45	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-5.50	06/15/84	NA	NA	NA	NA	NA	NA	NA	NA	NA

WJ008007

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
DH-6.04	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.09	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.13.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.19	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.24	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.29	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.33.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.38.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.43.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.48.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.53.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.58.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.63.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-6.68.5	07/05/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.04.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.09.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.14.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.19.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.24.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.29	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.33.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.38.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.43.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.49	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.53.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.58.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.63.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.68.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.73.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.78.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-7.83.5	07/06/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-8.06	07/17/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-8.11	07/17/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-8.16	07/17/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-8.21	07/17/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-8.26	07/17/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.09.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.14.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.18.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.23.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.28.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.33.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.38.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.43.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.48.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA

WJ008008

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
DH-9.53.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.58.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.63.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.68.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
DH-9.73.5	07/09/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
LF2-1.05	05/06/87	U 100	NA	NA	NA	NA	NA	NA	NA	NA
LF2-1.10	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF2-1.15	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF2-1.20	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF2-1.25	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.05	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.10	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.15	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.20	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.25	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.30	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.35	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.40	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.45	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.50	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.55	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.60	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.65	05/04/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.75	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-1.80	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.05	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.10	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.15	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.20	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.25	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.30	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.35	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.40	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.45	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.50	05/05/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.55	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.60	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.65	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.70	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.75	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF6-2.80	05/06/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-1.05	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-1.10	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-1.15	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-1.20	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200

WJ008009

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
LF8-1.25	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-1.30	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-2.05	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-2.10	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-2.15	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-2.20	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-2.25	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-2.30	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.05	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.10	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.15	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.20	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.25	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.30	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-3.35	05/08/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-4.05	05/11/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-4.10	05/11/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-4.15	05/11/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-4.20	05/11/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-4.25	05/11/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
LF8-4.30	05/11/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB2-1.01	050388-15	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-1.05	050388-20	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.10	050388-21	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.15	050388-22	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.20	050388-23	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.25	050388-24	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.30	050388-16	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-1.40	050388-25	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.50	050388-17	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-1.50 D	050388-18	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-1.60	050388-26	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.70	050388-27	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.80	050388-28	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-1.85	050388-19	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-2.01	050588-06	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-2.05	050588-19	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.10	050588-20	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.15	050588-21	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.20	050588-22	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.25	050588-23	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.30	050588-07	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-2.40	050588-25	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.50	050588-26	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.60	050588-27	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA

WJ008010

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
SB2-2.65	050588-08	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-2.70	050588-28	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.80	050588-29	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB2-2.90	050588-09	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-3.05	052988-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-3.10	052988-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-3.15	052988-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-4.05	052988-05	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-4.10	052988-06	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-4.15	052988-07	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-5.01	042188-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-5.05	053088-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-5.10	053088-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB2-5.15	053088-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-1.05	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.10	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.15	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.20	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.25	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.30	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.35	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.40	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.45	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.50	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.55	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.60	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.65	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.70	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.75	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.80	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-1.85	03/18/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.05	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.10	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.15	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.20	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.25	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.30	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.35	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.40	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.45	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.50	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.55	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.60	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.65	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.70	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
SB6-2.75	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.80	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-2.85	03/19/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-3.15	05/12/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-3.20	05/12/87	U 200	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-3.25	05/12/87	U 100	NA	NA	NA	NA	NA	NA	U 400	U 400
SB6-3.30	05/12/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-3.40	05/12/87	U 100	NA	NA	NA	NA	NA	NA	U 200	U 200
SB6-4.05	050588-01	U 1	U 1	U 5	U 1	U 1	3	U 1	NA	NA
SB6-4.10	050588-12	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.15	050588-13	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.20	050588-14	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.25	050588-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-4.25 D	050588-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-4.30	050588-15	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.40	050588-16	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.50	050588-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-4.60	050588-17	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.70	050588-18	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-4.80	050588-05	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-5.10	050788-15	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-5.15	050788-19	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.20	050788-20	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.25	050788-21	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.35	050788-16	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-5.40	050788-23	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.50	050788-24	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.55	050788-17	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-5.60	050788-25	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.70	050788-26	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
SB6-5.75	050788-18	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-6.01	042988-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-6.05	042988-06	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.10	042988-07	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.15	042988-08	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.20	042988-09	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.25	042988-10	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.30	042988-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-6.30 D	042988-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-6.50	042988-14	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.60	042988-16	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-6.70	042988-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-6.85	042988-05	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-7.01	042788-05	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-7.05	042788-09	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA

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WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
SB6-7.10	042788-10	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.15	042788-11	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.20	042788-12	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.25	042788-06	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-7.30	042788-13	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.40	042788-15	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.50	042788-17	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.60	042788-19	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.70	042788-07	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-7.80	042788-22	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB6-7.85	042788-08	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-8.05	042788-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-8.30	042788-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-8.50	042788-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB6-8.85	042788-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB7-1.01	050288-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB7-1.05	050288-05	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.10	050288-06	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.15	050288-07	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.25	050288-08	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.26	050288-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB7-1.30	050288-09	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.40	050288-11	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.50	050288-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB7-1.60	050288-14	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.70	050288-16	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB7-1.80	050288-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB8-1.01	050388-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB8-1.05	050388-06	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.10	050388-07	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.15	050388-08	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.20	050388-09	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.25	050388-10	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.30	050388-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB8-1.30 D	050388-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB8-1.40	050388-11	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.45	050388-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SB8-1.50	050388-12	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.60	050388-14	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SB8-1.65	050388-05	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
SKB-01.05	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-01.10	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-01.15	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-01.20	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-01.30	02/04/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA

WATKINS JOHNSON
PURGEABLE HALOCARBONS (EPA METHOD 8010)
SOIL ANALYSIS
(IN MICROGRAMS PER KILOGRAM)(a)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,1,2,2-TETRA-CHLORO ETHANE	1,2,3-TRI-CHLORO-PROPANE	CHLORO-TOLUENE	1,3-DI-CHLORO-BENZENE	1,4-DI-CHLORO-BENZENE	BENZYL CHLORIDE	1,2-DI-CHLORO-BENZENE	CIS-1,3-DICHLORO-PROPENE	1,2-DIBROMO-ETHANE
SKB-08.10	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-08.15	02/06/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-09.05	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-09.10	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-09.15	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-09.20	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-09.30	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-09.40	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-10.05	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-10A.10	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
SKB-10A.15	02/11/87	U 50	NA	NA	U 50	U 50	NA	U 50	U 50 (f)	NA
WJ-12.05	12/10/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-12.09.5	12/10/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-12.14.5	12/10/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-12.19.5	12/10/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-12.24.5	12/10/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-12.29.5	12/10/84	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-24.135	10/29/85	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-27.75	10/30/85	NA	NA	NA	NA	NA	NA	NA	NA	NA
WJ-38.01	050788-01	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-38.05	050788-05	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.10	050788-06	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.15	050788-07	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.20	050788-08	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.25	050788-09	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.30	050788-02	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-38.40	050788-10	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.50	050788-11	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.60	050788-12	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.65	050788-03	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-38.70	050788-13	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.80	050788-14	U 5.0	NA	NA	U 10	U 10	NA	U 10	U 5.0	NA
WJ-38.90	050788-04	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-43.05	050688-10	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-43.25	050688-11	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-43.25 D	050688-12	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-43.60	050688-13	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA
WJ-43.90	050688-14	U 1	U 1	U 5	U 1	U 1	U 2	U 1	NA	NA

WJ008014

VOLATILE ORGANICS - SOIL

(EPA METHOD 8240)

WATKINS JOHNSON
VOLATILE ORGANICS (EPA METHOD 8240)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	QA(e)	CHLORO-METHANE		BROMO-METHANE		VINYL CHLORIDE		CHLORO-ETHANE		METHYLENE CHLORIDE		ACETONE		CARBON DISULFIDE		1,1-DICHLORO-ETHENE		1,1-DICHLORO-ETHANE
SB2-1.01	050388-15	E/S	U 10	U 10	U 10	U 10	U 10	UJ 9	UJ 16	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-1.30	050388-16	E/S	U 10	U 10	U 10	U 10	U 10	UJ 8	UJ 17	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-1.50	050388-17	E/S	U 10	U 10	U 10	U 10	U 10	UJ 8	UJ 15	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-1.50 D	050388-18	E/S	U 10	U 10	U 10	U 10	U 10	UJ 9	UJ 15	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-1.80	050388-19	E/S	U 10	U 10	U 10	U 10	U 10	UJ 8	UJ 18	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-2.01	050588-06	E/S	U 10	U 10	U 10	U 10	U 10	UJ 3	UJ 17	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-2.30	050588-07	E/S	U 10	U 10	U 10	U 10	U 10	UJ 3	UJ 13	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-2.65	050588-08	E/S	U 10	U 10	U 10	U 10	U 10	UJ 19	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-2.90	050588-09	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 16	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-3.03	042188-03	E/S	UJ 10	UJ 10	UJ 10	UJ 10	UJ 10	UJ 19	UJ 20	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5
SB2-3.05	052988-02	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-3.10	052988-03	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 10	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-3.15	052988-04	E/S	U 10	U 10	U 10	U 10	U 10	U 25	UJ 15	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-4.02.5	042188-02	E/S	UJ 10	UJ 10	UJ 10	UJ 10	UJ 10	UJ 5	UJ 10	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5
SB2-4.05	052988-05	E/S	U 10	U 10	U 10	U 10	U 10	UJ 26	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-4.10	052988-06	E/S	U 10	U 10	U 10	U 10	U 10	UJ 26	UJ 17	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-4.15	052988-07	E/S	U 10	U 10	U 10	U 10	U 10	UJ 24	UJ 17	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-5.01	042188-01	E/S	UJ 10	UJ 10	UJ 10	UJ 10	UJ 10	UJ 6	UJ 16	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5
SB2-5.05	053088-01	E/S	U 10	U 10	U 10	U 10	U 10	UJ 26	UJ 20	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-5.10	053088-02	E/S	U 10	U 10	U 10	U 10	U 10	UJ 26	UJ 18	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB2-5.15	053088-03	E/S	U 10	U 10	U 10	U 10	U 10	UJ 3	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-4.05	050588-01	E/S	U 10	U 10	U 10	U 10	U 10	UJ 4	UJ 10	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-4.25	050588-02	E/S	U 10	U 10	U 10	U 10	U 10	UJ 3	UJ 13	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-4.25 D	050588-03	E/S	U 10	U 10	U 10	U 10	U 10	UJ 3	UJ 17	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-4.50	050588-04	E/S	U 10	U 10	U 10	U 10	U 10	UJ 3	UJ 19	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-4.80	050588-05	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 21	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-5.10	050788-15	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 13	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-5.35	050788-16	E/S	U 10	U 10	U 10	U 10	U 10	UJ 7	UJ 13	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-5.55	050788-17	E/S	U 10	U 10	U 10	U 10	U 10	UJ 7	UJ 16	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-5.75	050788-18	E/S	U 10	U 10	U 10	U 10	U 10	UJ 6	UJ 21	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-6.01	042988-01	E/S	U 10	U 10	U 10	U 10	U 10	UJ 6	UJ 15	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-6.30	042988-02	E/S	U 10	U 10	U 10	U 10	U 10	UJ 6	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-6.30 D	042988-03	E/S	U 10	U 10	U 10	U 10	U 10	UJ 7	UJ 13	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-6.70	042988-04	E/S	U 10	U 10	U 10	U 10	U 10	UJ 7	UJ 16	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-6.85	042988-05	E/S	U 10	U 10	U 10	U 10	U 10	UJ 6	UJ 19	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-7.01	042788-05	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 8	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-7.25	042788-06	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 6	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-7.70	042788-07	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 10	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-7.85	042788-08	E/S	U 10	U 10	U 10	U 10	U 10	UJ 19	UJ 17	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5	UJ 5
SB6-8.05	042788-01	E/S	UJ 10	UJ 10	UJ 10	UJ 10	UJ 10	UJ 3	UJ 11	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-8.30	042788-02	E/S	U 10	U 10	U 10	U 10	U 10	UJ 2	UJ 8	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-8.50	042788-03	E/S	U 10	U 10	U 10	U 10	U 10	UJ 6	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB6-8.85	042788-04	E/S	U 10	U 10	U 10	U 10	U 10	UJ 9	UJ 15	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB7-1.01	050288-01	E/S	U 10	U 10	U 10	U 10	U 10	UJ 6	UJ 14	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB7-1.26	050288-02	E/S	U 10	U 10	U 10	U 10	U 10	UJ 5	UJ 11	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB7-1.50	050288-03	E/S	U 10	U 10	U 10	U 10	U 10	UJ 11	UJ 18	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5
SB7-1.80	050288-04	E/S	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10	U 10

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WATKINS JOHNSON
VOLATILE ORGANICS (EPA METHOD 8240)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	QA(e)	CHLORO-METHANE	BROMO-METHANE	VINYL CHLORIDE	CHLORO-ETHANE	METHYLENE CHLORIDE	ACETONE	CARBON DISULFIDE	1,1-DICHLORO-ETHENE	1,1-DICHLORO-ETHANE
SB8-1.01	050388-01	E/S	U 10	U 10	U 10	U 10	UJ 9	UJ 17	U 5	U 5	U 5
SB8-1.30	050388-02	E/S	U 10	U 10	U 10	U 10	UJ 9	UJ 43	U 5	U 5	U 5
SB8-1.30 D	050388-03	E/S	U 10	U 10	U 10	U 10	UJ 8	UJ 14	U 5	U 5	U 5
SB8-1.45	050388-04	E/S	U 10	U 10	U 10	U 10	UJ 8	UJ 18	U 5	U 5	U 5
SB8-1.65	050388-05	E/S	U 10	U 10	U 10	U 10	UJ 8	UJ 21	U 5	U 5	U 5
WJ-38.01	050788-01	E/S	U 10	U 10	U 10	U 10	UJ 3	UJ 14	U 5	U 5	U 5
WJ-38.30	050788-02	E/S	U 10	U 10	U 10	U 10	UJ 2	UJ 11	U 5	U 5	U 5
WJ-38.65	050788-03	E/S	U 10	U 10	U 10	U 10	UJ 2	UJ 19	U 5	U 5	U 5
WJ-38.90	050788-04	E/S	U 10	U 10	U 10	U 10	UJ 3	UJ 14	U 5	U 5	U 5
WJ-43.010	050688-05	E/S	U 10	U 10	U 10	U 10	UJ 11	UJ 14	U 5	U 5	U 5
WJ-43.035	050688-06	E/S	U 10	U 10	U 10	U 10	UJ 12	UJ 15	U 5	U 5	U 5
WJ-43.035 D	050688-07	E/S	U 10	U 10	U 10	U 10	UJ 11	UJ 19	U 5	U 5	U 5
WJ-43.070	050688-08	E/S	U 10	U 10	U 10	U 10	UJ 11	UJ 9	U 5	U 5	U 5
WJ-43.100	050688-09	E/S	U 10	U 10	U 10	U 10	UJ 11	UJ 14	U 5	U 5	U 5

WATKINS JOHNSON
VOLATILE ORGANICS (EPA METHOD 8240)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,2-DICHLORO-ETHENE		CHLORO-FORM		1,2-DICHLORO-ETHANE		2-BUTANONE		1,1,1-TRICHLORO-ETHANE		CARBON TETRA-CHLORIDE		VINYL ACETATE		BROMO-DICHLORO-METHANE		1,2-DICHLORO-PROPANE	
SB2-1.01	050388-15	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-1.30	050388-16	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-1.50	050388-17	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-1.50 D	050388-18	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-1.80	050388-19	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-2.01	050588-06	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-2.30	050588-07	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-2.65	050588-08	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-2.90	050588-09	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-3.03	042188-03	UJ	5	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5
SB2-3.05	052988-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-3.10	052988-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-3.15	052988-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-4.02.5	042188-02	UJ	5	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5
SB2-4.05	052988-05	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-4.10	052988-06	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-4.15	052988-07	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-5.01	042188-01	UJ	5	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5
SB2-5.05	053088-01	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-5.10	053088-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB2-5.15	053088-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-4.05	050588-01	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-4.25	050588-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-4.25 D	050588-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-4.50	050588-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-4.80	050588-05	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-5.10	050788-15	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-5.35	050788-16	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-5.55	050788-17	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-5.75	050788-18	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-6.01	042988-01	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-6.30	042988-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-6.30 D	042988-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-6.70	042988-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-6.85	042988-05	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-7.01	042788-05	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-7.25	042788-06	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-7.70	042788-07	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-7.85	042788-08	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-8.05	042788-01	UJ	5	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5	UJ	10	UJ	5	UJ	5
SB6-8.30	042788-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-8.50	042788-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB6-8.85	042788-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB7-1.01	050288-01	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB7-1.26	050288-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB7-1.50	050288-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB7-1.80	050288-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5

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WATKINS JOHNSON
VOLATILE ORGANICS (EPA METHOD 8240)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	1,2-DICHLORO-ETHENE		CHLORO-FORM		1,2-DICHLORO-ETHANE		2-BUTANONE		1,1,1-TRICHLORO-ETHANE		CARBON TETRA-CHLORIDE		VINYL ACETATE		BROMO-DICHLORO-METHANE		1,2-DICHLORO-PROPANE
SB8-1.01	050388-01	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB8-1.30	050388-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB8-1.30 D	050388-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB8-1.45	050388-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
SB8-1.65	050388-05	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-38.01	050788-01	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-38.30	050788-02	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-38.65	050788-03	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-38.90	050788-04	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-43.010	050688-05	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-43.035	050688-06	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-43.035 D	050688-07	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-43.070	050688-08	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5
WJ-43.100	050688-09	U	5	U	5	U	5	U	10	U	5	U	5	U	10	U	5	U	5

WATKINS JOHNSON
VOLATILE ORGANICS (EPA METHOD 8240)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	CIS-1,3-DICHLORO-PROPENE		TRI-CHLORO-ETHENE		DIBROMO-CHLORO-METHANE		1,1,2-TRI-CHLORO-ETHANE		BENZENE		TRANS-1,3-DICHLORO-PROPENE		BROMOFORM		4-METHYL-2-PENTANONE		2-HEXANONE	
SB2-1.01	050388-15	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-1.30	050388-16	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-1.50	050388-17	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-1.50 D	050388-18	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-1.80	050388-19	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-2.01	050588-06	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-2.30	050588-07	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-2.65	050588-08	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-2.90	050588-09	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-3.03	042188-03	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	10	UJ	10
SB2-3.05	052988-02	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-3.10	052988-03	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB2-3.15	052988-04	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB2-4.02.5	042188-02	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	10	UJ	10
SB2-4.05	052988-05	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB2-4.10	052988-06	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB2-4.15	052988-07	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB2-5.01	042188-01	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	10	UJ	10
SB2-5.05	053088-01	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB2-5.10	053088-02	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB2-5.15	053088-03	U	5	U	5	U	5	U	5	UJ	3	U	5	U	5	U	10	U	10
SB6-4.05	050588-01	U	5	J	21	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-4.25	050588-02	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-4.25 D	050588-03	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-4.50	050588-04	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-4.80	050588-05	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-5.10	050788-15	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-5.35	050788-16	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-5.55	050788-17	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-5.75	050788-18	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-6.01	042988-01	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-6.30	042988-02	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-6.30 D	042988-03	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-6.70	042988-04	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-6.85	042988-05	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-7.01	042788-05	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-7.25	042788-06	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-7.70	042788-07	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-7.85	042788-08	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-8.05	042788-01	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	5	UJ	10	UJ	10
SB6-8.30	042788-02	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-8.50	042788-03	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB6-8.85	042788-04	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB7-1.01	050288-01	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB7-1.26	050288-02	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB7-1.50	050288-03	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10
SB7-1.80	050288-04	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	10	U	10

WJ008020

SEMIVOLATILE ORGANICS - SOIL

(EPA METHOD 8270)

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	QA(e)	PHENOL	BIS (2-CHLORO-ETHYL) ETHER	2-CHLORO-PHENOL	1,3-DICHLORO-BENZENE	1,4-DICHLORO-BENZENE	BENZYL ALCOHOL	1,2-DICHLORO-BENZENE	2-METHYL-PHENOL
SB2-1.01	050388-15	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.30	050388-16	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.50	050388-17	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.50 D	050388-18	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.85	050388-19	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.01	050588-06	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.30	050588-07	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.65	050588-08	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.90	050588-09	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.03	042188-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.05	052988-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.10	052988-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.15	052988-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.02.5	042188-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.05	052988-05	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.10	052988-06	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.15	052988-07	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.01	042188-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.05	053088-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.10	053088-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.15	053088-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.05	050588-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.25	050588-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.25 D	050588-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.50	050588-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.80	050588-05	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.10	050788-15	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.35	050788-16	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.55	050788-17	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.75	050788-18	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.01	042988-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.30	042988-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.30 D	042988-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.70	042988-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.85	042988-05	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.01	042788-05	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.25	042788-06	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.70	042788-07	S	U 330	U 330	U 330	UJ 55	U 330	U 330	U 330	U 330
SB6-7.85	042788-08	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-8.05	042788-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-8.30	042788-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-8.50	042788-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-8.85	042788-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB7-1.01	050288-01	S	U 330	U 330	U 330	J 40	U 330	U 330	U 330	U 330
SB7-1.26	050288-02	S	U 330	U 330	U 330	J 23	U 330	U 330	U 330	U 330
SB7-1.50	050288-03	S	U 330	U 330	U 330	J 28	U 330	U 330	U 330	U 330

WJ008022

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	QA(a)	PHENOL	BIS (2-CHLORO-ETHYL) ETHER	2-CHLORO-PHENOL	1,3-DICHLORO-BENZENE	1,4-DICHLORO-BENZENE	BENZYL ALCOHOL	1,2-DICHLORO-BENZENE	2-METHYL-PHENOL
SB7-1.80	050288-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.01	050388-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.30	050388-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.30 D	050388-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.45	050388-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.65	050388-05	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.01	050788-01	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.30	050788-02	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.65	050788-03	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.90	050788-04	S	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BIS (2-CHLOROISO-PROPYL) ETHER	4-METHYL-PHENOL	N-NITROSO-DI-N-PRO-PYLAMINE	HEXA-CHLORO-ETHANE	NITRO-BENZENE	ISO-PHORONE	2-NITRO-PHENOL	2,4-DIMETHYL-PHENOL	BENZOIC ACID
SB2-1.01	050388-15	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-1.30	050388-16	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-1.50	050388-17	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-1.50 D	050388-18	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-1.85	050388-19	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-2.01	050588-06	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 170
SB2-2.30	050588-07	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 96
SB2-2.65	050588-08	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 73
SB2-2.90	050588-09	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-3.03	042188-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-3.05	052988-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-3.10	052988-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-3.15	052988-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-4.02.5	042188-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-4.05	052988-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-4.10	052988-06	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-4.15	052988-07	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-5.01	042188-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-5.05	053088-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-5.10	053088-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB2-5.15	053088-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-4.05	050588-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-4.25	050588-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 140
SB6-4.25 D	050588-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	UJ 1600
SB6-4.50	050588-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 51
SB6-4.80	050588-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	UJ 1600
SB6-5.10	050788-15	UJ 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-5.35	050788-16	UJ 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-5.55	050788-17	UJ 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-5.75	050788-18	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-6.01	042988-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-6.30	042988-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-6.30 D	042988-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-6.70	042988-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-6.85	042988-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-7.01	042788-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 180
SB6-7.25	042788-06	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 130
SB6-7.70	042788-07	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-7.85	042788-08	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-8.05	042788-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-8.30	042788-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-8.50	042788-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB6-8.85	042788-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB7-1.01	050288-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB7-1.26	050288-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB7-1.50	050288-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BIS (2-CHLOROISO-PROPYL) ETHER	4-METHYL-PHENOL	N-NITROSO-DI-N-PRO-PYLAMINE	HEXA-CHLORO-ETHANE	NITRO-BENZENE	ISO-PHORONE	2-NITRO-PHENOL	2,4-DIMETHYL-PHENOL	BENZOIC ACID
SB7-1.80	050288-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB8-1.01	050388-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB8-1.30	050388-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB8-1.30 D	050388-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	J 140
SB8-1.45	050388-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
SB8-1.65	050388-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 1600
WJ-38.01	050788-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	UJ 1600
WJ-38.30	050788-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	UJ 1600
WJ-38.65	050788-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	UJ 1600
WJ-38.90	050788-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330	UJ 1600

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BIS(2-CHLORO-ETHOXY) METHANE	2,4-DICHLORO-PHENOL	1,2,4-TRI-CHLORO-BENZENE	NAPH-THALENE	4-CHLORO-ANILINE	HEXA-CHLORO-BUTADIENE	4-CHLORO-3-METHYL-PHENOL	2-METHYL-NAPH-THALENE
SB2-1.01	050388-15	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.30	050388-16	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.50	050388-17	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.50 D	050388-18	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.85	050388-19	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.01	050588-06	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.30	050588-07	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.65	050588-08	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.90	050588-09	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.03	042188-03	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-3.05	052988-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.10	052988-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-3.15	052988-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.02.5	042188-02	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-4.05	052988-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.10	052988-06	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.15	052988-07	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-5.01	042188-01	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-5.05	053088-01	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-5.10	053088-02	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-5.15	053088-03	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-4.05	050588-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.25	050588-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.25 D	050588-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.50	050588-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.80	050588-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.10	050788-15	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.35	050788-16	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.55	050788-17	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.75	050788-18	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.01	042988-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.30	042988-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.30 D	042988-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.70	042988-04	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-6.85	042988-05	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-7.01	042788-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.25	042788-06	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.70	042788-07	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-7.85	042788-08	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-8.05	042788-01	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-8.30	042788-02	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-8.50	042788-03	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB6-8.85	042788-04	U 330	U 330	U 330	U 330	UJ 330	U 330	U 330	U 330
SB7-1.01	050288-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB7-1.26	050288-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB7-1.50	050288-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330

WJ008026

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BIS(2-CHLORO-ETHOXY) METHANE	2,4-DICHLORO-PHENOL	1,2,4-TRI-CHLORO-BENZENE	NAPH-THALENE	4-CHLORO-ANILINE	HEXA-CHLORO-BUTADIENE	4-CHLORO-3-METHYL-PHENOL	2-METHYL-NAPH-THALENE
SB7-1.80	050288-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.01	050388-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.30	050388-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.30 D	050388-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.45	050388-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.65	050388-05	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.01	050788-01	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.30	050788-02	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.65	050788-03	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.90	050788-04	U 330	U 330	U 330	U 330	U 330	U 330	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	HEXA-CHLORO-CYCLO-PENTADIENE	2,4,6-TRI-CHLORO-PHENOL	2,4,5-TRI-CHLORO-PHENOL	2-CHLORO-NAPH-THALENE	2-NITRO-ANILINE	DIMETHYL PHTHALATE	ACENA-PHTHY-LENE	2,6-DINITRO-TOLUENE
SB2-1.01	050388-15	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-1.30	050388-16	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-1.50	050388-17	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-1.50 D	050388-18	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-1.85	050388-19	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-2.01	050588-06	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-2.30	050588-07	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-2.65	050588-08	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-2.90	050588-09	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-3.03	042188-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-3.05	052988-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-3.10	052988-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-3.15	052988-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-4.02.5	042188-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-4.05	052988-05	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-4.10	052988-06	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-4.15	052988-07	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-5.01	042188-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-5.05	053088-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-5.10	053088-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB2-5.15	053088-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-4.05	050588-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-4.25	050588-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-4.25 D	050588-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-4.50	050588-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-4.80	050588-05	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-5.10	050788-15	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-5.35	050788-16	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-5.55	050788-17	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-5.75	050788-18	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-6.01	042988-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-6.30	042988-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-6.30 D	042988-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-6.70	042988-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-6.85	042988-05	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-7.01	042788-05	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-7.25	042788-06	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-7.70	042788-07	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-7.85	042788-08	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-8.05	042788-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-8.30	042788-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-8.50	042788-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB6-8.85	042788-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB7-1.01	050288-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB7-1.26	050288-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB7-1.50	050288-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330

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WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	HEXA-CHLORO-CYCLO-PENTADIENE	2,4,6-TRI-CHLORO-PHENOL	2,4,5-TRI-CHLORO-PHENOL	2-CHLORO-NAPH-THALENE	2-NITRO-ANILINE	DIMETHYL PHTHALATE	ACENA-PHTHY-LENE	2,6-DINITRO-TOLUENE
SB7-1.80	050288-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB8-1.01	050388-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB8-1.30	050388-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB8-1.30 D	050388-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB8-1.45	050388-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
SB8-1.65	050388-05	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
WJ-38.01	050788-01	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
WJ-38.30	050788-02	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
WJ-38.65	050788-03	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330
WJ-38.90	050788-04	U 330	U 330	U 1600	U 330	U 1600	U 330	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	3-NITRO-ANILINE	ACENAPH-THENE	2,4-DINITRO-PHENOL	4-NITRO-PHENOL	DI-BENZO-FURAN	2,4-DINITRO-TOLUENE	DI-ETHYL-PHTHALATE	4-CHLORO-PHENYL-PHENYL-ETHER	FLUORENE
SB2-1.01	050388-15	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	J 19	U 330	U 330
SB2-1.30	050388-16	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.50	050388-17	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.50 D	050388-18	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.85	050388-19	U 1600	U 330	U 1600	U 1600	U 330	U 330	J 38	U 330	U 330
SB2-2.01	050588-06	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 22	U 330	U 330
SB2-2.30	050588-07	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-2.65	050588-08	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-2.90	050588-09	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.03	042188-03	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.05	052988-02	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.10	052988-03	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.15	052988-04	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.02.5	042188-02	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.05	052988-05	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.10	052988-06	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.15	052988-07	UJ 1600	U 330	U 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.01	042188-01	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.05	053088-01	UJ 1600	U 330	U 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.10	053088-02	UJ 1600	U 330	U 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.15	053088-03	UJ 1600	U 330	U 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.05	050588-01	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 16	U 330	U 330
SB6-4.25	050588-02	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 29	U 330	U 330
SB6-4.25 D	050588-03	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.50	050588-04	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 19	U 330	U 330
SB6-4.80	050588-05	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 17	U 330	U 330
SB6-5.10	050788-15	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.35	050788-16	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.55	050788-17	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.75	050788-18	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.01	042988-01	U 1600	U 330	U 1600	U 1600	U 330	U 330	J 15	U 330	U 330
SB6-6.30	042988-02	U 1600	U 330	U 1600	U 1600	U 330	U 330	J 20	U 330	U 330
SB6-6.30 D	042988-03	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.70	042988-04	UJ 1600	U 330	UJ 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.85	042988-05	UJ 1600	U 330	UJ 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.01	042788-05	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.25	042788-06	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.70	042788-07	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.85	042788-08	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.05	042788-01	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.30	042788-02	UJ 1600	U 330	UJ 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.50	042788-03	UJ 1600	U 330	UJ 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.85	042788-04	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB7-1.01	050288-01	UJ 1600	U 330	UJ 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB7-1.26	050288-02	UJ 1600	U 330	UJ 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB7-1.50	050288-03	UJ 1600	U 330	UJ 1600	UJ 1600	U 330	U 330	J 17	U 330	U 330

WJ008030

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	3-NITRO-ANILINE	ACENAPH-THENE	2,4-DINITRO-PHENOL	4-NITRO-PHENOL	DI-BENZO-FURAN	2,4-DINITRO-TOLUENE	DI-ETHYL-PHTHALATE	4-CHLORO-PHENYL-PHENYL-ETHER	FLUORENE
SB7-1.80	050288-04	UJ 1600	U 330	UJ 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.01	050388-01	UJ 1600	U 330	UJ 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.30	050388-02	UJ 1600	U 330	UJ 1600	UJ 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.30 D	050388-03	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.45	050388-04	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.65	050388-05	UJ 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
WJ-38.01	050788-01	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
WJ-38.30	050788-02	U 1600	U 330	U 1600	U 1600	U 330	U 330	U 330	U 330	U 330
WJ-38.65	050788-03	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 16	U 330	U 330
WJ-38.90	050788-04	U 1600	U 330	U 1600	U 1600	U 330	U 330	UJ 17	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	4-NITRO-ANILINE	4,6-DINITRO-2-METHYL-PHENOL	N-NITROSO-DIPHENYL-AMINE	4-BROMO-PHENYL-PHENYL-ETHER	HEXA-CHLORO-BENZENE	PENTA-CHLORO-PHENOL	PHENAN-THRENE	ANTH-RACENE	DI-N-BUTYL-PHTHALATE	FLUOR-ANTHENE	PYRENE
SB2-1.01	050388-15	U 1600	U 1600	UJ 46	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.30	050388-16	U 1600	U 1600	UJ 45	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.50	050388-17	U 1600	U 1600	UJ 42	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.50 D	050388-18	U 1600	U 1600	UJ 71	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-1.85	050388-19	U 1600	U 1600	UJ 55	U 330	U 330	U 1600	U 330	U 330	J 72	U 330	U 330
SB2-2.01	050588-06	U 1600	U 1600	UJ 45	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-2.30	050588-07	U 1600	U 1600	UJ 50	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-2.65	050588-08	U 1600	U 1600	UJ 47	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-2.90	050588-09	U 1600	U 1600	UJ 38	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.03	042188-03	U 1600	U 1600	UJ 53	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.05	052988-02	U 1600	U 1600	UJ 40	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.10	052988-03	U 1600	U 1600	UJ 41	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-3.15	052988-04	U 1600	U 1600	UJ 41	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.02.5	042188-02	U 1600	U 1600	UJ 51	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.05	052988-05	U 1600	U 1600	UJ 38	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.10	052988-06	U 1600	U 1600	UJ 46	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-4.15	052988-07	UJ 1600	U 1600	UJ 74	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.01	042188-01	U 1600	U 1600	UJ 67	U 330	U 330	U 1600	U 330	U 330	680	U 330	U 330
SB2-5.05	053088-01	UJ 1600	U 1600	UJ 48	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.10	053088-02	UJ 1600	U 1600	UJ 46	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB2-5.15	053088-03	UJ 1600	U 1600	UJ 46	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.05	050588-01	U 1600	U 1600	UJ 52	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.25	050588-02	UJ 1600	U 1600	UJ 87	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.25 D	050588-03	UJ 1600	U 1600	UJ 64	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.50	050588-04	UJ 1600	U 1600	UJ 63	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-4.80	050588-05	UJ 1600	U 1600	UJ 58	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.10	050788-15	U 1600	U 1600	UJ 49	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.35	050788-16	U 1600	U 1600	UJ 64	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.55	050788-17	U 1600	U 1600	UJ 63	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-5.75	050788-18	U 1600	U 1600	UJ 60	U 330	U 330	U 1600	U 330	U 330	J 31	U 330	U 330
SB6-6.01	042988-01	U 1600	U 1600	UJ 55	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.30	042988-02	U 1600	U 1600	UJ 51	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.30 D	042988-03	U 1600	U 1600	U 330	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.70	042988-04	U 1600	U 1600	UJ 54	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-6.85	042988-05	U 1600	U 1600	UJ 53	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.01	042788-05	U 1600	U 1600	UJ 42	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.25	042788-06	U 1600	U 1600	UJ 40	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.70	042788-07	U 1600	U 1600	UJ 83	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-7.85	042788-08	U 1600	U 1600	UJ 57	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.05	042788-01	U 1600	U 1600	UJ 57	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.30	042788-02	U 1600	U 1600	UJ 51	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB6-8.50	042788-03	U 1600	U 1600	UJ 56	U 330	U 330	U 1600	U 330	U 330	J 22	U 330	U 330
SB6-8.85	042788-04	U 1600	U 1600	UJ 61	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB7-1.01	050288-01	UJ 1600	U 1600	UJ 49	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	J 35
SB7-1.26	050288-02	UJ 1600	U 1600	UJ 40	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB7-1.50	050288-03	UJ 1600	U 1600	UJ 38	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	4-NITRO-ANILINE	4,6-DINITRO-2-METHYL-PHENOL	N-NITROSO-DIPHENYL-AMINE	4-BROMO-PHENYL-PHENYL-ETHER	HEXA-CHLORO-BENZENE	PENTA-CHLORO-PHENOL	PHENAN-THRENE	ANTH-RACENE	DI-N-BUTYL-PHTHALATE	FLUOR-ANTHENE	PYRENE
SB7-1.80	050288-04	UJ 1600	U 1600	UJ 35	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.01	050388-01	UJ 1600	U 1600	UJ 51	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.30	050388-02	UJ 1600	U 1600	UJ 41	U 330	U 330	U 1600	U 330	U 330	J 90	U 330	U 330
SB8-1.30 D	050388-03	U 1600	U 1600	UJ 100	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.45	050388-04	U 1600	U 1600	UJ 51	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
SB8-1.65	050388-05	U 1600	U 1600	UJ 49	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
WJ-38.01	050788-01	UJ 1600	U 1600	UJ 60	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
WJ-38.30	050788-02	UJ 1600	U 1600	UJ 58	U 330	U 330	U 1600	U 330	U 330	J 67	U 330	U 330
WJ-38.65	050788-03	UJ 1600	U 1600	UJ 55	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330
WJ-38.90	050788-04	UJ 1600	U 1600	UJ 48	U 330	U 330	U 1600	U 330	U 330	U 330	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BUTYL-BENZYL-PHTHALATE	3,3'-DICHLORO-BENZIDINE	BENZO (A)ANTH-RACENE	CHRYSENE	BIS (2-ETHYL-HEXYL) PHTHALATE	DI-N-OCTYL PHTHALATE	BENZO(B) FLUOR-ANTHENE	BENZO(K) FLUOR-ANTHENE
SB2-1.01	050388-15	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.30	050388-16	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.50	050388-17	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.50 D	050388-18	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-1.85	050388-19	U 330	U 660	U 330	U 330	J 240	U 330	U 330	U 330
SB2-2.01	050588-06	U 330	U 660	U 330	U 330	J 45	U 330	U 330	U 330
SB2-2.30	050588-07	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.65	050588-08	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-2.90	050588-09	U 330	U 660	U 330	U 330	J 51	U 330	U 330	U 330
SB2-3.03	042188-03	U 330	UJ 660	U 330	U 330	UJ 45	U 330	U 330	U 330
SB2-3.05	052988-02	U 330	U 660	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-3.10	052988-03	U 330	U 660	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-3.15	052988-04	U 330	U 660	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-4.02.5	042188-02	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-4.05	052988-05	U 330	U 660	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-4.10	052988-06	U 330	U 660	U 330	U 330	UJ 330	U 330	U 330	U 330
SB2-4.15	052988-07	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.01	042188-01	U 330	U 660	U 330	U 330	UJ 190	U 330	U 330	U 330
SB2-5.05	053088-01	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.10	053088-02	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB2-5.15	053088-03	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.05	050588-01	U 330	U 660	U 330	U 330	J 34	U 330	U 330	U 330
SB6-4.25	050588-02	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.25 D	050588-03	U 330	U 660	U 330	U 330	440	U 330	U 330	U 330
SB6-4.50	050588-04	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-4.80	050588-05	U 330	U 660	U 330	U 330	J 130	U 330	U 330	U 330
SB6-5.10	050788-15	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.35	050788-16	U 330	U 660	U 330	U 330	J 70	U 330	U 330	U 330
SB6-5.55	050788-17	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-5.75	050788-18	U 330	U 660	U 330	U 330	J 64	U 330	U 330	U 330
SB6-6.01	042988-01	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.30	042988-02	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.30 D	042988-03	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.70	042988-04	U 330	UJ 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-6.85	042988-05	U 330	UJ 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.01	042788-05	U 330	U 660	U 330	U 330	J 96	U 330	U 330	U 330
SB6-7.25	042788-06	U 330	U 660	U 330	U 330	J 76	U 330	U 330	U 330
SB6-7.70	042788-07	U 330	UJ 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-7.85	042788-08	U 330	UJ 660	U 330	U 330	J 48	U 330	U 330	U 330
SB6-8.05	042788-01	U 330	UJ 660	U 330	U 330	U 330	U 330	U 330	U 330
SB6-8.30	042788-02	U 330	U 660	U 330	U 330	J 150	U 330	U 330	U 330
SB6-8.50	042788-03	U 330	U 660	U 330	U 330	J 62	U 330	U 330	U 330
SB6-8.85	042788-04	U 330	U 660	U 330	U 330	J 44	U 330	U 330	U 330
SB7-1.01	050288-01	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB7-1.26	050288-02	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB7-1.50	050288-03	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330

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WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BUTYL-BENZYL-PHTHALATE	3,3'-DICHLORO-BENZIDINE	BENZO (A)ANTH-RACENE	CHRYSENE	BIS (2-ETHYL-HEXYL) PHTHALATE	DI-N-OCTYL PHTHALATE	BENZO(B) FLUOR-ANTHENE	BENZO(K) FLUOR-ANTHENE
SB7-1.80	050288-04	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.01	050388-01	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.30	050388-02	U 330	U 660	U 330	U 330	950	U 330	U 330	U 330
SB8-1.30 D	050388-03	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
SB8-1.45	050388-04	U 330	U 660	U 330	U 330	J 55	U 330	U 330	U 330
SB8-1.65	050388-05	U 330	U 660	U 330	U 330	J 60	U 330	U 330	U 330
WJ-38.01	050788-01	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.30	050788-02	U 330	U 660	U 330	U 330	J 300	U 330	U 330	U 330
WJ-38.65	050788-03	U 330	U 660	U 330	U 330	U 330	U 330	U 330	U 330
WJ-38.90	050788-04	U 330	U 660	U 330	U 330	J 36	U 330	U 330	U 330

WATKINS JOHNSON
SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BENZO(A) PYRENE	INDENO (1,2,3-CD) PYRENE	DIBENZ (A,H)ANTH-RACENE	BENZO (G,H,I) PERYLENE
SB2-1.01	050388-15	U 330	U 330	U 330	U 330
SB2-1.30	050388-16	U 330	U 330	U 330	U 330
SB2-1.50	050388-17	U 330	U 330	U 330	U 330
SB2-1.50 D	050388-18	U 330	U 330	U 330	U 330
SB2-1.85	050388-19	U 330	U 330	U 330	U 330
SB2-2.01	050588-06	U 330	U 330	U 330	U 330
SB2-2.30	050588-07	U 330	U 330	U 330	U 330
SB2-2.65	050588-08	U 330	U 330	U 330	U 330
SB2-2.90	050588-09	U 330	U 330	U 330	U 330
SB2-3.03	042188-03	U 330	U 330	U 330	U 330
SB2-3.05	052988-02	U 330	U 330	U 330	U 330
SB2-3.10	052988-03	U 330	U 330	U 330	U 330
SB2-3.15	052988-04	U 330	U 330	U 330	U 330
SB2-4.02.5	042188-02	U 330	U 330	U 330	U 330
SB2-4.05	052988-05	U 330	U 330	U 330	U 330
SB2-4.10	052988-06	U 330	U 330	U 330	U 330
SB2-4.15	052988-07	U 330	U 330	U 330	U 330
SB2-5.01	042188-01	U 330	U 330	U 330	U 330
SB2-5.05	053088-01	U 330	U 330	U 330	U 330
SB2-5.10	053088-02	U 330	U 330	U 330	U 330
SB2-5.15	053088-03	U 330	U 330	U 330	U 330
SB6-4.05	050588-01	U 330	U 330	U 330	U 330
SB6-4.25	050588-02	U 330	U 330	U 330	U 330
SB6-4.25 D	050588-03	U 330	U 330	U 330	U 330
SB6-4.50	050588-04	U 330	U 330	U 330	U 330
SB6-4.80	050588-05	U 330	U 330	U 330	U 330
SB6-5.10	050788-15	U 330	U 330	U 330	U 330
SB6-5.35	050788-16	U 330	U 330	U 330	U 330
SB6-5.55	050788-17	U 330	U 330	U 330	U 330
SB6-5.75	050788-18	U 330	U 330	U 330	U 330
SB6-6.01	042988-01	U 330	U 330	U 330	U 330
SB6-6.30	042988-02	U 330	U 330	U 330	U 330
SB6-6.30 D	042988-03	U 330	U 330	U 330	U 330
SB6-6.70	042988-04	U 330	U 330	U 330	U 330
SB6-6.85	042988-05	U 330	U 330	U 330	U 330
SB6-7.01	042788-05	U 330	U 330	U 330	U 330
SB6-7.25	042788-06	U 330	U 330	U 330	U 330
SB6-7.70	042788-07	U 330	U 330	U 330	U 330
SB6-7.85	042788-08	U 330	U 330	U 330	U 330
SB6-8.05	042788-01	U 330	U 330	U 330	U 330
SB6-8.30	042788-02	U 330	U 330	U 330	U 330
SB6-8.50	042788-03	U 330	U 330	U 330	U 330
SB6-8.85	042788-04	U 330	U 330	U 330	U 330
SB7-1.01	050288-01	J 74	U 330	U 330	J 47
SB7-1.26	050288-02	U 330	U 330	U 330	U 330
SB7-1.50	050288-03	U 330	U 330	U 330	U 330

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SEMIVOLATILE ORGANICS (EPA METHOD 8270)
SOIL ANALYSIS BY ACUREX LABORATORY
(IN MICROGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	BENZO(A) PYRENE	INDENO (1,2,3-CD) PYRENE	DIBENZ (A,H)ANTH-RACENE	BENZO (G,H,I) PERYLENE
SB7-1.80	050288-04	U 330	U 330	U 330	U 330
SB8-1.01	050388-01	U 330	U 330	U 330	U 330
SB8-1.30	050388-02	U 330	U 330	U 330	U 330
SB8-1.30 D	050388-03	U 330	U 330	U 330	U 330
SB8-1.45	050388-04	U 330	U 330	U 330	U 330
SB8-1.65	050388-05	U 330	U 330	U 330	U 330
WJ-38.01	050788-01	U 330	U 330	U 330	U 330
WJ-38.30	050788-02	U 330	U 330	U 330	U 330
WJ-38.65	050788-03	U 330	U 330	U 330	U 330
WJ-38.90	050788-04	U 330	U 330	U 330	U 330

ADDITIONAL ORGANICS - SOIL

WATKINS JOHNSON
ADDITIONAL ORGANICS
SOIL ANALYSIS BY SEQUOIA LABORATORY
(IN PARTS PER BILLION)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	QA(e)	ACROLEIN	ACRYLONITRILE	BENZENE	ETHYLBENZENE	TOLUENE	TOTAL HYDRO-CARBONS
AP-3.10	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
AP-3.20	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
AP-3.30	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
AP-3.40	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
AP-3.50	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-01.05	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	2100
SKB-01.10	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-01.15	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-01.20	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	28000
SKB-01.30	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-01.40	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-01.50	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.05	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.10	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.15	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.20	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.30	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.40	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-02.50	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-03.05	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	18000
SKB-03.10	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	1600
SKB-03.15	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-03.20	02/04/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-03.30	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-03.40	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-03.50	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-04.05	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-04.10	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-04.15	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-04.20	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	6000
SKB-04.30	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-04.40	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-04.50	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-05.05	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-05.10	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	1700
SKB-05.15	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	1500
SKB-05.20	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	1500
SKB-05.30	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-05.40	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-05.50	02/05/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-06.05	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-06.10	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-06.15	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-06.20	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-06.30	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000

WJ008039

WATKINS JOHNSON
ADDITIONAL ORGANICS
SOIL ANALYSIS BY SEQUOIA LABORATORY
(IN PARTS PER BILLION)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	QA(e)	ACROLEIN	ACRYLONITRILE	BENZENE	ETHYLBENZENE	TOLUENE	TOTAL HYDRO-CARBONS
SKB-06.40	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-06.50	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.05	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.10	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.15	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.25	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.30	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.40	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-07.50	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-08.05	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-08.10	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-08.15	02/06/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-09.05	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-09.10	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-09.15	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-09.20	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	3000
SKB-09.30	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-09.40	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000
SKB-10.05	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	1300
SKB-10A.10	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	1900
SKB-10A.15	02/11/87	N	U 10,000	U 10,000	U 50	U 50	U 50	U 1000

WJ008040

INORGANICS - SOIL

WATKINS JOHNSON
INORGANIC SOIL ANALYSIS
(IN MILLIGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	LAB(d)	QA(e)		ALUMINUM		ANTIMONY		ARSENIC		BARIUM		BERYL-LIUM		BORON		CADMIUM		CALCIUM
BS2-1.10	05/06/87	EC	N		3110	U	5.0	U	10		14		0.17		3.0	U	0.50		337
BS2-1.15	05/06/87	EC	N		2850	U	5.0	U	10		11		0.14		2.8	U	0.50		421
BS2-2.10	05/06/87	EC	N		3020	U	5.0	U	10		14		0.14		2.8	U	0.50		310
BS2-2.15	05/06/87	EC	N		3790	U	5.0	U	10		11		0.17		3.0	U	0.50		425
SB2-1.01	050388-15	A	N	/P/	3776	U/P/	2.8	B/F/	1.2	B/P/	8.64	U/P/	0.2		NA	U/P/	0.2	B/P/	226.2
SB2-1.30	050388-16	A	N	/P/	2551	U/P/	2.8	B/F/	1.0	B/P/	10.43	U/P/	0.2		NA	/P/	0.78	/P/	547.4
SB2-1.50	050388-17	A	N	/P/	1303	U/P/	2.8	B/F/	0.58	B/P/	6.26	U/P/	0.2		NA	B/P/	0.36	/P/	882.0
SB2-1.50 D	050388-18	A	N	/P/	1563	U/P/	2.8	B/F/	0.72	B/P/	5.33	U/P/	0.2		NA	B/P/	0.33	/P/	1113
SB2-1.85	050388-19	A	N	/P/	1115	U/P/	2.8	B/F/	0.91	B/P/	4.72	U/P/	0.2		NA	U/P/	0.2	/P/	1384
SB2-2.01	050588-06	A	N	/P/	653.8	U/P/	2.8	U/F/	0.37	B/P/	1.81	U/P/	0.2		NA	U/P/	0.2	B/P/	332.0
SB2-2.30	050588-07	A	N	/P/	1135	U/P/	2.8	U/F/	0.35	B/P/	6.38	U/P/	0.2		NA	U/P/	0.2	B/P/	646.2
SB2-2.65	050588-08	A	N	/P/	928.2	U/P/	2.8	U/F/	0.35	B/P/	5.51	U/P/	0.2		NA	U/P/	0.2	/P/	1175
SB2-2.90	050588-09	A	N	/P/	1095	U/P/	2.8	U/F/	0.35	B/P/	6.39	U/P/	0.2		NA	U/P/	0.2	/P/	579.4
SB2-3.03	042188-03	A	N	/P/	3560.6	U/P/	2.8	B/F/	0.82	/P/	19.0	U/P/	0.2		NA	U/P/	0.2	/P/	534.0
SB2-3.05	052988-02	A	N	/P/	1580.0	U/P/	3.0	B/F/	1.0	B/P/	5.4	U/P/	0.22		NA	U/P/	0.22	B/P/	308
SB2-3.10	052988-03	A	N	/P/	1410.0	U/P/	3.0	U/F/	0.35	B/P/	5.4	U/P/	0.21		NA	B/P/	0.31	B/P/	334.0
SB2-3.15	052988-04	A	N	/P/	1570.0	U/P/	3.0	U/F/	0.36	B/P/	6.6	U/P/	0.22		NA	/P/	1.0	B/P/	416.0
SB2-4.02.5	042188-02	A	N	/P/	4333.7	U/P/	2.8	/F/	1.4	/P/	16.5	U/P/	0.2		NA	U/P/	0.2	/P/	419.8
SB2-4.05	052988-05	A	N	/P/	2200.0	U/P/	3.1	U/F/	0.36	B/P/	7.7	U/P/	0.22		NA	B/P/	0.32	B/P/	312.0
SB2-4.10	052988-06	A	N	/P/	1590.0	U/P/	3.0	U/F/	0.36	B/P/	5.7	U/P/	0.22		NA	U/P/	0.22	B/P/	346.0
SB2-4.15	052988-07	A	N	/P/	1270.0	U/P/	3.0	B/F/	0.43	B/P/	4.8	U/P/	0.21		NA	B/P/	0.31	B/P/	389.0
SB2-5.01	042188-01	A	N	/P/	2107.0	U/P/	2.8	U/F/	0.36	/P/	9.12	U/P/	0.2		NA	U/P/	0.2	/P/	232.6
SB2-5.05	053088-01	A	N	/P/	2430.0	U/P/	3.2	B/F/	0.4	B/P/	8.7	U/P/	0.20		NA	U/P/	0.23	B/P/	276.0
SB2-5.10	053088-02	A	N	/P/	1300.0	U/P/	3.1	U/F/	0.37	B/P/	6.7	U/P/	0.22		NA	B/P/	0.43	B/P/	370.0
SB2-5.15	053088-03	A	N	/P/	1280.0	U/P/	3.1	B/F/	0.38	B/P/	4.4	U/P/	0.22		NA	B/P/	0.32	B/P/	415.0
SB6-1.05	03/18/87	EC	N		NA		NA		NA		NA		NA		NA		NA		NA
SB6-1.15	03/18/87	EC	N		3160	U	12	U	40	U	40	U	1	U	20	U	1	U	1000
SB6-1.40	03/18/87	EC	N		NA		NA		NA		NA		NA		NA		NA		NA
SB6-1.75	03/18/87	EC	N		NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.05	03/19/87	EC	N		NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.15	03/19/87	EC	N		4690	U	12	U	40	U	40	U	1	U	20	U	1	U	1000
SB6-2.40	03/19/87	EC	N		NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.75	03/19/87	EC	N		NA		NA		NA		NA		NA		NA		NA		NA
SB6-4.05	050588-01	A	N	/P/	3476	U/P/	2.8	U/F/	0.35	/P/	36.8	U/P/	0.2		NA	U/P/	0.2	/P/	1148
SB6-4.25	050588-02	A	N	/P/	2238	U/P/	2.8	U/F/	0.38	B/P/	8.40	U/P/	0.2		NA	U/P/	0.2	/P/	1105
SB6-4.25 D	050588-03	A	N	/P/	2631	U/P/	2.8	U/F/	0.38	B/P/	8.75	U/P/	0.2		NA	/P/	0.62	/P/	1125
SB6-4.50	050588-04	A	N	/P/	1836	U/P/	2.8	U/F/	0.36	B/P/	8.33	U/P/	0.2		NA	U/P/	0.2	/P/	1167
SB6-4.80	050588-05	A	N	/P/	1119	U/P/	2.8	U/F/	0.35	/P/	8.39	U/P/	0.2		NA	U/P/	0.2	/P/	1269
SB6-5.10	050788-15	A	N	/P/	2283	U/P/	2.8	/F/	1.4	B/P/	9.54	U/P/	0.2		NA	B/P/	0.36	B/P/	328.7
SB6-5.35	050788-16	A	N	/P/	2133	U/P/	2.8	B/F/	0.95	B/P/	14.84	U/P/	0.2		NA	U/P/	0.2	/P/	1090
SB6-5.55	050788-17	A	N	/P/	1383	U/P/	2.8	B/F/	0.52	B/P/	4.29	U/P/	0.2		NA	U/P/	0.2	/P/	605.0
SB6-5.75	050788-18	A	N	/P/	1079	U/P/	2.8	B/F/	0.64	B/P/	5.23	U/P/	0.2		NA	B/P/	0.37	/P/	884.2
SB6-6.01	042988-01	A	N	/P/	2259.6	U/P/	2.8	B/F/	0.85	/P/	8.46	/P/	3.15		NA	U/P/	0.2	/P/	517.4
SB6-6.30	042988-02	A	N	/P/	1621.1	U/P/	2.8	B/F/	0.54	/P/	9.96	B/P/	1.84		NA	U/P/	0.2	/P/	449.1
SB6-6.30 D	042988-03	A	N	/P/	3016.4	U/P/	2.8	B/F/	0.89	/P/	12.9	U/P/	0.2		NA	U/P/	0.2	/P/	505.2
SB6-6.70	042988-04	A	N	/P/	1452.4	U/P/	2.8	B/F/	0.59	/P/	6.82	U/P/	0.2		NA	U/P/	0.2	/P/	1220.9

WATKINS JOHNSON
INORGANIC SOIL ANALYSIS
(IN MILLIGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	LAB(d)	QA(e)		ALUMINUM		ANTIMONY		ARSENIC		BARIUM		BERYL-LIUM	BORON		CADMIUM		CALCIUM
SB6-6.85	042988-05	A	N	/P/	963.3	U/P/	2.6	U/F/	0.35	/P/	4.42	U/P/	0.2	NA	U/P/	0.2	/P/	536.9
SB6-7.01	042788-05	A	N	/P/	1982.5	U/P/	2.8	/F/	2.9	/P/	83.4	U/P/	0.2	NA	U/P/	0.2	/P/	582.4
SB6-7.25	042788-06	A	N	/P/	3252.0	U/P/	2.8	/F/	1.6	/P/	12.8	U/P/	0.2	NA	U/P/	0.2	/P/	498.5
SB6-7.70	042788-07	A	N	/P/	1338.8	U/P/	2.8	B/F/	0.79	/P/	7.08	U/P/	0.2	NA	U/P/	0.2	/P/	1250.8
SB6-7.85	042788-08	A	N	/P/	1224.3	U/P/	2.8	B/F/	0.53	/P/	5.57	U/P/	0.2	NA	U/P/	0.2	/P/	389.9
SB6-8.05	042788-01	A	N	/P/	2609.4	U/P/	2.8	B/F/	0.67	/P/	10.4	U/P/	0.2	NA	/P/	0.2	/P/	466.5
SB6-8.30	042788-02	A	N	/P/	2909.3	U/P/	2.8	B/F/	0.77	/P/	7.50	U/P/	0.2	NA	U/P/	0.2	/P/	712.0
SB6-8.50	042788-03	A	N	/P/	1714.1	U/P/	2.8	B/F/	0.53	/P/	5.09	U/P/	0.2	NA	U/P/	0.2	/P/	722.1
SB6-8.85	042788-04	A	N	/P/	1303.6	U/P/	2.8	B/F/	0.73	/P/	7.07	B/P/	0.71	NA	U/P/	0.2	/P/	387.1
SB7-1.01	050288-01	A	N	/P/	5132	U/P/	2.8	/F/	15.0	/P/	45.3	U/P/	0.2	NA	B/P/	0.32	/P/	714.3
SB7-1.26	050288-02	A	N	/P/	1429	U/P/	2.8	U/F/	0.36	B/P/	8.69	U/P/	0.2	NA	B/P/	0.28	B/P/	379.0
SB7-1.50	050288-03	A	N	/P/	1455	U/P/	2.8	B/F/	0.42	/P/	8.38	U/P/	0.2	NA	U/P/	0.2	/P/	1328
SB7-1.80	050288-04	A	N	/P/	1368	U/P/	2.8	B/F/	0.45	/P/	4.75	U/P/	0.2	NA	U/P/	0.2	/P/	688.2
SB8-1.01	050388-01	A	N	/P/	2339	U/P/	2.8	B/F/	0.44	B/P/	8.71	U/P/	0.2	NA	B/P/	0.36	/P/	551.9
SB8-1.30	050388-02	A	N	/P/	2210	U/P/	2.8	B/F/	1.1	B/P/	14.0	U/P/	0.2	NA	B/P/	0.26	/P/	2184
SB8-1.30 D	050388-03	A	N	/P/	2287	U/P/	2.8	B/F/	0.76	B/P/	11.7	U/P/	0.3	NA	B/P/	0.31	B/P/	450.7
SB8-1.45	050388-04	A	N	/P/	1304	U/P/	2.8	B/F/	1.1	B/P/	4.91	U/P/	0.2	NA	U/P/	0.2	B/P/	493.1
SB8-1.65	050388-05	A	N	/P/	1247	U/P/	2.8	U/F/	0.36	B/P/	6.09	U/P/	0.2	NA	U/P/	0.2	/P/	644.3
WJ-38.01	050788-01	A	N	/P/	1859	U/P/	2.8	U/F/	0.3	B/P/	6.97	U/P/	0.1	NA	B/P/	0.27	/P/	653.9
WJ-38.30	050788-02	A	N	/P/	1215	U/P/	2.8	B/F/	0.48	/P/	6.55	U/P/	0.2	NA	U/P/	0.2	/P/	764.3
WJ-38.65	050788-03	A	N	/P/	2083	U/P/	2.8	B/F/	0.50	B/P/	6.03	U/P/	0.2	NA	U/P/	0.2	/P/	1096
WJ-38.90	050788-04	A	N	/P/	1815	U/P/	2.8	U/F/	0.3	B/P/	9.17	U/P/	0.2	NA	U/P/	0.2	/P/	543.3

WATKINS JOHNSON
INORGANIC SOIL ANALYSIS
(IN MILLIGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)		CHROMIUM		COBALT		COPPER		IRON		LEAD		LITHIUM		MAG-NESIUM		MAN-GANESE
BS2-1.10	05/06/87		4.5	U	1.0		10		1990	U	5.0	U	2.0		277		21
BS2-1.15	05/06/87		4.9	U	1.0		17		2000	U	5.0	U	2.0		264		41
BS2-2.10	05/06/87		4.1	U	1.0		7.4		1800	U	5.0	U	2.0		258		31
BS2-2.15	05/06/87		4.8	U	1.0		6.7		2320	U	5.0	U	2.0		321		22
SB2-1.01	050388-15	/P/	5.15	B/P/	0.41	/P/	3.76	/P/	1662	/F/	0.71		NA	B/P/	228.4	/P/	17.0
SB2-1.30	050388-16	/P/	5.08	B/P/	1.78	/P/	2.56	/P/	2190	/F/	1.0		NA	B/P/	279.8	/P/	60.2
SB2-1.50	050388-17	/P/	5.04	B/P/	0.42	/P/	7.62	/P/	1826	/F/	0.87		NA	B/P/	242.6	/P/	15.5
SB2-1.50 D	050388-18	/P/	6.40	B/P/	0.48	/P/	7.26	/P/	2131	/F/	0.71		NA	B/P/	289.7	/P/	19.0
SB2-1.85	050388-19	/P/	4.70	U/P/	0.3	/P/	13.4	/P/	1597	/F/	1.5		NA	/P/	212	/P/	21.20
SB2-2.01	050588-06	/P/	1.84	U/P/	0.3	/P/	6.35	/P/	585.4	B/F/	0.21		NA	B/P/	86.12	B/P/	1.48
SB2-2.30	050588-07	/P/	3.0	/P/	0.63	/P/	8.58	/P/	1112	B/F/	0.14		NA	B/P/	187.0	/P/	12.52
SB2-2.65	050588-08	B/P/	0.78	U/P/	0.3	/P/	5.67	/P/	1929	B/F/	0.12		NA	B/P/	186.5	U/P/	1.0
SB2-2.90	050588-09	/P/	1.72	B/P/	0.47	/P/	4.99	/P/	1501	B/F/	0.14		NA	B/P/	173.2	/P/	14.50
SB2-3.03	042188-03	/P/	9.48	U/P/	0.3	/P/	56.1	/P/	2950.4	/F/	0.9		NA	/P/	350.6	/P/	22.0
SB2-3.05	052988-02	/P/	5.3	U/P/	0.32	/P/	3.5	/P/	1720.0	/F/	2.0		NA	B/P/	232	/P/	16.7
SB2-3.10	052988-03	/P/	5.5	B/P/	0.33	B/P/	2.1	/P/	1470.0	B/F/	0.48		NA	B/P/	210.0	/P/	15.7
SB2-3.15	052988-04	/P/	6.3	B/P/	0.59	B/P/	2.6	/P/	2060.0	/F/	0.62		NA	B/P/	241.0	/P/	39.6
SB2-4.02.5	042188-02	/P/	11.3	/P/	8.78	/P/	47.4	/P/	2679.3	/F/	2.3		NA	/P/	393.9	/P/	18.2
SB2-4.05	052988-05	/P/	6.4	B/P/	0.64	B/P/	2.5	/P/	1620.0	/F/	0.69		NA	B/P/	244.0	/P/	16.7
SB2-4.10	052988-06	/P/	6.1	U/P/	0.32	B/P/	1.9	/P/	1570.0	B/F/	0.54		NA	B/P/	231.0	/P/	20.3
SB2-4.15	052988-07	/P/	4.9	U/P/	0.32	B/P/	1.9	/P/	1700.0	B/F/	0.51		NA	B/P/	192.0	/P/	22.9
SB2-5.01	042188-01	/P/	9.18	/P/	0.43	/P/	25.8	/P/	1593.0	/F/	0.87		NA	/P/	233.7	/P/	10.8
SB2-5.05	053088-01	/P/	6.8	U/P/	0.34	/P/	11.0	/P/	2270.0	/F/	0.58		NA	B/P/	244.0	/P/	10.8
SB2-5.10	053088-02	/P/	4.3	B/P/	0.35	B/P/	2.2	/P/	1590.0	/F/	0.61		NA	B/P/	210.0	/P/	26.5
SB2-5.15	053088-03	/P/	5.2	B/P/	0.47	B/P/	2.3	/P/	1910.0	/F/	0.82		NA	B/P/	230.0	/P/	22.4
SB6-1.05	03/18/87		NA		NA		NA		NA		NA		NA		NA		NA
SB6-1.15	03/18/87		3.6	U	10	U	5		1840	U	10	U	4	U	1000		13
SB6-1.40	03/18/87		NA		NA		NA		NA		NA		NA		NA		NA
SB6-1.75	03/18/87		NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.05	03/19/87		NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.15	03/19/87		5.8	U	10	U	5		2400	U	10	U	4	U	1000		10
SB6-2.40	03/19/87		NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.75	03/19/87		NA		NA		NA		NA		NA		NA		NA		NA
SB6-4.05	050588-01	/P/	3.88	B/P/	0.86	/P/	12.6	/P/	3783	U/F/	0.11		NA	B/P/	487.8	/P/	52.7
SB6-4.25	050588-02	/P/	2.62	B/P/	0.48	/P/	3.98	/P/	2248	U/F/	0.12		NA	B/P/	262.2	/P/	19.86
SB6-4.25 D	050588-03	/P/	4.67	/P/	0.62	/P/	4.77	/P/	2297	U/F/	0.11		NA	B/P/	297.3	/P/	17.90
SB6-4.50	050588-04	/P/	4.77	U/P/	0.3	B/P/	0.85	/P/	2785	B/F/	0.12		NA	/P/	2733	/P/	18.21
SB6-4.80	050588-05	/P/	1.75	U/P/	0.3	/P/	14.77	/P/	1106	B/F/	0.17		NA	B/P/	187.0	/P/	14.85
SB6-5.10	050788-15	/P/	5.29	/P/	0.45	/P/	5.88	/P/	1489	/F/	1.2		NA	/P/	205.0	/P/	11.54
SB6-5.35	050788-16	/P/	6.5	/P/	0.45	B/P/	1.3	/P/	1867	/F/	1.4		NA	/P/	240.4	/P/	25.98
SB6-5.55	050788-17	/P/	7.01	B/P/	0.78	B/P/	2.50	/P/	946	/F/	1.0		NA	B/P/	254.7	/P/	18.29
SB6-5.75	050788-18	/P/	5.64	B/P/	0.46	/P/	4.56	/P/	1586	/F/	1.1		NA	/P/	199	/P/	10.40
SB6-6.01	042988-01	/P/	5.78	B/P/	4.32	B/P/	2.33	/P/	2047.5	/F/	1.1		NA	/P/	293.2	/P/	23.11
SB6-6.30	042988-02	/P/	6.45	U/P/	0.3	/P/	9.90	/P/	2014.2	/F/	0.94		NA	/P/	229.7	/P/	17.3
SB6-6.30 D	042988-03	/P/	7.71	B/P/	7.30	/P/	3.21	/P/	2395.1	/F/	1.4		NA	/P/	328.4	/P/	17.4
SB6-6.70	042988-04	/P/	8.20	U/P/	0.3	/P/	11.8	/P/	1998.4	/F/	0.8		NA	/P/	292.2	/P/	13.8

WATKINS JOHNSON
INORGANIC SOIL ANALYSIS
(IN MILLIGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)		CHROMIUM		COBALT		COPPER		IRON		LEAD		LITHIUM		MAG-NESIUM		MAN-GANESE
SB6-6.85	042988-05	/P/	5.69	U/P/	0.3	/P/	9.52	/P/	1289.0	/F/	0.6	NA	/P/	183.4	/P/	6.73
SB6-7.01	042788-05	/P/	6.21	B/P/	4.52	/P/	106.0	/P/	1836.2	/F/	1.3	NA	/P/	277.0	/P/	23.2
SB6-7.25	042788-06	/P/	7.25	U/P/	0.3	/P/	12.3	/P/	2707.9	/F/	1.1	NA	/P/	313.0	/P/	22.9
SB6-7.70	042788-07	/P/	7.04	/P/	5.09	/P/	3.88	/P/	1981.1	/F/	0.74	NA	/P/	282.5	/P/	10.9
SB6-7.85	042788-08	/P/	7.04	U/P/	0.3	/P/	4.42	/P/	1313.6	/F/	0.64	NA	/P/	223.0	/P/	8.22
SB6-8.05	042788-01	/P/	7.28	U/P/	0.3	/P/	6.16	/P/	1425.8	/F/	0.65	NA	/P/	249.5	/P/	13.5
SB6-8.30	042788-02	/P/	9.01	B/P/	0.68	B/P/	0.91	/P/	2064.5	/F/	0.85	NA	/P/	329.5	/P/	12.9
SB6-8.50	042788-03	/P/	8.37	B/P/	0.9	/P/	2.88	/P/	2000.0	/F/	0.73	NA	/P/	282.0	/P/	17.1
SB6-8.85	042788-04	/P/	7.39	U/P/	0.3	/P/	33.1	/P/	1198.0	/F/	0.62	NA	/P/	228.8	/P/	6.19
SB7-1.01	050288-01	/P/	5.95	B/P/	2.68	/P/	10.43	/P/	8318	/F/	1.3	NA	B/P/	1176	/P/	131.1
SB7-1.26	050288-02	/P/	4.17	B/P/	0.43	B/P/	1.49	/P/	1252	/F/	0.62	NA	B/P/	173.6	/P/	30.5
SB7-1.50	050288-03	/P/	5.56	/P/	1.1	/P/	22.5	/P/	1747	/F/	0.63	NA	B/P/	213.3	/P/	39.5
SB7-1.80	050288-04	/P/	7.30	B/P/	0.63	/P/	6.80	/P/	1458	B/F/	0.59	NA	B/P/	213.7	/P/	17.6
SB8-1.01	050388-01	/P/	4.67	B/P/	0.50	/P/	13.46	/P/	1667.8	/F/	0.96	NA	/P/	240.2	/P/	18.5
SB8-1.30	050388-02	/P/	7.10	B/P/	0.77	/P/	11.2	/P/	2866	/F/	2.0	NA	B/P/	294.2	/P/	80.7
SB8-1.30 D	050388-03	/P/	5.92	B/P/	0.85	/P/	3.09	/P/	2144	/F/	0.88	NA	/P/	301	/P/	52.7
SB8-1.45	050388-04	/P/	4.85	B/P/	0.46	/P/	4.15	/P/	1927	/F/	0.96	NA	B/P/	206.9	/P/	19.6
SB8-1.65	050388-05	/P/	6.89	U/P/	0.3	/P/	7.83	/P/	1442	/F/	0.87	NA	B/P/	243.2	/P/	8.32
WJ-38.01	050788-01	/P/	7.03	B/P/	0.46	/P/	5.81	/P/	1450	/F/	0.88	NA	B/P/	286.4	/P/	12.35
WJ-38.30	050788-02	/P/	5.94	U/P/	0.3	/P/	5.59	/P/	1550	/F/	1.3	NA	B/P/	209.2	/P/	16.07
WJ-38.65	050788-03	/P/	9.15	U/P/	0.3	/P/	12.99	/P/	2256	B/F/	1.1	NA	B/P/	326.1	/P/	14.12
WJ-38.90	050788-04	/P/	8.31	U/P/	0.3	/P/	24.6	/P/	1547	/F/	0.94	NA	B/P/	260.2	/P/	8.71

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INORGANIC SOIL ANALYSIS
(IN MILLIGRAMS PER KILOGRAM)

SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)	MERCURY		MOLYB-DENUM		NICKEL		POTAS-SIUM		SELENIUM		SILVER		SODIUM		THALLIUM
BS2-1.10	05/06/87	NA	U	1.5		5.3	U	500	U	20	U	0.50		83	U	40
BS2-1.15	05/06/87	NA	U	1.5		7.5	U	500	U	20	U	0.50		51	U	40
BS2-2.10	05/06/87	NA	U	1.5		4.9	U	500	U	20	U	0.50		69	U	40
BS2-2.15	05/06/87	NA	U	1.5		4.2	U	500	U	20	U	0.50		49	U	40
SB2-1.01	050388-15	U/CV/ 0.1		NA	U/P/	2.30	B/A/	215	U/F/	0.38	U/P/	0.4	B/P/	89.79	U/F/	0.51
SB2-1.30	050388-16	U/CV/ 0.12		NA	/P/	4.56	B/A/	289	U/F/	0.45	U/P/	0.4	/P/	151.7	U/F/	0.6
SB2-1.50	050388-17	U/CV/ 0.11		NA	B/P/	2.2	B/A/	310	U/F/	0.4	U/P/	0.4	B/P/	204.9	U/F/	0.54
SB2-1.50 D	050388-18	U/CV/ 0.11		NA	B/P/	2.16	B/A/	348	U/F/	0.4	U/P/	0.4	B/P/	160.4	U/F/	0.54
SB2-1.85	050388-19	U/CV/ 0.11		NA	U/P/	1.1	B/A/	251	U/F/	0.4	U/P/	0.4	B/P/	132.2	U/F/	0.54
SB2-2.01	050588-06	U/CV/ 0.11		NA	U/P/	1.1	B/A/	196	U/F/	0.41	U/P/	0.4	B/P/	144.9	U/F/	0.55
SB2-2.30	050588-07	U/CV/ 0.11		NA	U/P/	1.1	B/A/	290	U/F/	0.39	U/P/	0.4	B/P/	146.3	U/F/	[illegible]
SB2-2.65	050588-08	U/CV/ 0.11		NA	B/P/	1.53	B/A/	236	U/F/	0.39	/P/	2.32	B/P/	150.9	U/F/	[illegible]
SB2-2.90	050588-09	U/CV/ 0.11		NA	U/P/	1.1	B/A/	259	U/F/	0.39	U/P/	0.4	/P/	165.6	U/F/	0.53
SB2-3.03	042188-03	U/CV/ 0.023		NA	/P/	3.82	/A/	398	U/F/	0.42	U/P/	0.4	/P/	117.6	U/F/	0.57
SB2-3.05	052988-02	U/CV/ 0.11		NA	B/P/	2.0	B/A/	280.0	U/F/	0.4	U/P/	0.43	B/P/	78.9	U/F/	0.54
SB2-3.10	052988-03	U/CV/ 0.11		NA	B/P/	3.0	B/A/	304.0	U/F/	0.39	U/P/	0.42	B/P/	68	U/F/	0.53
SB2-3.15	052988-04	U/CV/ 0.11		NA	B/P/	3.6	B/A/	280.0	U/F/	0.4	U/P/	0.43	B/P/	75.0	U/F/	0.54
SB2-4.02.5	042188-02	U/CV/ 0.023		NA	/P/	66.9	/A/	419	U/F/	0.43	U/P/	0.4	/P/	116.5	U/F/	0.59
SB2-4.05	052988-05	U/CV/ 0.11		NA	B/P/	3.9	B/A/	268.0	U/F/	0.41	/P/	2.1	B/P/	74.8	U/F/	0.55
SB2-4.10	052988-06	U/CV/ 0.11		NA	B/P/	2.5	B/A/	268.0	U/F/	0.40	U/P/	0.43	B/P/	63.6	U/F/	0.54
SB2-4.15	052988-07	U/CV/ 0.11		NA	B/P/	2.3	B/A/	211.0	U/F/	0.40	U/P/	0.43	B/P/	58.1	U/F/	0.54
SB2-5.01	042188-01	U/CV/ 0.022		NA	/P/	2.83	/A/	246.0	U/F/	0.4	U/P/	0.4	/P/	105.8	U/F/	0.54
SB2-5.05	053088-01	U/CV/ 0.11		NA	B/P/	2.5	B/A/	287.0	U/F/	0.42	U/P/	0.45	B/P/	70.8	U/F/	0.57
SB2-5.10	053088-02	U/CV/ 0.11		NA	B/P/	3.2	B/A/	210.0	U/F/	0.41	U/P/	0.45	B/P/	57.8	U/F/	0.56
SB2-5.15	053088-03	U/CV/ 0.11		NA	B/P/	3.7	B/A/	247.0	U/F/	0.41	U/P/	0.44	B/P/	63.6	U/F/	0.55
SB6-1.05	03/18/87	NA		NA		NA		NA		NA		NA		NA		NA
SB6-1.15	03/18/87	NA	U	10	U	8	U	1000	U	40	U	2	U	1000	U	80
SB6-1.40	03/18/87	NA		NA		NA		NA		NA		NA		NA		NA
SB6-1.75	03/18/87	NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.05	03/19/87	NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.15	03/19/87	NA	U	10	U	8	U	1000	U	40	U	2	U	1000	U	80
SB6-2.40	03/19/87	NA		NA		NA		NA		NA		NA		NA		NA
SB6-2.75	03/19/87	NA		NA		NA		NA		NA		NA		NA		NA
SB6-4.05	050588-01	U/CV/ 0.11		NA	/P/	4.46	/A/	603	U/F/	0.4	U/P/	0.4	B/P/	206.3	U/F/	0.54
SB6-4.25	050588-02	U/CV/ 0.12		NA	B/P/	3.89	B/A/	274	U/F/	0.43	U/P/	0.4	/P/	172.7	U/F/	0.5
SB6-4.25 D	050588-03	U/CV/ 0.11		NA	B/P/	2.76	B/A/	352	U/F/	0.43	U/P/	0.4	B/P/	219.1	U/F/	0.57
SB6-4.50	050588-04	U/CV/ 0.11		NA	B/P/	2.25	B/A/	419	U/F/	0.4	U/P/	0.4	B/P/	217.7	U/F/	0.54
SB6-4.80	050588-05	B/CV/ 0.16		NA	B/P/	1.85	B/A/	267	U/F/	0.39	U/P/	0.4	/P/	164.7	U/F/	0.53
SB6-5.10	050788-15	U/CV/ 0.02		NA	B/P/	1.37	B/A/	264	U/F/	0.4	U/P/	0.4	B/P/	122.4	U/F/	0.5
SB6-5.35	050788-16	U/CV/ 0.02		NA	B/P/	1.81	B/A/	291	U/F/	0.4	U/P/	0.4	/P/	193	U/F/	0.5
SB6-5.55	050788-17	U/CV/ 0.02		NA	U/P/	1.1	B/A/	326	U/F/	0.4	U/P/	0.4	B/P/	119.2	U/F/	0.5
SB6-5.75	050788-18	U/CV/ 0.02		NA	U/P/	1.1	B/A/	265	U/F/	0.4	U/P/	0.4	/P/	1712	U/F/	0.5
SB6-6.01	042988-01	U/CV/ 0.021		NA	/P/	3.36	/A/	307	U/F/	0.39	B/P/	3.67	B/P/	104	U/F/	0.53
SB6-6.30	042988-02	U/CV/ 0.022		NA	/P/	2.48	/A/	294	U/F/	0.4	B/P/	4.86	/P/	125.9	U/F/	0.54
SB6-6.30 D	042988-03	U/CV/ 0.023		NA	/P/	3.50	/A/	332	U/F/	0.42	U/P/	0.4	/P/	99.8	U/F/	0.57
SB6-6.70	042988-04	U/CV/ 0.021		NA	/P/	2.45	/A/	362	U/F/	0.39	U/P/	0.4	/P/	150.0	U/F/	0.53

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SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)		MERCURY	MOLYB-DENUM		NICKEL		POTAS-SIUM		SELENIUM		SILVER		SODIUM		THALLIUM
SB6-6.85	042988-05	U/CV/	0.021	NA	B/P/	1.46	/A/	255	U/F/	0.39	U/P/	0.4	/P/	109.2	U/F/	0.53
SB6-7.01	042788-05	U/CV/	0.24	NA	/P/	2.93	/A/	313	U/F/	0.44	B/P/	7.50	/P/	99.4	U/F/	0.59
SB6-7.25	042788-06	U/CV/	0.024	NA	/P/	5.16	/A/	314	U/F/	0.45	U/P/	0.4	/P/	93.4	U/F/	0.6
SB6-7.70	042788-07	U/CV/	0.021	NA	/P/	2.01	/A/	367	U/F/	0.39	U/P/	0.4	/P/	137.9	U/F/	0.53
SB6-7.85	042788-08	U/CV/	0.021	NA	/P/	1.37	/A/	335	U/F/	0.39	U/P/	0.4	/P/	115.0	U/F/	0.53
SB6-8.05	042788-01	U/CV/	0.021	NA	/P/	3.50	/A/	322	U/F/	0.38	U/P/	0.4	/P/	119.4	U/F/	0.52
SB6-8.30	042788-02	U/CV/	0.023	NA	/P/	2.97	/A/	353	U/F/	0.42	U/P/	0.4	/P/	116.5	U/F/	0.57
SB6-8.50	042788-03	U/CV/	0.022	NA	/P/	3.00	/A/	357	U/F/	0.4	U/P/	0.4	/P/	111.7	U/F/	0.54
SB6-8.85	042788-04	U/CV/	0.022	NA	U/P/	1.1	/A/	342	U/F/	0.4	B/P/	0.65	/P/	144.7	U/F/	0.54
SB7-1.01	050288-01	U/CV/	0.11	NA	B/P/	3.89	/A/	1320	U/F/	0.4	U/P/	0.4	B/P/	139.6	U/F/	0.54
SB7-1.26	050288-02	U/CV/	0.11	NA	/P/	5.76	B/A/	216	U/F/	0.4	U/P/	0.4	/P/	103.2	U/F/	0.54
SB7-1.50	050288-03	U/CV/	0.11	NA	B/P/	2.72	B/A/	299	U/F/	0.39	U/P/	0.4	U/P/	166.5	U/F/	0.53
SB7-1.80	050288-04	U/CV/	0.13	NA	B/P/	3.41	B/A/	319	U/F/	0.49	U/P/	0.4	B/P/	135.8	U/F/	0.63
SB8-1.01	050388-01	U/CV/	0.11	NA	/P/	2.57	B/A/	250	U/F/	0.4	U/P/	0.4	B/P/	105.6	U/F/	0.54
SB8-1.30	050388-02	U/CV/	0.12	NA	/P/	4.22	B/A/	270	U/F/	0.43	U/P/	0.4	/P/	180.2	U/F/	0.58
SB8-1.30 D	050388-03	U/CV/	0.12	NA	B/P/	2.67	B/A/	288	U/F/	0.44	U/P/	0.4	/P/	144.2	U/F/	0.6
SB8-1.45	050388-04	U/CV/	0.12	NA	B/P/	1.70	B/A/	236	U/F/	0.43	U/P/	0.4	/P/	131.1	U/F/	0.58
SB8-1.65	050388-05	U/CV/	0.11	NA	B/P/	1.17	B/A/	302	U/F/	0.4	U/P/	0.4	B/P/	132.8	U/F/	0.54
WJ-38.01	050788-01	U/CV/	0.02	NA	U/P/	1.1	B/A/	326.0	U/F/	0.4	U/P/	0.40	B/P/	142.2	U/F/	0.5
WJ-38.30	050788-02	U/CV/	0.02	NA	/P/	1.59	B/A/	276	U/F/	0.4	U/P/	0.4	B/P/	122.3	U/F/	0.5
WJ-38.65	050788-03	U/CV/	0.02	NA	/P/	1.70	B/A/	378	U/F/	0.4	U/P/	0.4	B/P/	126.2	U/F/	0.5
WJ-38.90	050788-04	U/CV/	0.02	NA	U/P/	1.1	B/A/	481	U/F/	0.4	U/P/	0.4	B/P/	219.0	U/F/	0.5

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SITE IDENTI-FICATION(b)	SAMPLE ID/ DATE(c)		TIN	TITANIUM		VANADIUM		ZINC		CYANIDE		NITRATES
BS2-1.10	05/06/87	U	3.0	63		3.9		24		NA		NA
BS2-1.15	05/06/87	U	3.0	53		3.9		34		NA		NA
BS2-2.10	05/06/87	U	3.0	48		3.8		17		NA		NA
BS2-2.15	05/06/87	U	3.0	73		4.3		16		NA		NA
SB2-1.01	050388-15		NA	NA	U/P/	3.34	/P/	7.89	U/C/	0.5		NA
SB2-1.30	050388-16		NA	NA	B/P/	3.06	/P/	8.70	U/C/	0.5		NA
SB2-1.50	050388-17		NA	NA	B/P/	3.25	/P/	10.9	U/C/	0.5		NA
SB2-1.50 D	050388-18		NA	NA	/P/	4.96	/P/	11.7	U/C/	0.5		NA
SB2-1.85	050388-19		NA	NA	B/P/	2.21	/P/	19.0	U/C/	0.5		NA
SB2-2.01	050588-06		NA	NA	B/P/	1.89	/P/	3.30	U/C/	0.5		NA
SB2-2.30	050588-07		NA	NA	B/P/	2.38	/P/	6.83	U/C/	0.5		NA
SB2-2.65	050588-08		NA	NA	B/P/	1.80	/P/	9.59	U/C/	0.5		NA
SB2-2.90	050588-09		NA	NA	B/P/	2.01	/P/	5.90	U/C/	0.5		NA
SB2-3.03	042188-03		NA	NA	/P/	5.39	/P/	66.2	U/C/	0.20		NA
SB2-3.05	052988-02		NA	NA	B/P/	2.9	/P/	4.2	/C/	2.5		NA
SB2-3.10	052988-03		NA	NA	/P/	3.3	/P/	4.8	U/C/	0.5		NA
SB2-3.15	052988-04		NA	NA	B/P/	4.5	/P/	10.6	U/C/	0.5		NA
SB2-4.02.5	042188-02		NA	NA	/P/	6.56	/P/	94.0	U/C/	0.45		NA
SB2-4.05	052988-05		NA	NA	B/P/	3.6	/P/	9.7	U/C/	0.5		NA
SB2-4.10	052988-06		NA	NA	B/P/	3.3	/P/	6.5	U/C/	0.5		NA
SB2-4.15	052988-07		NA	NA	B/P/	2.6	/P/	5.1	U/C/	0.5		NA
SB2-5.01	042188-01		NA	NA	/P/	4.65	/P/	17.2	U/C/	0.23		NA
SB2-5.05	053088-01		NA	NA	B/P/	3.6	/P/	6.1	U/C/	0.5		NA
SB2-5.10	053088-02		NA	NA	B/P/	2.6	/P/	4.8	U/C/	0.5		NA
SB2-5.15	053088-03		NA	NA	B/P/	3.1	/P/	5.5	U/C/	0.5		NA
SB6-1.05	03/18/87		NA	NA		NA		NA		NA	U	0.5
SB6-1.15	03/18/87	U	20	NA	U	10		11		NA		NA
SB6-1.40	03/18/87		NA	NA		NA		NA		NA	U	0.5
SB6-1.75	03/18/87		NA	NA		NA		NA		NA	U	0.5
SB6-2.05	03/19/87		NA	NA		NA		NA		NA	U	0.5
SB6-2.15	03/19/87	U	20	NA	U	10		7.8		NA		NA
SB6-2.40	03/19/87		NA	NA		NA		NA		NA	U	0.5
SB6-2.75	03/19/87		NA	NA		NA		NA		NA	U	0.5
SB6-4.05	050588-01		NA	NA	/P/	5.31	/P/	30.4	U/C/	0.5		NA
SB6-4.25	050588-02		NA	NA	B/P/	2.92	/P/	14.36	U/C/	0.5		NA
SB6-4.25 D	050588-03		NA	NA	B/P/	4.34	/P/	13.09	U/C/	0.5		NA
SB6-4.50	050588-04		NA	NA	/P/	6.01	/P/	13.43	U/C/	0.5		NA
SB6-4.80	050588-05		NA	NA	B/P/	1.92	/P/	15.44	U/C/	0.5		NA
SB6-5.10	050788-15		NA	NA	B/P/	2.25	/P/	11.06	U/C/	0.5		NA
SB6-5.35	050788-16		NA	NA	B/P/	2.71	/P/	8.40	U/C/	0.5		NA
SB6-5.55	050788-17		NA	NA	B/P/	3.46	/P/	5.78	U/C/	0.5		NA
SB6-5.75	050788-18		NA	NA	B/P/	3.28	/P/	6.72	U/C/	0.5		NA
SB6-6.01	042988-01		NA	NA	/P/	3.65	/P/	8.40	U/C/	0.17		NA
SB6-6.30	042988-02		NA	NA	/P/	3.52	/P/	11.7	U/C/	0.17		NA
SB6-6.30 D	042988-03		NA	NA	/P/	4.63	/P/	9.30	U/C/	0.22		NA
SB6-6.70	042988-04		NA	NA	/P/	5.05	/P/	11.1	U/C/	0.17		NA

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SITE IDENTI-FICATION(D)	SAMPLE ID/ DATE(C)	TIN	TITANIUM	VANADIUM	ZINC	CYANIDE	NITRATES
SB6-6.85	042988-05	NA	NA	/P/ 2.67	/P/ 8.85 U/C/	0.21	NA
SB6-7.01	042788-05	NA	NA	/P/ 36.5	/P/ 22.2 U/C/	0.24	NA
SB6-7.25	042788-06	NA	NA	/P/ 4.33	/P/ 35.4 U/C/	0.29	NA
SB6-7.70	042788-07	NA	NA	/P/ 5.25	/P/ 15.4 U/C/	0.21	NA
SB6-7.85	042788-08	NA	NA	/P/ 3.71	/P/ 12.5 U/C/	0.25	NA
SB6-8.05	042788-01	NA	NA	/P/ 4.69	/P/ 10.8 U/C/	0.33	NA
SB6-8.30	042788-02	NA	NA	/P/ 5.7	/P/ 7.97 U/C/	0.27	NA
SB6-8.50	042788-03	NA	NA	/P/ 5.14	/P/ 8.96 U/C/	0.26	NA
SB6-8.85	042788-04	NA	NA	/P/ 3.53	/P/ 5.23 U/C/	0.22	NA
SB7-1.01	050288-01	NA	NA	/P/ 11.0	/P/ 37.3 U/C/	0.5	NA
SB7-1.26	050288-02	NA	NA	/P/ 2.17	/P/ 9.91 U/C/	0.5	NA
SB7-1.50	050288-03	NA	NA	/P/ 3.64	/P/ 16.3 U/C/	0.5	NA
SB7-1.80	050288-04	NA	NA	/P/ 3.65	/P/ 14.6 U/C/	0.5	NA
SB8-1.01	050388-01	NA	NA	/P/ 3.00	/P/ 17.6 U/C/	0.5	NA
SB8-1.30	050388-02	NA	NA	/P/ 3.76	/P/ 20.7 U/C/	0.5	NA
SB8-1.30 D	050388-03	NA	NA	/P/ 5.16	/P/ 15.7 U/C/	0.5	NA
SB8-1.45	050388-04	NA	NA	B/P/ 3.02	/P/ 9.4 U/C/	0.5	NA
SB8-1.65	050388-05	NA	NA	/P/ 4.05	B/P/ 7.60 U/C/	0.5	NA
WJ-38.01	050788-01	NA	NA	B/P/ 3.94	/P/ 13.07 U/C/	0.5	NA
WJ-38.30	050788-02	NA	NA	/P/ 2.54	/P/ 11.42 U/C/	0.5	NA
WJ-38.65	050788-03	NA	NA	/P/ 5.89	/P/ 11.84 U/C/	0.5	NA
WJ-38.90	050788-04	NA	NA	B/P/ 4.29	/P/ 125.1 U/C/	0.5	NA

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