Ground-Water Hydrology and Water Quality of Irwin Basin at Fort Irwin National Training Center, California

By Jill N. Densmore *and* Clark J. Londquist

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 97–4092

Prepared in cooperation with the

FORT IRWIN NATIONAL TRAINING CENTER

5010-02

Sacramento, California
1997

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Gordon P. Eaton, Director

For additional information write to:

District Chief
U.S. Geological Survey
Placer Hall, Suite 2012
6000 J Street
Sacramento, CA 95819-6129

Copies of this report can be purchased from:

U.S. Geological Survey
Information Services
Box 25286
Federal Center
Denver, CO 80225

CONTENTS

FIGURES

TABLES

CONVERSION FACTORS, VERTICAL DATUM, ABBREVIATIONS, AND WELL-NUMBERING SYSTEM

Multiply	By	To obtain
	Length	
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
	Area	
acre	4,047	square meter
square foot (ft^2)	0.09290	square meter
square mile (mi^2)	2.590	square kilometer
	Volume	
cubic foot (ft^3)	0.02832	cubic meter
acre-foot (acre-ft)	1,233	cubic meter
	Flow rate	
acre-foot per day (acre-ft/d)	0.01427	cubic meter per second
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year
foot per day (ft/d)	0.3048	meter per day
foot per foot (ft/ft)	1	meter per meter
foot per year (ft/yr)	0.3048	meter per year
cubic foot per day (ft^3/d)	0.02832	cubic meter per day
gallon per minute (gal/min)	0.06308	liter per second
inch per year (in/yr)	25.4	millimeter per year
	Transmissivity	
foot squared per day (ft^2/d)	0.09290	meter squared per day

Temperature is given in degrees Fahrenheit (°F), which can be converted to degrees Celsius (°C) by the following equation:

$$°C=(°F-32)/1.8.$$

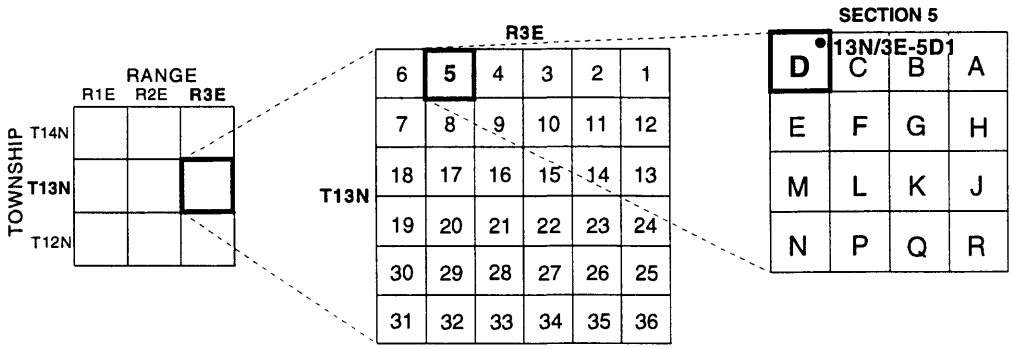
Sea Level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

ABBREVIATIONS:

g	gram	NTC	(Fort Irwin) National Training Center
kg	kilogram	per mil	parts per thousand
MAAR	Mojave Army Antiaircraft Range	PVC	polyvinyl chloride
mg/L	milligram per liter	µg/L	microgram per liter
mL	milliliter	µS/cm	microsiemen per centimeter
mm	millimeter		

Well-Numbering System

Wells and springs are identified and numbered according to their location in the rectangular system for the subdivision of public lands. Identification consists of the township number, north or south; the range number, east or west; and the section number. Each section is divided into sixteen 40-acre tracts lettered consecutively (except I and O), beginning with "A" in the northeast corner of the section and progressing in a sinusoidal manner to "R" in the southeast corner. Within the 40-acre tract, wells are sequentially numbered in the order they are inventoried. The final letter refers to the base line and meridian. In California, there are three base lines and meridians: Humboldt (H), Mount Diablo (M), and San Bernardino (S). All wells in the study area are referenced to the San Bernardino base line and meridian (S). The letters (LYS) following the sequence number indicate a lysimeter. Well numbers consist of 15 characters and follow the format 013N003E05D001S. In this report, well numbers are abbreviated and written 13N/3E-5D1. Wells in the same township and range are referred to only by their section designation, 5D1. The following diagram shows how the number for well 13N/3E-5D1 is derived.



Ground-Water Hydrology and Water Quality of Irwin Basin at Fort Irwin National Training Center, California

By Jill N. Densmore *and* C.J. Londquist

ABSTRACT

Geohydrologic data were collected from Irwin Basin at Fort Irwin National Training Center in the Mojave Desert of southern California by the U.S. Geological Survey during 1992–96 to determine the quantity and quality of ground water available in this basin. In addition to data collected from existing wells and test holes, 17 monitoring sites were constructed in Irwin Basin to provide data on subsurface geology, ground-water levels, and ground-water quality. Eleven of these sites were multiple-well monitoring sites that were constructed to provide depth-dependent geohydrologic data in the aquifer system. The aquifer system of Irwin Basin, defined on the basis of hydrologic data collected from wells in Irwin Basin, consists of an upper and a lower aquifer. A 1994 water-table contour map shows that a cone of depression beneath Irwin Basin well field has developed as a result of ground-water development. Water-quality samples collected from Irwin Basin wells to determine potential sources of ground-water degradation indicate that water in three areas in the basin contains high nitrate and dissolved-solids concentrations. The stable isotopes of oxygen and hydrogen indicate that present-day precipitation is not a major source of recharge in this basin. Tritium and carbon-14 data indicate that most of the basin was recharged before 1953 and that this water may be more than 14,000 years old.

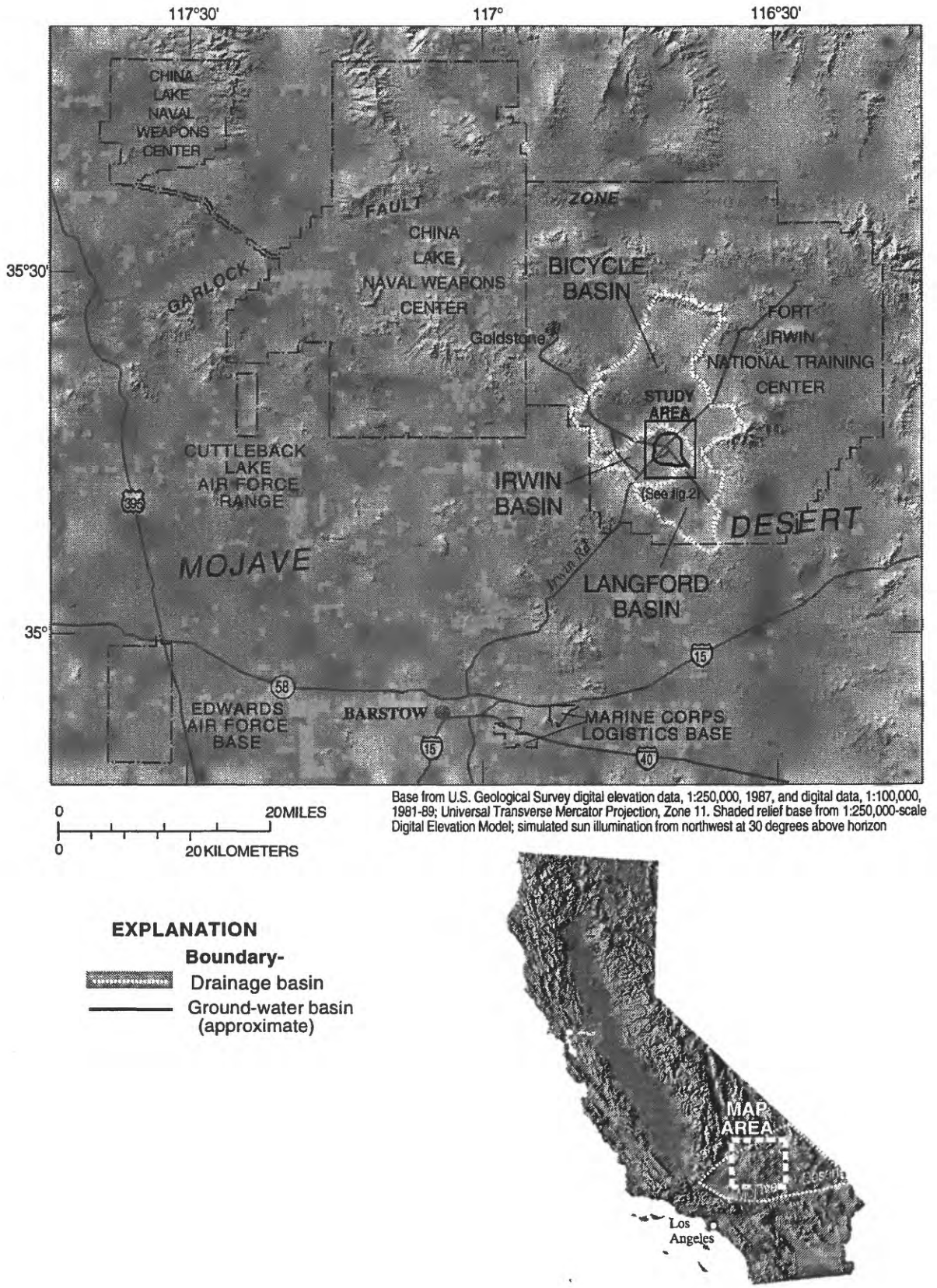
INTRODUCTION

The area presently known as Fort Irwin National Training Center (NTC) was established as the Mojave Army Antiaircraft Range (MAAR) in August 1940 as an area for antiaircraft training. MAAR was renamed "Camp Irwin" in 1942. Camp Irwin was deactivated in 1944 and transferred back to the U.S. Department of the Interior. In 1951, Camp Irwin was reactivated, and in 1961, the land was transferred to the U.S. Army and renamed "Fort Irwin". It served as an armory and artillery national training center until 1971. From 1971 to 1972, Fort Irwin was closed. Fort Irwin was transferred to the State of California as a training area for the California Army National Guard during 1972–80, and has been supporting the NTC since 1981.

The U.S. Army at Fort Irwin NTC obtains all its potable water supply from ground water in the Irwin, Bicycle, and Langford Basins (fig. 1). From 1941 to 1995, most of their ground-water pumpage at Fort Irwin had been from Irwin Basin, which resulted in about 30 ft of water-level decline in the basin. Future water demands at the Army base probably will cause a further decline in water levels, and several wells in Irwin Basin have been taken out of production because of water-quality problems. In 1992, the U.S. Geological Survey entered into an agreement with Fort Irwin National Training Center to evaluate the long-term availability and quality of ground water.

Purpose and Scope

The objectives of this study were to describe the geohydrologic and geochemical framework of the ground-water basins that supply water to the base, to develop ground-water-flow models to help refine the understanding of the geohydrology of the basins, and to



Base from U.S. Geological Survey digital elevation data, 1:250,000, 1987, and digital data, 1:100,000, 1981-89; Universal Transverse Mercator Projection, Zone 11. Shaded relief base from 1:250,000-scale Digital Elevation Model; simulated sun illumination from northwest at 30 degrees above horizon

Figure 1. Mojave Desert region and study area.

evaluate the long-term availability of ground water for the base. This study will be completed in four phases:

Phase 1. Describe the geohydrologic and geochemical framework of Irwin Basin,

Phase 2. Develop and calibrate a ground-water-flow model for Irwin Basin,

Phase 3. Describe the geohydrologic and geochemical framework of Bicycle and Langford Basins,

Phase 4. Develop and calibrate ground-water-flow models for Bicycle and Langford Basins.

The purpose of this report is to describe the results of phase 1 of the study. Available geohydrologic and geochemical data were compiled and new data were collected from existing wells. In addition, between 1992 and 1995, 17 monitoring sites were drilled in which 40 wells and 8 lysimeters were installed to describe the areal and vertical geohydrologic and geochemical framework of Irwin Basin. A conceptual model of the subsurface geology was developed using lithologic and geophysical data collected from available boreholes (data shown in appendix A). Additional structural information was obtained from a seismic-refraction survey. Water-quality samples were collected to evaluate possible sources of ground-water quality degradation. Samples also were analyzed for the stable isotopes of oxygen and hydrogen to determine the source of ground water and for the radioactive isotopes of tritium and carbon-14 to evaluate the relative age of ground water (years since the water entered the ground-water system) in Irwin Basin.

Location and General Features

Fort Irwin NTC is about 130 mi northeast of Los Angeles in the Mojave Desert region of southern California (fig. 1). The nearest major community is Barstow, which is about 35 mi to the southwest. The base covers an area of about 970 mi^2 and encompasses several ground-water basins. Irwin Basin is bounded to the east by Beacon Hill, to the north-northwest by Northwest Ridge, to the west by Southwest Ridge, and to the south by low-lying hills that separate Irwin Basin from Langford Basin (fig. 2).

Irwin Basin is typical of desert basins in the Mojave Desert in that it has a relatively flat floor surrounded by generally rugged mountains. The basin has a surface drainage area of about 30 mi^2 and the floor of the basin covers about 7 mi^2. No perennial streams are in the basin, but several dry washes contain some surface flow during or immediately after large storms. Surface drainage out of the basin, when it occurs, is to the southeast through an unnamed wash near Garlic Spring into Langford Basin (fig. 2).

The Irwin Basin climate is typical of the Mojave Desert—low precipitation with hot summers and cool winters. There are no official weather records for the basin, but records for Goldstone, about 7 mi northwest of the basin, indicate that average annual precipitation is about 6.5 in., mostly during the winter or from a few isolated thunder storms during the summer (National Oceanic and Atmospheric Administration, 1994). Between 1973 and 1993, the annual precipitation at Goldstone ranged from about 11.5 in. in 1983 to about 2 in. in 1975. Between 1940 and 1993, the average annual temperature at Barstow was 64°F, ranging from 3°F in the winter to 116°F in the summer (EarthInfo, Inc., 1994, 1995). In Death Valley, about 80 mi north of the basin, the average annual potential evaporation is about 148 in. and at Newberry Springs, about 25 mi to the south, it is about 76 in. (David Inouye, California Department of Water Resources, written commun., 1996).

Previous Studies

Previous studies by the U.S. Geological Survey include a hydrogeologic reconnaissance by Kunkel and Riley (1959) that identified unconsolidated water-bearing and consolidated nonwater-bearing deposits and established that Irwin, Bicycle, and Langford Basins were favorable for development of ground water. Yount and others (1994) did detailed geologic mapping in Irwin Basin and part of Langford Basin and determined the location of several faults on the base.

Several consulting and engineering investigations have been completed for the base (C.F. Hostrup and Associates, 1955; James M. Montgomery and Associates, 1981; Wilson F. So and Associates, 1989) to determine the long-term availability of ground water for the Fort Irwin NTC. The Montgomery study in 1981 concluded that ground water was being mined from Irwin and Bicycle Basins. Wilson F. So and Associates (1989) determined that if projected Irwin Basin water demands were accurate, water levels would be "critically deep" at some time between the years 2011 and 2020.

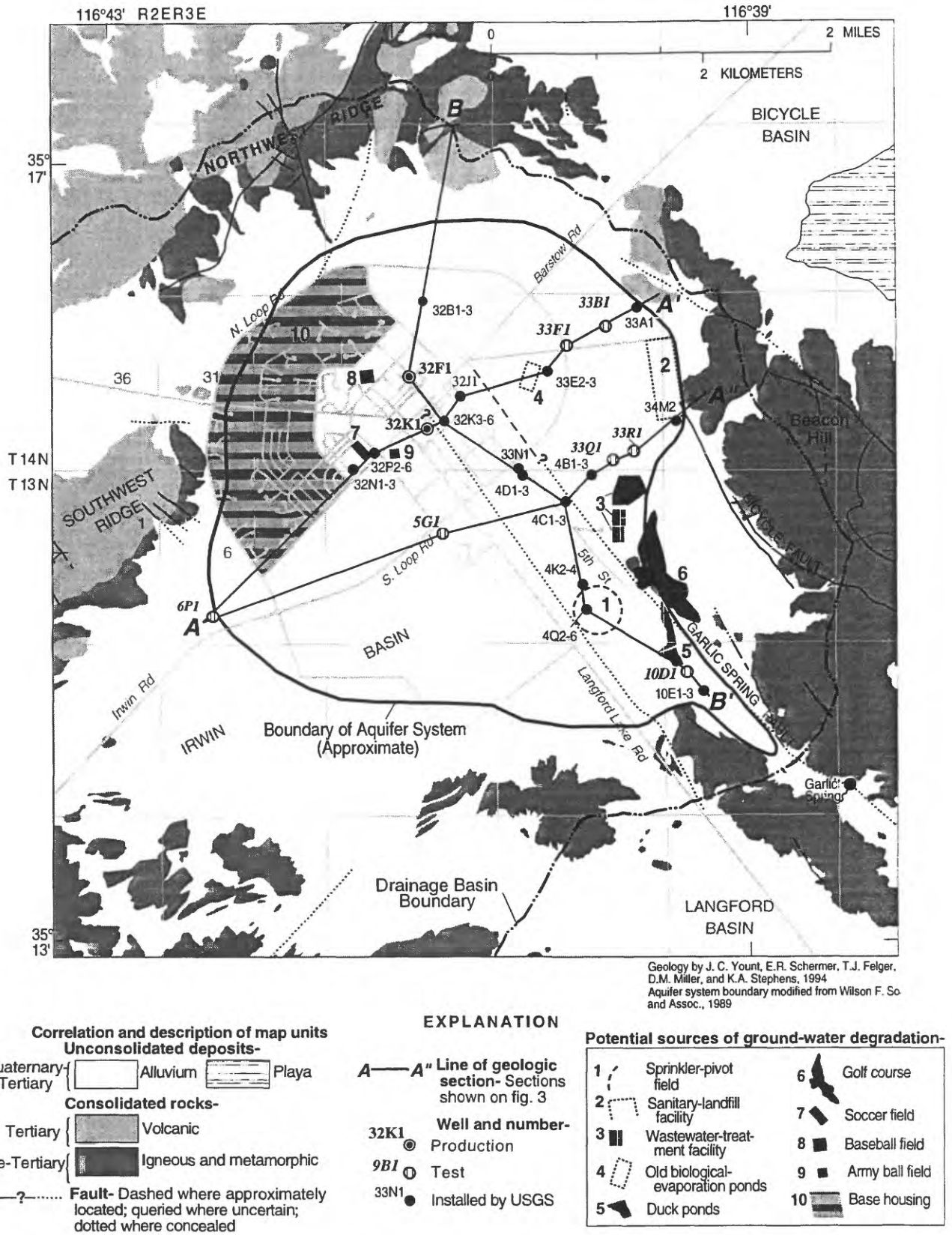


Figure 2. Generalized surficial geology, major faults, and location of selected wells and geologic-section lines at Fort Irwin National Training Center, California.

Acknowledgments

The authors thank the following personnel at Fort Irwin: Rene Quinones for providing all available data from existing wells, Benjamin Rodarte and Robert Washington for providing production well data, and the personnel at DynCorps for providing invaluable assistance in scheduling aquifer tests. The authors also thank U.S. Geological Survey Personnel Steven Crawford for performing and analyzing aquifer tests on wells in Irwin Basin, Kathryn Koczot for preparation of a Geographic Information System database containing all available data, and Robert Anders for bacteriologic analysis of soil samples.

GEOLOGIC FRAMEWORK

The geology of Irwin Basin was previously described by C.F. Hostrup and Associates (1955), Kunkel and Riley (1959), James M. Montgomery and Associates (1981), Wilson F. So and Associates (1989), and Yount and others (1994). The geologic discussion presented in this report summarizes information from these reports and updates the geology on the basis of data collected during this study.

Stratigraphy

For this report, the geologic units are grouped into "consolidated rocks" and "unconsolidated deposits" (fig. 2). The consolidated rocks which make up the basement complex in the area include igneous and metamorphic rocks of pre-Tertiary age and volcanic rocks of late Tertiary to Quaternary age. The igneous and metamorphic rocks underlie the ground-water basin and crop out in the surrounding hills. They contain water only where jointed and fractured, which is generally in the upper few tens of feet of the basement complex. Where saturated, this "weathered" zone may yield moderate quantities of water to wells and is considered to be the base of the aquifer system in the basin. Volcanic rocks are found in the mountains north, northwest, and west of Irwin Basin. These volcanic rocks generally are not classified as water-bearing (Kunkel and Riley, 1959). Basalt dikes, plugs, and lava flows of Tertiary to Quaternary age are found in scattered areas north and east of Irwin Basin (Kunkel and Riley, 1959) and also are not considered water-bearing.

The basin is filled with as much as 950 ft of unconsolidated deposits that consist of older alluvium of late Tertiary to Quaternary age and younger alluvium of Quaternary age (fig. 3). The older alluvium is composed of sand, gravel, and clay and is derived predominantly from granitic rocks, except in the northern part of the basin where volcanic rocks dominate. In the southeastern part of the basin, the older alluvium consists almost entirely of low-permeability silt and clay lacustrine deposits (fig. 3, B-B´). The older alluvium is more indurated and less permeable than the overlying younger alluvium. However, where the older alluvium consists predominantly of sand and gravel, it yields moderate amounts of water to wells.

The younger alluvium, which overlies the older alluvium throughout the basin (fig. 3), consists of primarily loose, coarse sand and gravel with small amounts of clay. These deposits range in thickness from 0 ft near the margins of the valley to more than 400 ft in the central part of the basin (fig. 3, A-A´). These deposits generally lie above the water table; however, where saturated (primarily in the central part of the basin), they are capable of yielding large quantities of water to wells (as much as 1,000 gal/min).

Wellbore-flow tests were done using the tracer-pulse method for selected base-supply wells to determine the relative contribution of water to a well from individual aquifer layers. The tracer-pulse method uses a tracer injected at a known depth in a pumped well. The discharge from the well is monitored at the surface, the arrival of the tracer is recorded, and the time-of-travel from the injection point to the surface is calculated. The tracer is then injected at another depth. As with the previous injection, discharge is monitored at the surface, the arrival of the tracer is recorded, and the time-of-travel from the injection point to the surface is calculated. The velocity of water in the well between the two injection points is the distance between the two depths divided by the difference between the time-of-travel from the first injection depth to the surface and the time-of-travel from the second injection depth to the surface. The injection is repeated at other depths in the well to obtain a velocity profile. The velocity profile obtained from the tracer-pulse data is equated to a flow rate, and the percentage of the flow contributed by individual water-bearing zones is calculated in the same manner as from velocity profiles obtained using conventional flowmeters. The results of these tests indicate that most of the water pumped from these wells is from the younger alluvium.

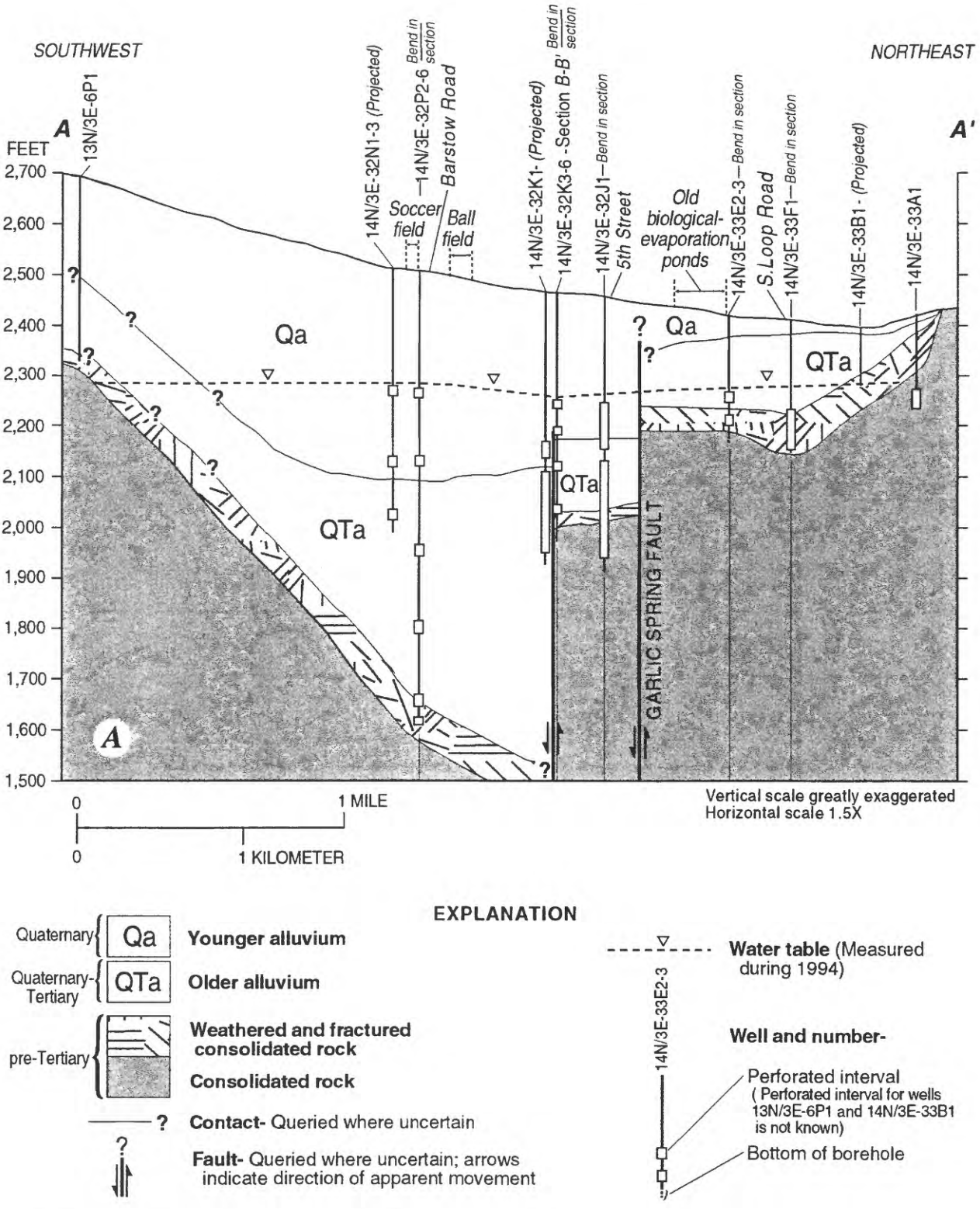


Figure 3. Generalized geology across Irwin Basin at Fort Irwin National Training Center, California.

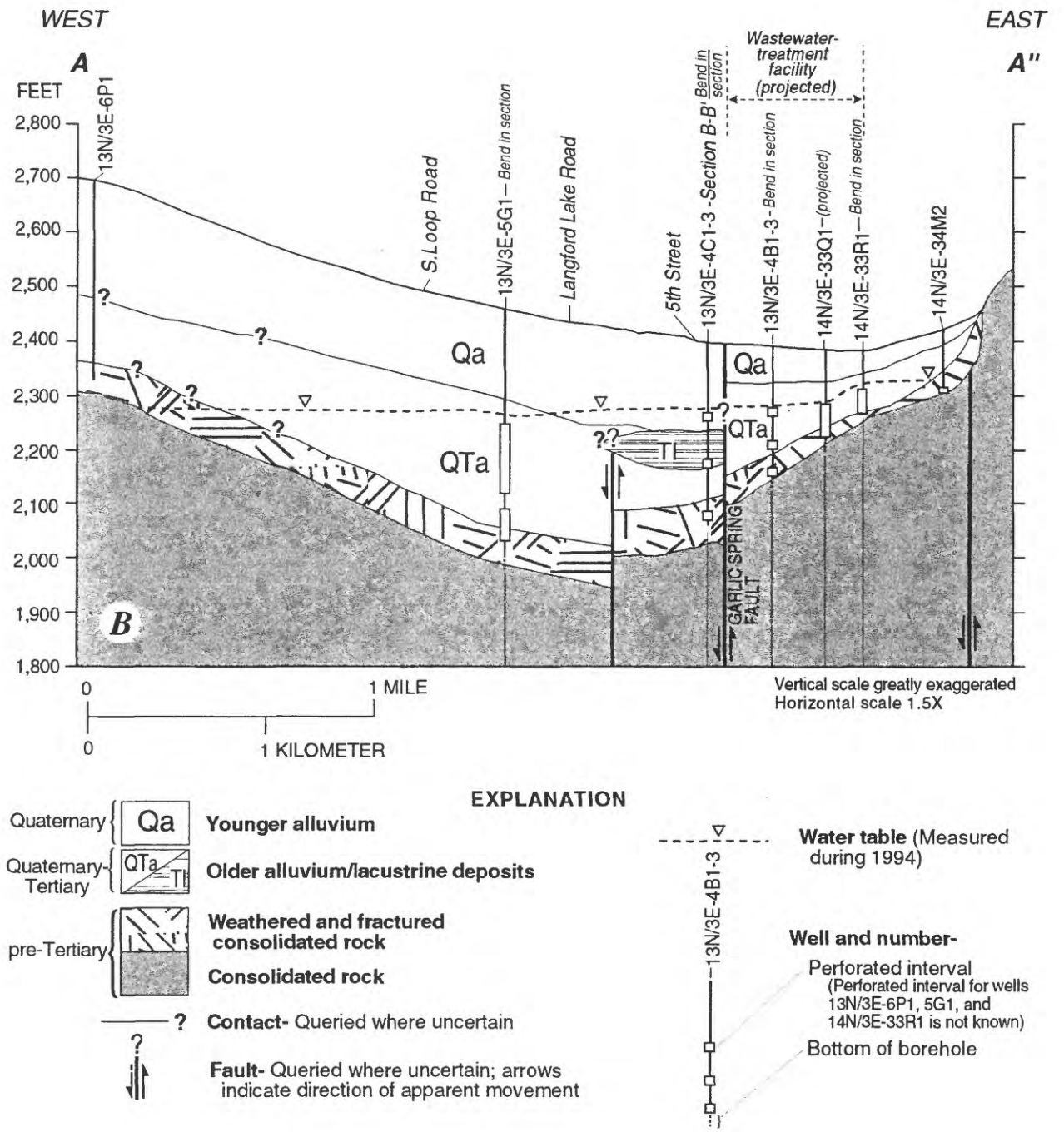


Figure 3.—Continued.

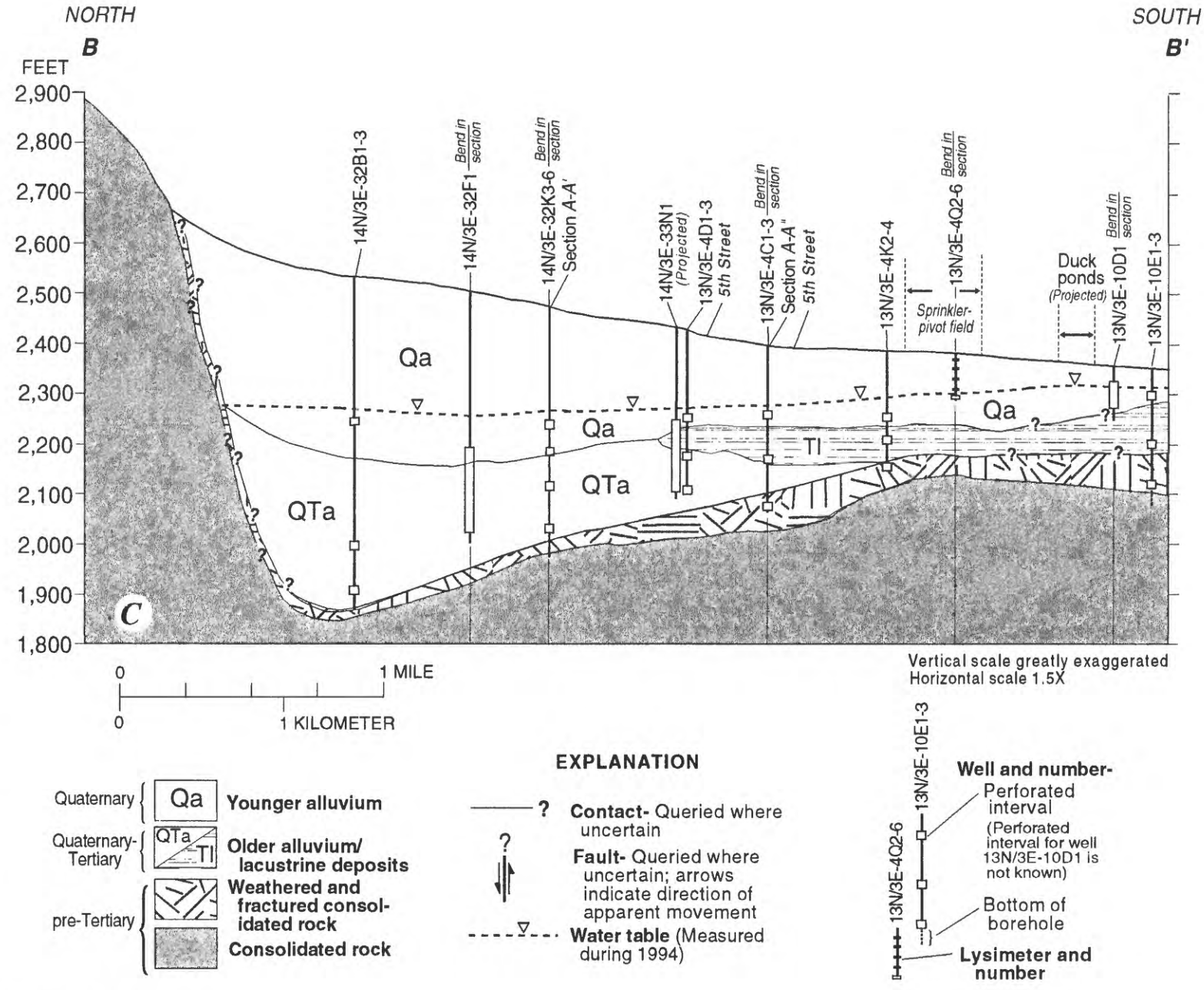


Figure 3.—Continued.

Faults

Several faults have been mapped in the bedrock hills surrounding the basin (Yount and others, 1994) (fig. 2). Most of these faults disappear beneath the unconsolidated deposits at the margins of the valley floor and their presence in the basin is largely unknown. Yount and others (1994) have mapped the Garlic Spring Fault as extending out into the unconsolidated deposits and they infer that it may cut through the older and younger alluvium in the southeastern part of the basin (fig. 3, A-A´ and A-A´´). Water-quality data presented in the "Ground-Water Quality" section of this report indicate that this fault is a partial barrier to ground-water flow. Seismic-refraction surveys were completed for this study to locate the extension of the Garlic Spring Fault, north-northwest of the wastewater-treatment facility. These surveys were inconclusive; however, they indicate that the bedrock surface is highly variable in this area.

The depth of the buried basement complex beneath the basin floor is shown in figure 3. The irregular bedrock surface of the basin seems to be affected by faulting. Borehole data indicate that the depth to the basement complex is shallow on the northeast side of the Garlic Spring Fault and deepens to the southwest across the Garlic Spring Fault and a parallel unnamed fault mapped by Yount and others (1994) (fig. 3). Several other faults in the area shown in figure 2 have been mapped (Yount and others, 1994); however, their influence on the depth of the basin is less evident than that of the Garlic Spring Fault.

GROUND-WATER HYDROLOGY

The aquifer system of Irwin Basin was defined on the basis of geohydrologic data collected from existing and newly installed wells in the basin (fig. 4). Seventeen monitoring sites containing 40 wells were completed during 1992–95 (fig. 4). The lithologic, well-construction, and geophysical data for these sites are shown in appendix A. Eleven of these sites are multiple-well monitoring sites that were constructed to measure ground-water levels and ground-water quality and to provide data on aquifer properties in the aquifer system. A typical multiple-well monitoring site consists of between two and five 2-in.-diameter polyvinyl chloride (PVC) piezometers each screened at different depths to allow depth-dependent measurements and sampling. Table 1 (at back of report) lists the State well number, local well name, and well-construction data for wells in Irwin Basin.

Aquifer System Definition

The aquifer system in Irwin Basin consists of an upper and a lower aquifer. The upper aquifer is contained in the saturated part of the younger alluvium and is unconfined. This aquifer reaches a maximum thickness of about 200 ft in the west-central part of the basin (fig. 3, A-A´). The lower aquifer includes the older alluvium and the upper part of the basement complex that is weathered and fractured and, because of formation differences, is confined or partly confined throughout most of the basin. This aquifer reaches a maximum thickness of 600 ft or more in the central part of the basin (fig. 3, A-A´).

The areal extent of the aquifer system in Irwin Basin changes in response to the quantity of water that is pumped from and recharged to the basin. For this study, the aquifer system boundary (fig. 2) was approximated using the basin boundary initially drawn by Wilson F. So and Associates (1989) and modified on the basis of 1994–96 water-level data; thus, the boundary shown approximates the boundary location from 1994 to 1996.

The average weighted specific yield for sediments in the first 150 ft below the water table in Irwin Basin was estimated to be 19 percent (James M. Montgomery and Associates, 1981). This estimate was based on sediments described in drillers' and geologists' logs using published specific yield values of similar material.

Estimates of the transmissivity of the aquifer system range from 500 to 5,000 ft^2/d (C.F. Hostrup and Associates, 1955; Wilson F. So and Associates, 1989). However, because most production wells are perforated across several zones in the aquifer system, many of these numbers do not define the zones that contribute large amounts of water to a well. A wellbore-flow test using the tracer-pulse method was done in well 14N/3E-32K1 to measure the relative parts of flow from several depths while the well was being pumped. The test results indicate that most of the water enters the well above the depth of 350 ft, the approximate contact between the upper and lower aquifers (fig. 3, A-A´).

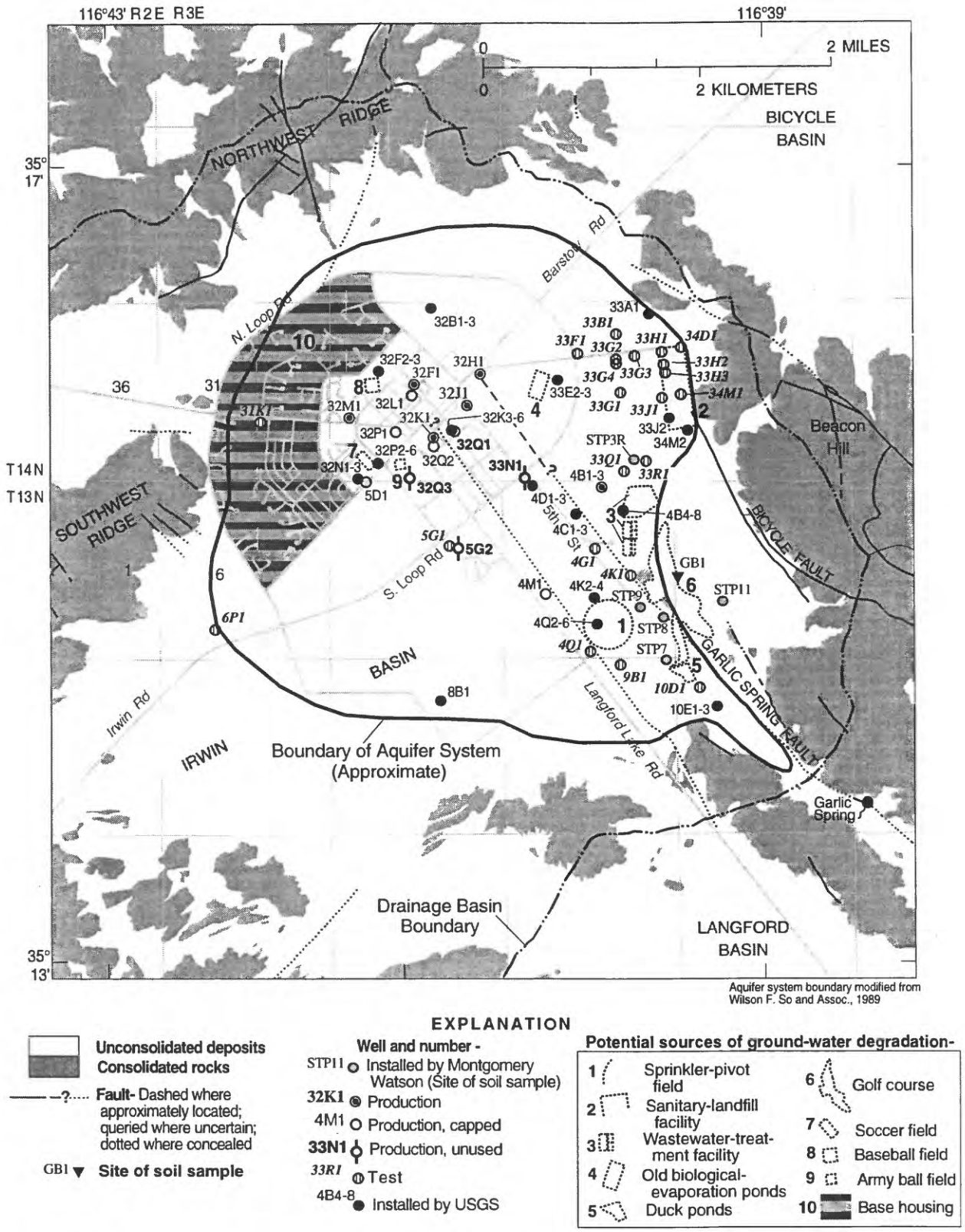


Figure 4. Location and type of ground-water monitoring sites in Irwin Basin at Fort Irwin National Training Center, California.

Natural Recharge and Discharge

The sole source of natural recharge in Irwin Basin is precipitation in the drainage basin (an area of 29.8 mi^2), which probably occurs only during and shortly after high-intensity or long-duration storms. The margins of the valley floor probably receive most of the recharge because runoff from the surrounding mountains infiltrates into the coarser alluvium of the foothills and farther out in the valley floor along the normally dry washes (fig. 2). C.F. Hostrup and Associates (1955) estimated that recharge in Irwin Basin was about 150 acre-ft/yr. This estimate, based on ground-water pumpage from February 1941 to June 1945 and water-level recovery from June 1945 to February 1951, is a minimum long-period average annual rate. Natural recharge from 1993 precipitation is assumed to be similar to this estimate.

Before 1941, prior to development in the basin, the ground-water system was assumed to be under steady-state conditions; therefore, the natural discharge from the basin was equal to the natural recharge to the basin. The primary natural ground-water discharge from the basin was underflow to Langford Basin beneath the unnamed wash near Garlic Spring (fig. 2). Evapotranspiration was considered to be negligible because of the sparse vegetation and because the depth to water generally was more than 30 ft below land surface throughout the basin.

Ground-Water Pumpage, Water Use, and Artificial Recharge

Before the development of Camp Irwin in 1941, there was no known pumping of ground water from the basin. In 1941, two wells were drilled to meet supply needs at MAAR/Camp Irwin, and by 1966, all water used at the base was supplied by eight wells in Irwin Basin. In 1967, the base began pumping ground water from Bicycle Basin to the northeast, and in 1992, they began pumping ground water from Langford Basin to the southeast (figs. 1 and 5). Total ground-water withdrawals at the base ranged from about 30 acre-ft in 1941 to more than 3,000 acre-ft in 1990, with as much as 1,927 acre-ft being pumped from Irwin Basin in

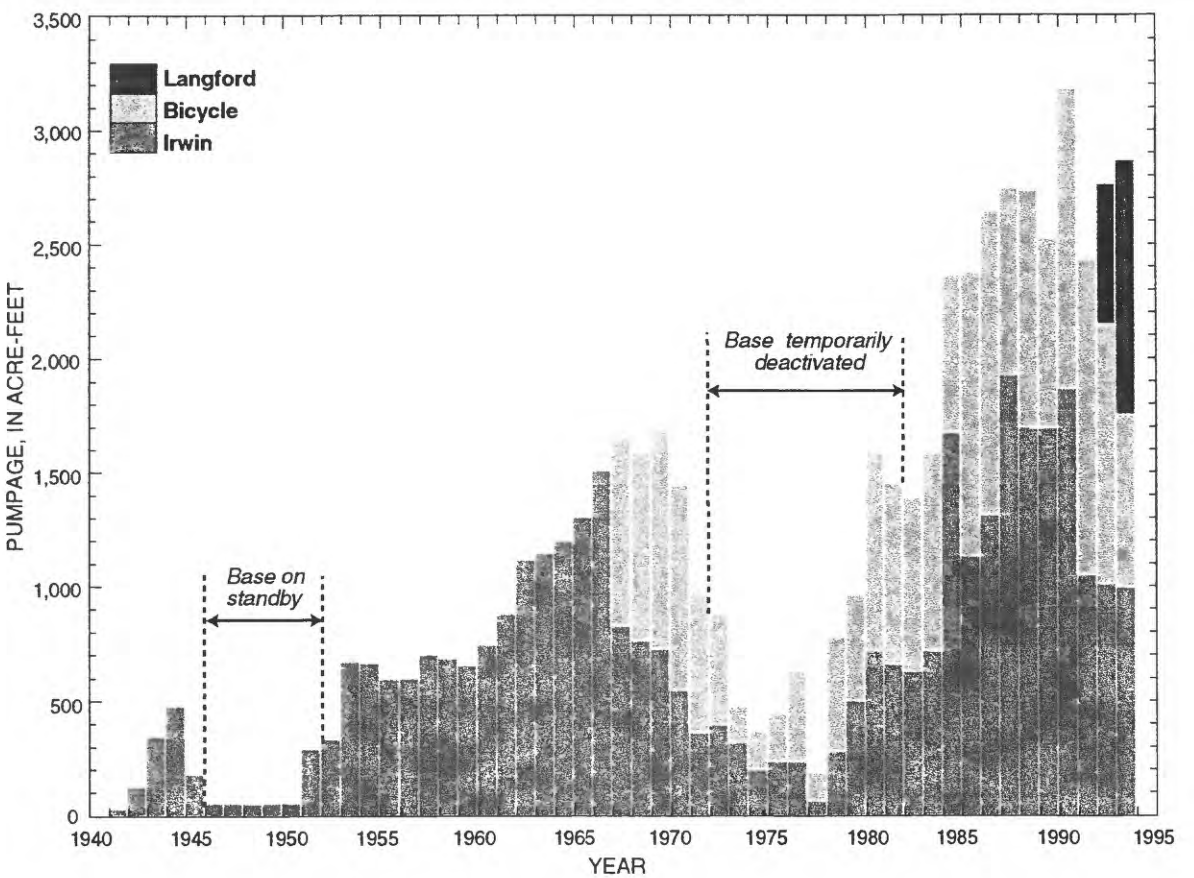


Figure 5. Pumpage for Irwin, Bicycle, and Langford Basins at Fort Irwin National Training Center, California, 1941–93.

1987 (fig. 5, table 2, at back of report). Table 2 summarizes pumpage from 1941 to 1993 for Irwin, Bicycle, and Langford Basins.

Most water that is not consumptively used in the Fort Irwin Basin is discharged to a wastewater-collection system and treatment facility. From 1941 to 1955, wastewater was collected in biological evaporation ponds in the northeastern part of the basin (old biological evaporation ponds, fig. 2), and from 1955 until present (1997), wastewater was collected and treated at the wastewater-treatment facility in the southeastern part of the base (fig. 2). The percolation (seepage) of wastewater to the water table, estimated at about 1,100 acre-ft in 1993 (see table 4, later in this section), probably is the largest source of ground-water recharge in Irwin Basin. C.F. Hostrup and Associates (1955) reported that in 1954, about 70 percent of the total water pumped for all uses on the base eventually went to the biological evaporation ponds. However, inspection of 1993 records, (Thomas Borley, DynCorps, written commun., 1995), indicates that about 58 percent of the total water pumped for all uses on the base went to the wastewater-treatment facility. The percentage of pumped water that is discharged to the wastewater-treatment facility is less in recent years because more ground water is being used for watering lawns, washing vehicles, and supplying water outside Irwin Basin. For the purposes of this study, these values are used as the maximum (70 percent of pumpage) and minimum (58 percent of pumpage) water deliveries to the wastewater-treatment facility between 1941 and 1993 (table 3, at back of report).

Untreated wastewater was disposed of in the biological evaporation ponds, an area of about 8 acres, during 1941–55 in the northeastern part of the basin (fig. 2). Since 1955, wastewater has been treated and disposed of in ponds at the wastewater-treatment facility in the southeastern part of the basin (fig. 2). These ponds covered about 17 acres from 1955 to the mid-1980's and, with the addition of three evaporation ponds, about 47 acres thereafter. Some of the treated wastewater is diverted from these ponds to irrigate the base driving range, golf course, and sprinkler-pivot field in the southeastern part of the basin (fig. 2). The driving range and golf course (an area of about 58 acres) were irrigated from 1955 to 1971 and from 1981 to 1993. In 1986, the sprinkler-pivot field (about 10 acres) was added in the southeastern part of the basin.

Some of the wastewater that goes to the treatment facility is evaporated, but some percolates to the water table. Ground-water recharge from the treatment facility (table 3) is calculated by subtracting the estimated potential evaporation from the sewage ponds at the facility and the estimated potential evapotranspiration of wastewater diverted from the ponds for watering grass areas (driving range, golf course, and sprinkler-pivot field) from the wastewater entering the treatment facility. The potential evaporation from the ponds was estimated (table 3) by multiplying the area of the ponds by the potential evaporation of 6.6 ft/yr reported for ponded water at the California Department of Water Resources Cimis Station at Newberry Springs, about 25 mi south of Fort Irwin (David Inouye, California Department of Water Resources, written commun., 1996). The potential evapotranspiration from the grass areas was estimated (table 3) by multiplying the grass area by the potential consumptive use of 6.3 ft/yr reported for alfalfa and grass crops in southwestern Arizona (Sandra Owen-Joyce, U. S. Geological Survey, oral commun., 1996).

Estimates of ground-water recharge from wastewater from 1941 to 1993 ranged from 0 to 1,486 acre-ft/yr and averaged about 320 acre-ft/yr for the minimum estimated wastewater recharge and about 450 acre-ft/yr for the maximum estimated wastewater recharge (table 3). During 1942–45, 1951–55, 1957, and 1960–93, wastewater was assumed to be recharging the basin. During 1969–70, 1972–80, 1983, 1985, and 1991–93, however, estimated ground-water recharge from wastewater approached or exceeded pumpage in Irwin Basin (table 3).

The infiltration of water used to irrigate lawns and playing fields that is not consumptively used by the plants is another source of recharge not present before the development of the base. During the mid-1960's to early 1980's, the area of lawn watering at the base was about 14 acres and included lawns at the base housing and an Army ball field. The housing area grew in 1983, increasing the irrigated area to about 25 acres. During 1984–85, an additional 8 acres of irrigated area (soccer field and a baseball field complex) was added adjacent to the base housing in the western part of the basin (fig. 2). Thus, the total irrigated area was 33 acres by the mid-1980's. Assuming that the consumptive use for grass in Irwin Basin is about 6.3 ft/yr (Sandra Owen-Joyce, U.S. Geological Survey, oral commun., 1996), about 90 acre-ft/yr of irrigation water was needed to maintain the lawns during the 1960's to the early 1980's, and about 210 acre-ft/yr (33 acres x 6.3 ft/yr) was needed from the early-1980's to present (1997).

Because the irrigation efficiency (consumptive use divided by the quantity of applied water) is undoubtedly less than 100 percent, there is the potential for irrigation return water (applied irrigation water in excess of the consumptive use) to recharge the ground-water system. If one assumes that the irrigation efficiency of the lawn areas averages 50 percent (twice as much water is applied than is consumptively used), then irrigation-return flows would be about 90 acre-ft/yr before the early 1980's and 210 acre-ft/yr from the early 1980's to present (1997).

Ground-Water Levels and Movement

Before development of Irwin Basin, the ground-water gradient in the basin was relatively flat with a slight gradient toward the unnamed wash near Garlic Springs. The average water-table altitude was about 2,305 ft above sea level at the time the first six wells were drilled in Irwin Basin (Kunkel and Riley, 1959). Ground-water discharge from the basin was underflow to Langford Basin beneath the unnamed wash near Garlic Spring (James M. Montgomery and Associates, 1981). A water-level altitude of 2,236.73 ft above sea level from a well drilled in the wash near Garlic Spring in 1980 and water-level altitudes of 2,110 to 2,113 ft above sea level in January 1981 from wells in Langford Basin indicate a gradient toward Langford Basin.

During 1992–96, water-level measurements were made at 67 wells in Irwin Basin (appendix B). Figure 4 shows the locations of the monitored wells and table 1 summarizes the construction specifications of the wells.

The highest fluctuations of water levels were in response to ground-water withdrawals and wastewater disposal. Figure 6 shows water-level fluctuations near the pumping depression from two wells that are perforated opposite the upper and lower aquifers. These hydrographs indicate that, since pumping began in 1941, water levels have declined slightly more than 30 ft (well I-1, 13N/3E-5D1, fig. 6) in the central part of the basin and that most of this declined (26 ft) between 1953 and 1967. From 1967 to 1982, water levels in this well recovered about 16 ft as a result of the importation of water from Bicycle Basin and the decline in activity at the base. From the early 1980's until the early 1990's, pumpage from Irwin Basin increased (maximum of 1,927 acre-ft in 1987), and water levels in well I-1 declined about 15 ft to the levels measured in the late 1960's. Since 1993, water levels have been recovering or stabilizing in Irwin Basin, probably in response to decreases in ground-water withdrawals in the basin (pumpage increased in Bicycle and Langford Basins, see fig. 5) and the percolation of wastewater in the southeastern part of the basin that has resulted from the importation of water from Bicycle and Langford Basins. At the time this report was being written, pumpage data for 1995–96 were not available, but declining water levels during 1995–96 indicate that pumpage must be exceeding recharge. Water-level measurements from a well northeast of Irwin Basin well field (well I-7, 14N/3E-32H1, fig. 6) indicate a similar trend in water levels from 1963 to 1996.

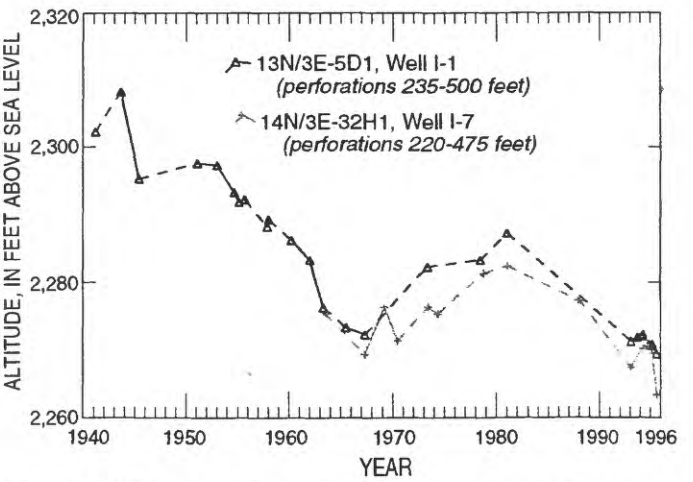


Figure 6. Water-level fluctuations in selected wells in Irwin Basin at Fort Irwin National Training Center, California.

Before ground-water development in Irwin Basin in 1941, the direction of ground-water flow probably was from the margins of the alluvium near the mountain fronts toward the unnamed wash near Garlic Spring, through which ground water discharges to Langford Basin. The 1994 water-table contour map, created from measurements of the shallowest well at a multiple-well monitoring site and of the production wells, which are generally perforated over both aquifers, is shown in figure 7. Arrows at right angles to the contours indicate the general direction of ground-water movement. By 1994, pumping in the basin had created a water-table depression in the central part of the basin beneath the well field. The 1994 water-table contours indicate that the direction of ground-water movement throughout most of the basin was from the margins of the basin toward the pumping depression (fig. 7). Furthermore, a ground-water mound and ground-water divide has formed as a result of wastewater disposal in the southeastern part of the basin, resulting in an

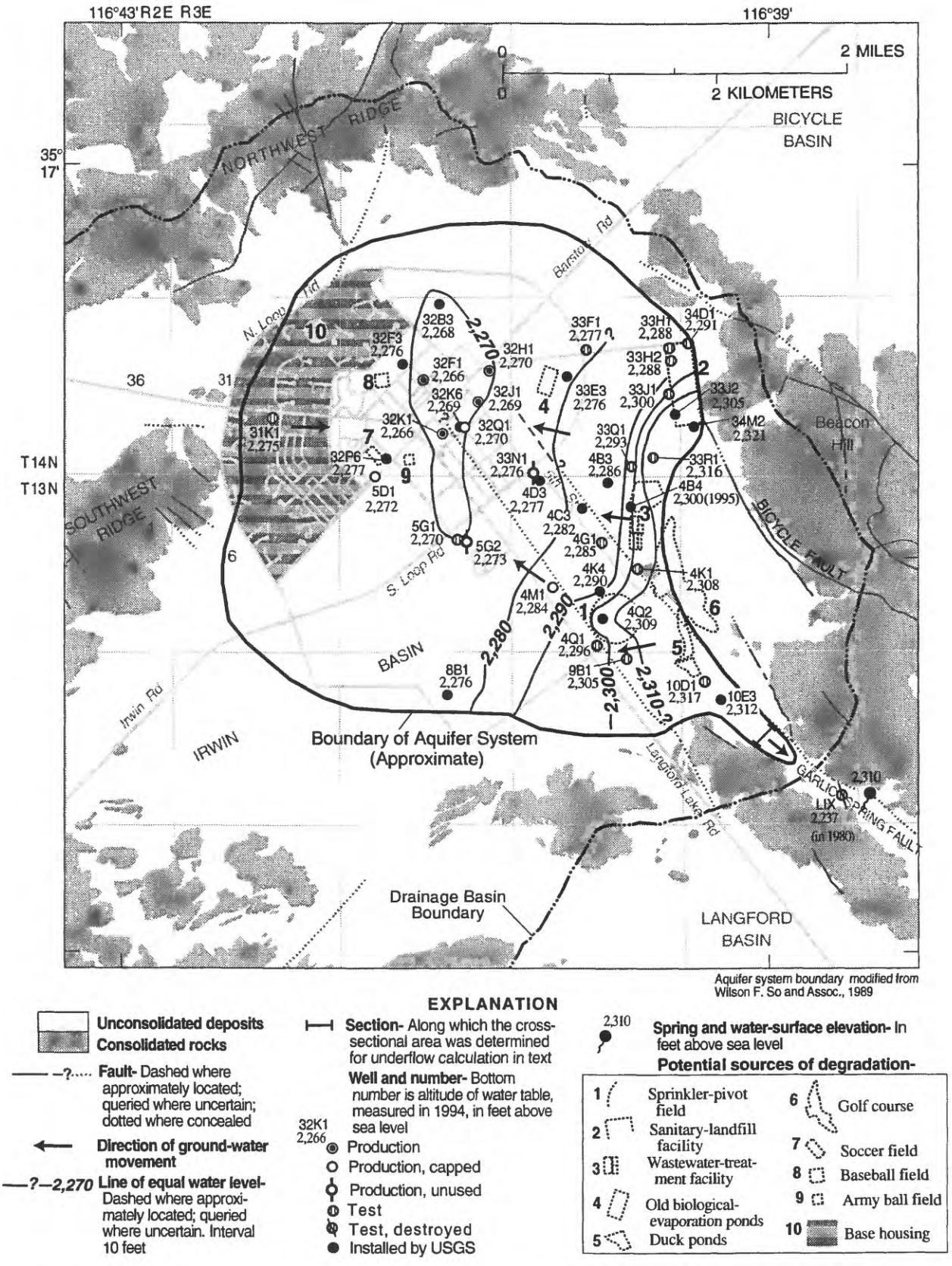


Figure 7. Water levels in shallow monitoring and production wells in Irwin Basin at Fort Irwin National Training Center, California, 1994.

increase in water levels in this area (fig. 7). The ground-water levels possibly are higher than those present before the development of ground water in Irwin Basin. Water from this mound flows northwestward toward the ground-water depression in the central part of the basin and southeastward toward the wash near Garlic Spring.

The 1994 water-table contours indicate that ground water continues to discharge from Irwin Basin to Langford Basin. The quantity of ground-water discharge to Langford Basin was estimated with the following form of Darcy's law:

$$Q = KIA \quad (1)$$

where

- Q is ground-water underflow, in cubic feet per day;
- K is hydraulic conductivity, in this case about 25 ft/d at well 13N/3E-10E3, (Steven Crawford, U.S. Geological Survey, written commun., 1996);
- I is hydraulic gradient estimated from the water-level altitude at well 13N/3E-10E3 and the altitude (2,237 ft above sea level in 1980) at well LIX near Garlic Spring, in this case 0.01 ft/ft (fig. 7); and
- A is cross-sectional area of the aquifer (fig. 7) perpendicular to flow, in this case 40,000 ft^2 [Computed by multiplying the saturated thickness of the younger alluvium (50 ft at well 13N/3E-10E3; fig. 3) by the aquifer width of 800 ft (fig. 2) in the area of discharge. Flow in the fine-grained older alluvium and the fractured bedrock was considered negligible.]

Ground-water discharge from Irwin Basin to Langford Basin calculated from the above equation is 10,000 ft^3/d (85 acre-ft/yr) or more. Under 1994 conditions, discharge of ground water from Irwin Basin to Langford Basin through the unnamed wash near Garlic Spring results from mounding of water beneath the duck ponds.

Water-level data from multiple-well monitoring sites indicate that the hydraulic head (or water level) varies with depth (appendix B). In general, the hydraulic head is higher in wells perforated in the upper aquifer than those perforated in the lower aquifer. This head distribution indicates downward vertical flow. The difference in hydraulic head between the upper and lower aquifer ranges from 0.1 to 4.5 ft. The largest differences in hydraulic head are at monitoring site 13N/3E-10E1-3 in the southeastern part of the basin and at monitoring sites 14N/3E-32N1-3 and -32P2-6 in the west-central part of the basin (fig. 4, appendix B). This difference in hydraulic head probably results from wastewater disposal and irrigation return, respectively, near these sites.

Ground-Water Budget

The ground-water budget for Irwin Basin indicates that total recharge (1,460 acre-ft/yr) to the basin exceeded total discharge (1,085 acre-ft/yr) from the basin in 1993 (table 4, at back of report). The difference between recharge and discharge indicates a change in storage. A positive number indicates water is recharging the system and that water levels will rise; a negative number indicates that water is discharging from the system and that water levels will decline. Assuming that pumpage in Irwin Basin continues to decline and wastewater disposal practices continue to increase, water levels will continue to rise. The declining water levels in 1996 (fig. 6) indicate that discharge (pumpage) exceeded recharge (wastewater disposal) during this year.

GROUND-WATER QUALITY

Water-quality samples were collected from 68 wells and 7 suction lysimeters in Irwin Basin between January 1992 and September 1996 (fig. 4). Of the wells sampled, 12 were multiple-well monitoring sites, which allow depth-dependent sampling. The suction lysimeters consist of a porous ceramic cup that is attached to a PVC pipe connected to land surface by two access tubes. The suction lysimeters were used to collect porewater samples from the unsaturated zone by applying a vacuum to one of the access tubes. Samples from the wells and suction lysimeters were analyzed in the field for temperature, pH, alkalinity, and specific conductance and in the lab for major ions, trace elements, and selected isotopes (appendix C).

Areal Variation in Ground-Water Quality

The quality of ground water in Irwin Basin varies areally in the water-bearing deposits. Representative

chemical analyses of ground water throughout the area are shown in figure 8 using a method suggested by Stiff (1951). The water-quality diagrams show the general quality and areal differences in chemical character of the water. Analyses with similarly shaped diagrams represent ground water with similar chemical characteristics for major ions. Changes in the width of the diagrams are approximate indications of the differences in the concentrations of dissolved constituents.

Sodium is the predominant cation in ground water throughout most of Irwin Basin, and chloride, sulfate, and bicarbonate are the primary anions (fig. 8). However, the primary cations in the samples from wells in the southeastern part of the basin are calcium and sodium. Samples from wells in the southeastern part of the basin also have greater dissolved-solids concentrations, as indicated by the larger Stiff diagrams (fig. 8). The difference in chemical character and dissolved-solids concentrations indicate that the southeastern part of the basin contains different geologic materials and(or) is being recharged by a different source of water—possibly the evaporated and treated wastewater. Dissolved-solids and nitrate concentrations are used in this report to further describe the areal variation in water quality in Irwin Basin.

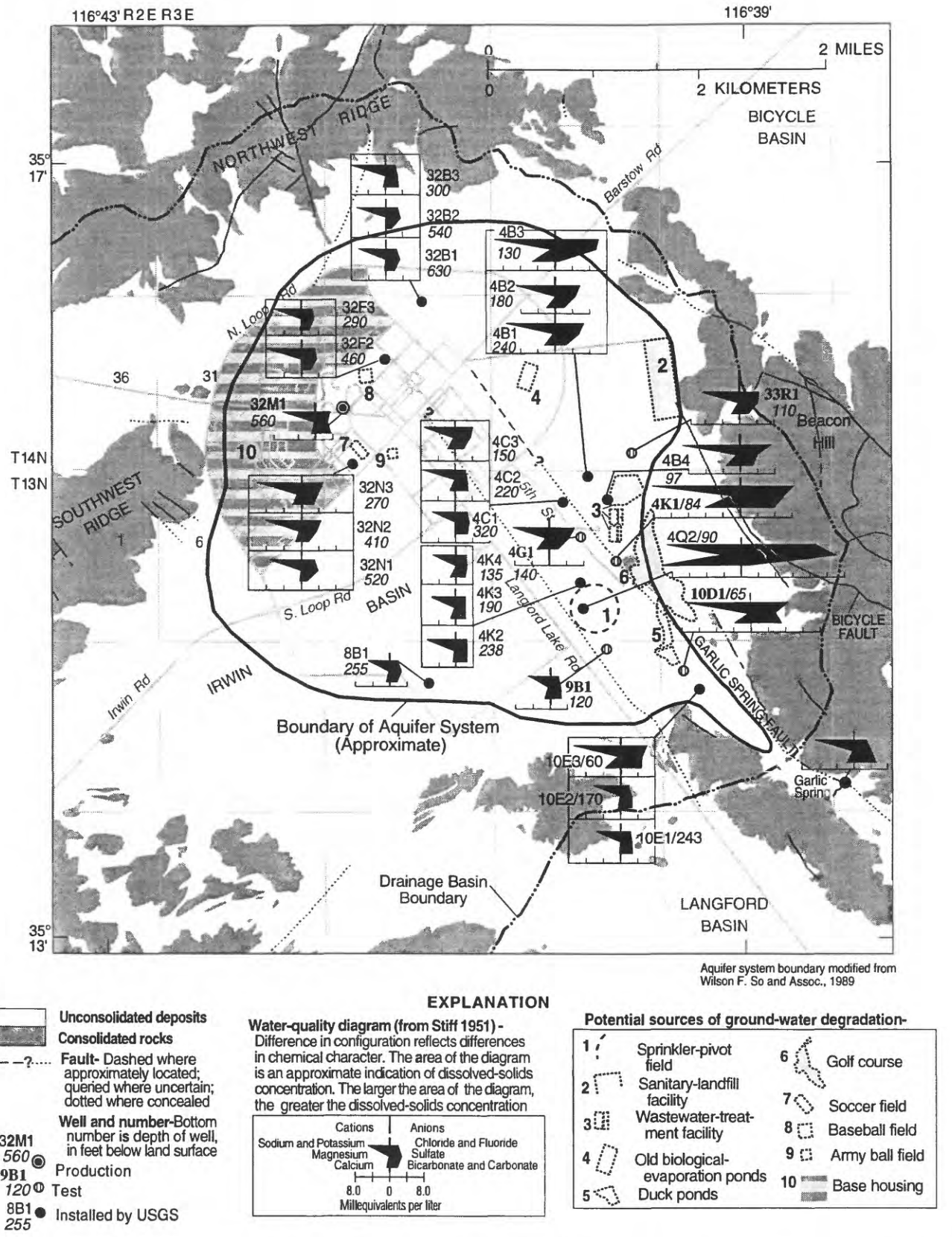
Dissolved Solids

The dissolved-solids concentrations of ground water in Irwin Basin range from 433 to 6,380 mg/L and exceed 500 mg/L—the level recommended as a secondary drinking-water standard by the U.S. Environmental Protection Agency (1991)—in 64 of 74 wells sampled in the basin (table 5, at back of report). The areal distribution of the average dissolved-solids concentrations is shown on figure 9; the vertical distributions of the dissolved-solids concentrations are presented along a southwest-northeast, west-east, and a north-south section on figure 10. In general, dissolved-solids concentrations are higher in the upper aquifer than in the lower aquifer because the upper aquifer is more easily contaminated from surface infiltration.

The highest dissolved-solids concentrations (greater than 2,000 mg/L) are present in the southeastern part of Irwin Basin near the wastewater-treatment facility, the golf course, and the sprinkler-pivot field (figs. 9 and 10). Wastewater that is discharged to the evaporation ponds at the wastewater-treatment facility and that is used for irrigation in the area is a potential source of ground-water recharge. Dissolved-solids concentrations in porewater samples from the suction lysimeters in the unsaturated zone (13N/3E-4Q3LYS, -4Q4LYS, -4Q5LYS, and -4Q6LYS) beneath the sprinkler-pivot field range from 2,140 mg/L in lysimeter 13N/3E-4Q6LYS at 15 ft below land surface to 6,380 mg/L in lysimeter 13N/3E-4Q3LYS at 75 ft below land surface (fig. 10). The dissolved-solids concentrations of the porewater were much higher than the dissolved-solids concentrations of the wastewater effluent. The dissolved-solids concentration of a grab sample of the wastewater effluent was 826 mg/L (table 6, at back of report), which is much less than the measured dissolved-solids concentrations in the porewater samples from the lysimeters beneath the sprinkler-pivot field. Therefore, wastewater alone cannot be the source of the high dissolved-solids concentrations.

The fact that the dissolved-solids concentrations of the porewater increase with depth in the unsaturated zone beneath the sprinkler-pivot field (fig. 10) indicates that the wastewater effluent leaches salts from the unsaturated zone as it moves downward to the water table. Selected core samples were collected during drilling at sites GB1, STP3R, STP7, STP8, STP9, and STP11 in the southeastern part of the basin (fig. 4). Core extracts for estimating the salt content of the unsaturated zone were prepared by adding 50 mL of deionized water to about 50 g wet weight of core material. Extracts from core samples collected at STP8 at 40 ft, STP9 at 15 ft, and STP11 at 15 ft and 25 ft had high specific-conductance concentrations (greater than 1,000 µS/cm, table 7, at back of report). Specific conductance can be used as an approximate measurement of dissolved-solids concentrations of the core extract. The core extract data indicate that the sediment in the area of the golf course and duck ponds contains minerals that dissolve readily if water is added. This area is at the lowest land-surface altitude of the basin, and surface runoff has collected in this part of the basin at least throughout the Holocene period. Evaporite deposits, such as halite, gypsum, and calcite, formed in the sediments as surface water were evaporated and transpired. Before the wastewater recharge, there was scant natural recharge in the area to flush the salts from the sediments. The high dissolved-solids concentrations in water from wells in this part of the basin are the result of dissolution of these evaporite deposits when wastewater effluent percolates through these sediments.

Ground water with high dissolved-solids concentrations is migrating northwestward toward the pumping depression in the center of the basin. Westward, horizontal migration of the high dissolved-solids



Aquifer system boundary modified from Wilson F. So and Assoc., 1989

EXPLANATION

Unconsolidated deposits

Consolidated rocks

Fault- Dashed where approximately located; queried where uncertain; dotted where concealed

Well and number-Bottom number is depth of well, in feet below land surface

32M1 560 ◉ Production

9B1 120 ◍ Test

8B1 255 ● Installed by USGS

Water-quality diagram (from Stiff 1951) - Difference in configuration reflects differences in chemical character. The area of the diagram is an approximate indication of dissolved-solids concentration. The larger the area of the diagram, the greater the dissolved-solids concentration

Potential sources of ground-water degradation-

1. Sprinkler-pivot field
2. Sanitary-landfill facility
3. Wastewater-treatment facility
4. Old biological-evaporation ponds
5. Duck ponds
6. Golf course
7. Soccer field
8. Baseball field
9. Army ball field
10. Base housing

Figure 8. Water quality of ground-water samples for selected wells in Irwin Basin at Fort Irwin National Training Center, California.

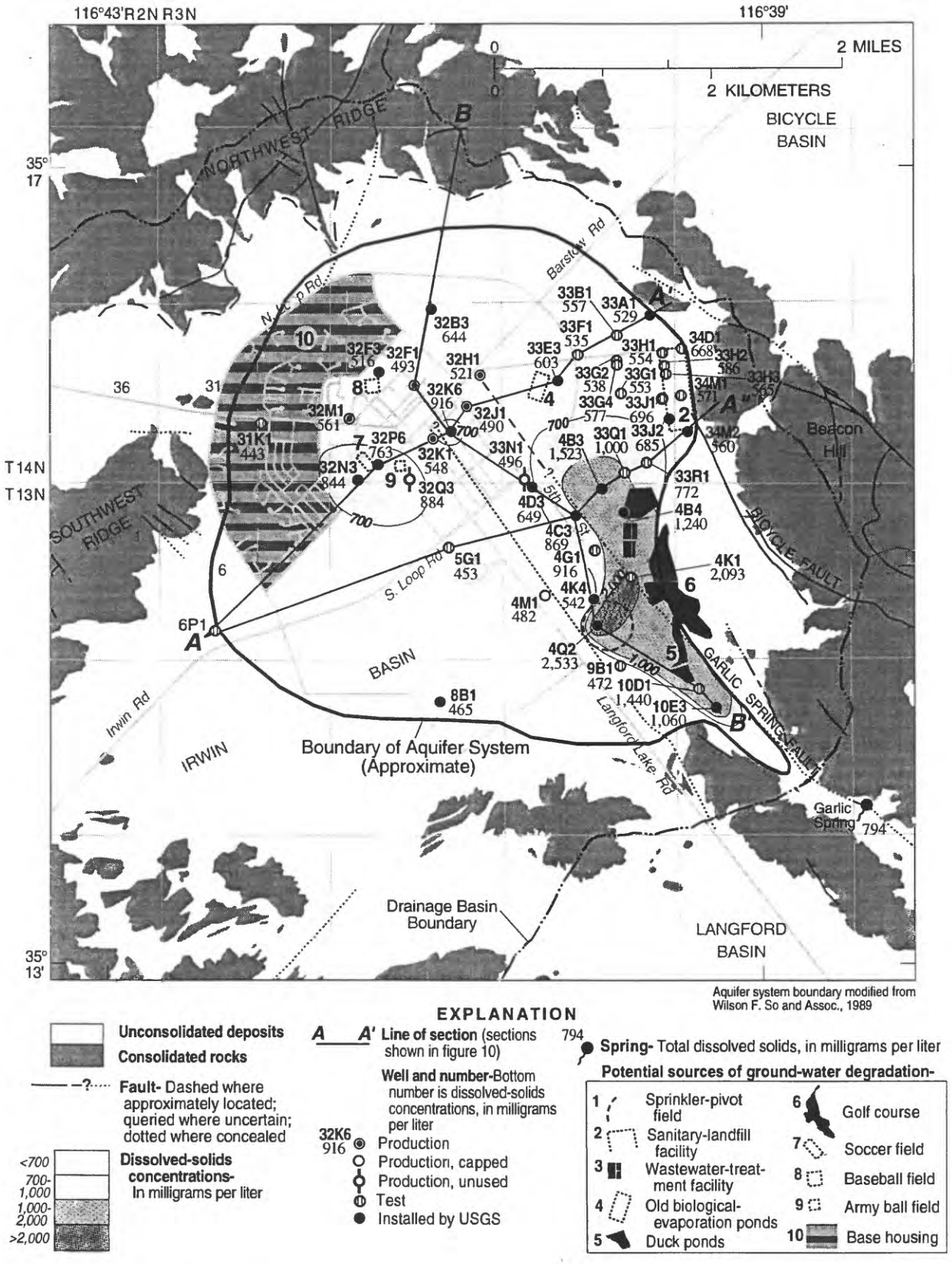


Figure 9. Areal distribution of the average dissolved-solids concentrations in ground water from shallow water-table wells and production wells in Irwin Basin at Fort Irwin National Training Center, California.

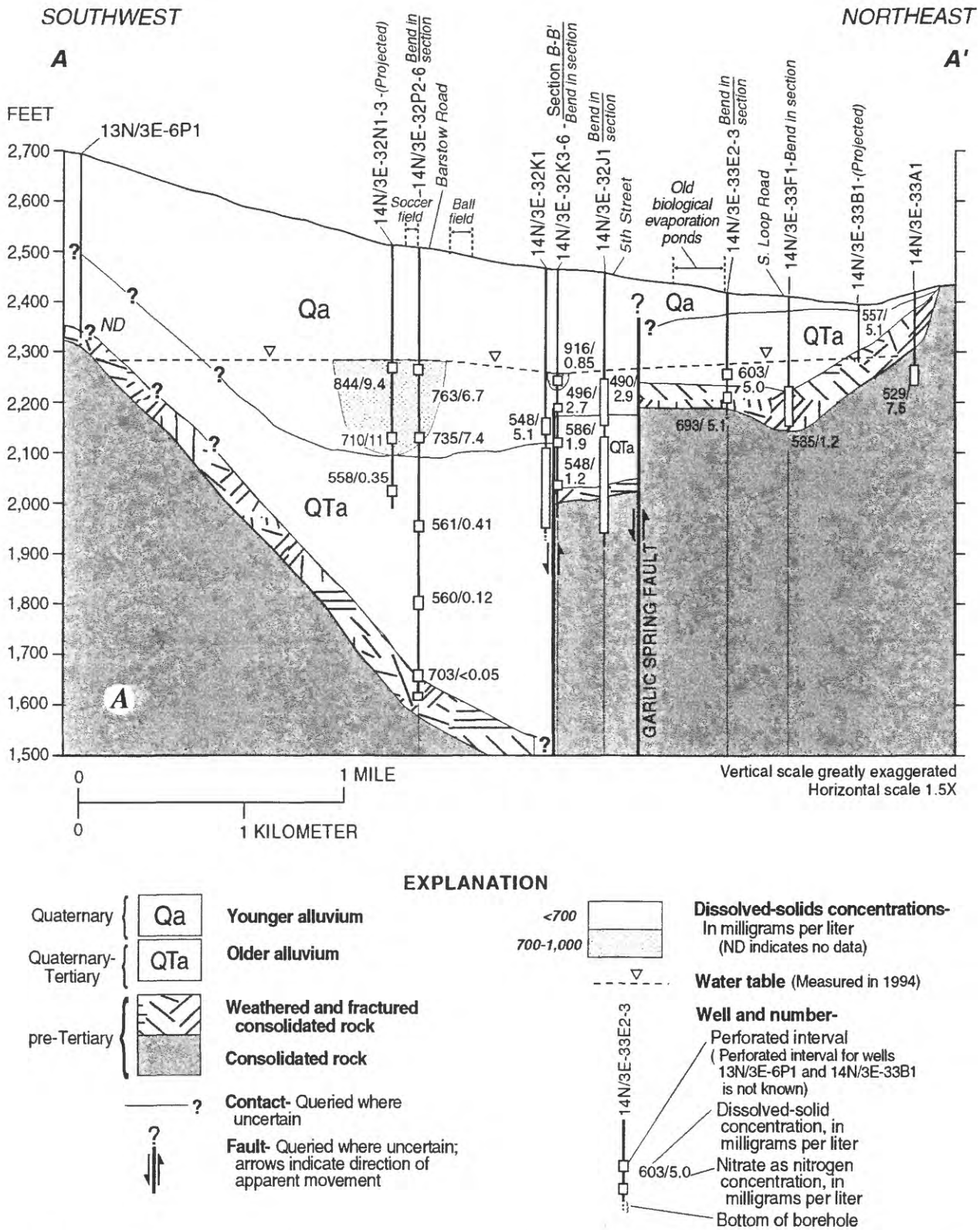


Figure 10. Average dissolved-solids and nitrate concentrations in ground water from selected wells in Irwin Basin at Fort Irwin National Training Center, California. (Location of sections is shown on figure 9).

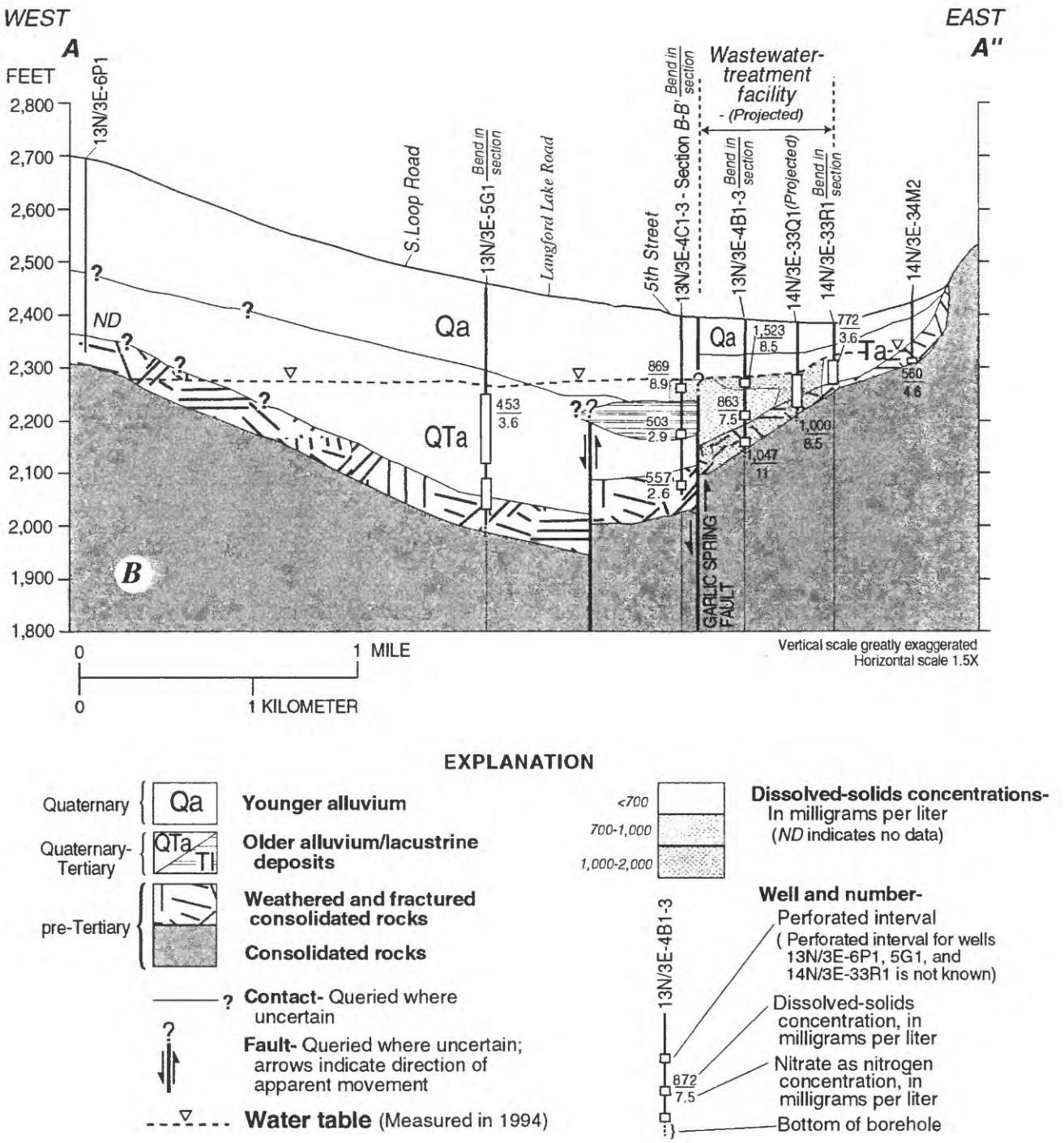


Figure 10.—Continued.

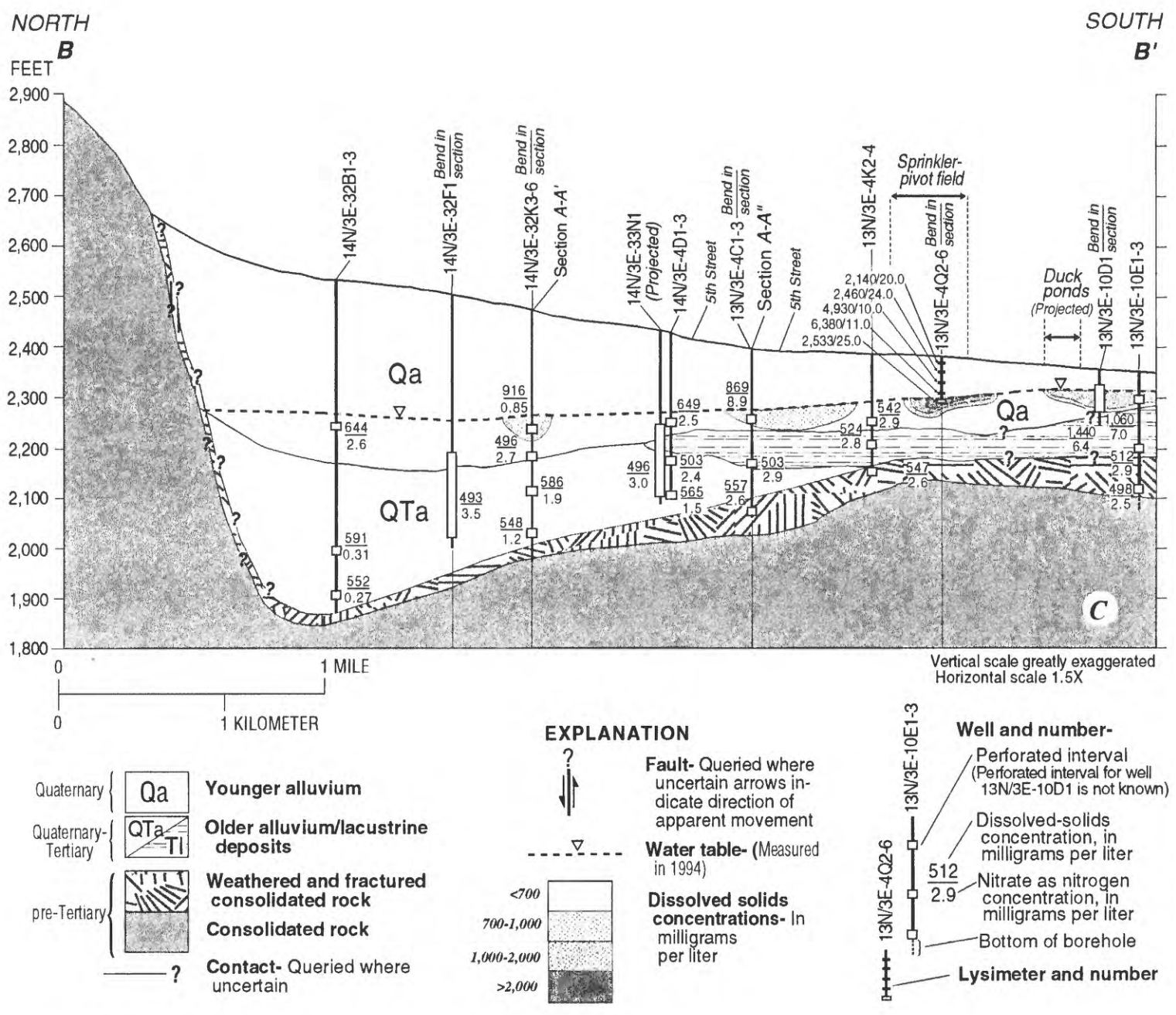


Figure 10.—Continued.

content water is retarded at depth by the Garlic Spring Fault, which acts as a partial barrier to ground-water flow near the wastewater-treatment facility. Water from wells east of Garlic Spring Fault (13N/3E-4B1-3), perforated in the lower aquifer, contains moderate to high dissolved-solids concentrations (863–1,523 mg/L), whereas water from wells west of the fault (13N/3E-4C1-3) contains moderate dissolved-solids concentrations (869 mg/L) in the shallowest zone (the upper aquifer) and low dissolved-solids concentrations (503–557 mg/L) in the deeper zone (the lower aquifer) (fig. 10, section A-A´´). The higher dissolved-solids concentrations of water in the upper aquifer, and the contrasting lower concentrations in ground water at depth west of Garlic Spring Fault indicate that there is horizontal movement across the fault in the upper aquifer but minimal horizontal movement at depth. Where the fine-grained deposits are in the older alluvium in the southeastern part of the basin, they seem to retard the vertical movement of the high dissolved-solids content ground water from the upper to the lower aquifer (fig. 10, section B-B´).

Another area of the basin with relatively high dissolved-solids concentrations (in excess of 700 mg/L) is in the west-central part of the basin (figs. 9 and 10). Data from the multiple-well monitoring sites (14N/3E-32N1-3, -32P2-6, and -32K3-6) (fig. 10, section A-A´) indicate that the highest dissolved-solids concentrations are near the water table in the upper aquifer. Irrigation-return flow from the base housing area and(or) leaking sewer pipes are probable sources of the high dissolved-solids concentrations.

Nitrate

Wastewater influent (water entering the wastewater-treatment facility) contains high concentrations (in excess of 40 mg/L as N) of nitrogen in the form of ammonia and organic nitrogen (table 6). As the wastewater moves through the treatment facility and into the evaporation ponds (effluent) and is used for irrigation, the concentration and chemical form (species) of the nitrogen in the wastewater change. The nitrogen species are interrelated by a complicated series of reactions that collectively constitute the nitrogen cycle (National Research Council, 1978). Nitrogen in the wastewater influent and effluent is predominantly in the form of ammonia and organic nitrogen (table 6). Organic nitrogen in wastewater can be converted to ammonia, which along with ammonia already in the wastewater, can be oxidized to nitrate. The organic nitrogen can be converted to ammonia by aerobic bacteria, which exist with oxygen, and anaerobic bacteria, which exist without oxygen. The conversion of ammonia to nitrate is a two-step process accomplished by aerobic bacteria. The first step involves the oxidation of ammonia to nitrite and the second step involves the oxidation of nitrite to nitrate. Nitrite commonly does not accumulate because it is oxidized as rapidly as it is formed.

Comparison of samples of the wastewater influent and effluent (table 6) indicate a total nitrogen reduction of 16 mg/L as N. Nitrogen can be removed from wastewater by sorption and ion exchange, ammonia volatilization, incorporation into cell biomass, plant-root uptake, and denitrification. Denitrification is the biochemical reduction of nitrate and nitrite to gaseous nitrogen by anaerobic bacteria. Although the nitrogen in wastewater is predominantly in the form of ammonia and organic nitrogen, nitrate is the predominant nitrogen form in the underlying ground water (appendix C). The ammonia and organic nitrogen are most likely oxidized to nitrate in the unsaturated part of the alluvium beneath the evaporation ponds and the irrigated fields and golf course.

Nitrate concentrations obtained from water samples collected from wells during the study are given in table 5 as nitrite plus nitrate as nitrogen (NO_2+NO_3-N) and, in some instances, as nitrate as nitrogen (NO_3-N). Because nitrite concentrations generally are negligible, the NO_2+NO_3-N and NO_3-N analyses are equivalent and referred to in this report as nitrate-N. Nitrate-N concentrations in ground water in Irwin Basin range from <0.05 to 34 mg/L (table 5). In general, nitrate concentrations decrease with depth beneath the water table (fig. 10). Nitrate-N concentrations in native ground water, as sampled by wells in areas with no evident sources of contamination (wells 14N/3E- 32B1-3 and 13N/3E-8B1), are generally less than 3 mg/L (table 5). This concentration is comparable to background levels of nitrate-N (2-3 mg/L) commonly from desert environments (Umari and others, 1993). High nitrate-N concentrations (greater than 5 mg/L) in ground water are in three areas of Irwin Basin: (1) in the southeastern part of the basin near the wastewater-treatment facility, (2) in the northeastern part of the basin near the sanitary-landfill facility, and (3) in the west-central part of the basin (fig. 11).

Nitrate-N concentrations in excess of 10 mg/L, the maximum contaminant level of nitrate as nitrogen (U.S. Environmental Protection Agency, 1994), are in

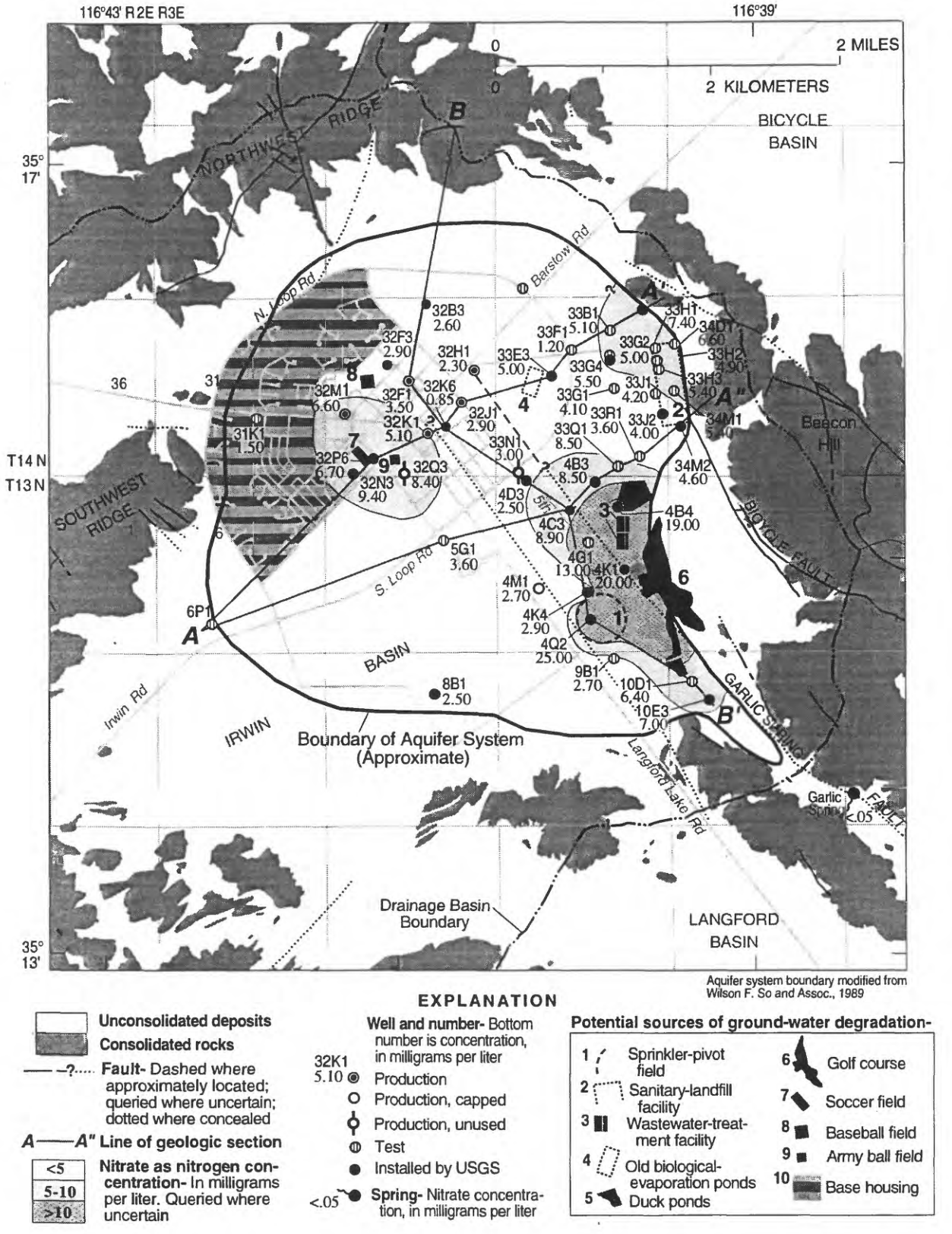


Figure 11. Areal distribution of the average nitrate concentrations in ground water from shallow water-table wells and production wells in Irwin Basin at Fort Irwin National Training Center, California.

water from wells adjacent to the wastewater-treatment facility (13N/3E-4B4, -4G1, and -4K1) and from lysimeters and a well (13N/3E-4Q5LYS, -4Q6LYS and -4Q2) beneath the sprinkler-pivot field (figs. 10 and 11). The high nitrate concentrations beneath and near the wastewater-treatment facility are consistent with wastewater effluent recharging the ground-water system. The plume of high nitrate (water with nitrate concentrations in excess of 10 mg/L) extends about 0.5 mi northwest of the wastewater-treatment facility and at least 0.25 mi southeast of the duck ponds (fig. 11). East of the Garlic Spring Fault, the younger alluvium is unsaturated beneath the wastewater-treatment facility. Therefore, the wastewater can directly recharge the older alluvium of the lower aquifer, as evidenced by high nitrate concentrations in the older alluvium and weathered basement complex (fig. 10, A-A´). West of the Garlic Spring Fault, where part of the younger alluvium is saturated, high nitrate concentrations are in the upper aquifer and not in the lower aquifer (fig. 10, A-A´). The silt and clay deposits of the older alluvium in this part of the basin probably retard the downward migration of the high nitrate ground water.

No horizontal barriers are known to exist between the high nitrate plume on the west of the Garlic Spring Fault and the base production wells (fig. 11). Consequently, if the water-level gradients were to remain the same as 1994 (fig. 7), the high nitrate plume west of the Garlic Spring Fault could move toward the center of the basin and contaminate the base production wells. The time required for the plume to move from its position during 1993–96 to the nearest production well (14N/3E-32Q1) can be estimated by using the following form of Darcy's law:

$$\bar{v} = (KI)/\theta \qquad (2)$$

where

- $\bar{v}$ is average velocity of ground-water movement in feet per day;
- K is hydraulic conductivity of the younger alluvium of the upper aquifer, in this case, 25 ft/d (Steven Crawford, U.S. Geological Survey, written commun., 1996);
- I is hydraulic gradient estimated from water-level contours (using water levels at well 13N/3E-4B3 and well 14N/3E-32K1, fig.7), in this case 0.004 ft/ft (fig. 7); and
- θ is effective porosity of the upper aquifer, in this case 30 percent (estimated from drillers' logs).

The average velocity of ground-water movement calculated by the above equation is 0.3 ft/d. At this rate of ground-water movement, the high nitrate content water would move from the wastewater treatment facility to the nearest production well in the center of the basin (well 14N/3E-32Q1 in fig. 7), a distance of about 1 mi, in about 43 years. The time calculated for the degraded water to reach the production well should be considered only as a gross estimate; the actual movement may take place faster or slower than calculated.

High nitrate concentrations also are near the northern end of and beneath the sanitary-landfill facility (fig. 11). Nitrate-N concentrations in water from wells beneath or adjacent to the sanitary-landfill facility range from 4.0 to 7.5 mg/L (14N/3E-33A1, -33B1, -33G1, -33G2, -33G4, -33H1, -33H2, -33H3, -33J1, -33J2, -34D1, -34M1, and -34M2; fig. 11). Eight wells are perforated in fractured consolidated rock and five wells are perforated in older alluvium (fig. 11). Five wells perforated in fractured consolidated rock and three wells perforated in alluvium contain water with more than 5 mg/L of nitrate-N (figs. 10 and 11). Because the nitrate concentration is higher in water north of and beneath the northern part of the sanitary-landfill facility than in water in the southern part, which is close to the northern edge of the wastewater-treatment facility, it is unlikely that the high nitrate concentrations result from wastewater recharging the aquifer beneath the wastewater-treatment facility. Nitrogen isotopes from soil samples collected in Irwin Basin and from ground-water samples from near the sanitary-landfill facility are being analyzed to help determine the source of the high nitrate concentrations.

High nitrate and dissolved-solids concentrations were in the upper aquifer near the center of Irwin Basin (figs. 9 and 11). Water from wells in the vicinity of the soccer and Army ball fields contain water with greater than 5 mg/L of nitrate-N (14N/3E-32K1, -32M1, -32N2-3, -32P5-6, and -32Q3; figs. 10 or 11). Wells 14N/3E-32P5-6 and -32N2-3, the upper two wells at multiple-well monitoring sites in this area, are perforated in the upper aquifer (fig. 10). The deeper wells at these sites (14N/3E-32P2-4 and -32N1) are perforated in the lower aquifer and have considerably lower nitrate concentrations. Wells 14N/3E-32P5 and -32N2 (perforated from 385–405 ft and 390–410 ft, respectively) provide an approximate lower depth of the high nitrate

water. Staff at Fort Irwin believed that the high nitrate concentrations measured in this area were the result of wastewater leakage from cracked seals at the junctions of sewer pipes. Other possible sources of high nitrate include: (1) fertilizer used on the lawns and playing fields in this area of the base and (2) natural nitrate that has been leached from the desert soils by the irrigation-return flows. Because there is scant natural recharge to the ground-water system in Irwin Basin, natural nitrate can remain immobilized in the desert soils for many years. Irrigation water applied to the desert soils leaches this nitrate from the soil and carries it down to the water table. Water samples are being analyzed for nitrogen isotopes to help determine the source of the high nitrate concentrations.

Temporal Variation in Ground-Water Quality

Time-series graphs of dissolved-solids (fig. 12) and nitrate concentrations (fig. 13) were examined for 11 current and former production wells in Irwin Basin to determine if there have been any water-quality changes since the base first opened. Analytical results of samples from production wells in Irwin Basin provided the longest period of record available. For the purposes of this discussion, the production wells were divided into two groups: (1) production wells west of the unnamed northwest-southeast trending fault that bisects the basin and (2) production wells east of the unnamed fault.

Production wells west of the unnamed fault include wells 13N/3E-5D1, 14N/3E- 32K1, -32M1,-32P1,-32Q2, and -32Q3 (fig. 4). Available data collected from these wells indicate that dissolved-solids and nitrate concentrations generally have increased since the base first opened in 1941 (figs. 12 and 13). The earliest available chemical analyses were from samples collected in 1943 from wells 13N/3E-32P1 and -32Q2. Both samples had dissolved-solids concentrations of less than 500 mg/L and nitrate-N concentrations of less than 2 mg/L (figs. 12 and 13). Dissolved-solids and nitrate concentrations remained relatively stable in these wells until the late 1970's when dissolved-solids concentrations increased to about 600 mg/L and nitrate-N concentrations increased to about 5 mg/L in samples from well 13N/3E-32P1. Neither of these wells is currently (1997) operating; however, samples from nearby replacement wells (13N/3E-32M1 and -32K1) had dissolved-solids concentrations of about 600 mg/L and nitrate-N concentrations in excess of 5 mg/L in 1994. These wells are downgradient of irrigated areas, including the base housing and the soccer and Army ball fields (fig. 4). Irrigation-return flows and mobilized natural nitrate from these areas may be the source of the increased dissolved-solids and nitrate concentrations.

Two wells nearest to the irrigated areas (13N/3E-5D1 and 14N/3E-32Q3) had at least one sample with dissolved-solids concentrations of about 900 mg/L and nitrate-N concentrations of about 10 mg/L. Dissolved-solids concentrations in samples from well 13N/3E-5D1 increased from about 400 mg/L in 1952 to more than 500 mg/L in 1958 (fig. 12). Samples from this well in 1974 and 1975 had dissolved-solids concentrations of about 900 mg/L; however, a sample collected in 1976 had a dissolved-solids concentration of about 500 mg/L. Nitrate-N concentrations in samples from this well followed a similar pattern (fig. 13). Dissolved-solids concentrations in samples from well 14N/3E-32Q3 increased from less than 600 mg/L in the 1960's and early 1970's to about 900 mg/L in 1995 (fig. 12). Nitrate-N concentrations increased from about 4 mg/L in 1975 to 8.4 mg/L in 1995 (fig. 13). The high concentrations were analyzed in samples from the wells after a long period of scant pumping from the wells. Dissolved-solids concentrations may have increased as a result of the accumulation of irrigation-return water in these areas during the periods of scant pumping. When the wells are not pumped regularly, irrigation-return water accumulates in the ground-water system and is a larger part of the water being pumped. When wells are purged regularly, irrigation-return water does not accumulate because the return water probably is pumped out almost as fast as it reaches the water table; thus a larger part of pumped water comes from native ground water. Poor sanitary seals may be another cause for the high concentrations. If the wells had poor sanitary seals, surface contamination, such as irrigation-return flows and leaking sewer pipes, could directly enter the well's gravel pack and contaminate the well. During periods of scant pumping, the contamination could accumulate in the vicinity of the well. When the wells are initially pumped after a period of inactivity, the initial water would contain a high percentage of the contaminated water and then, with time, this percentage would decrease.

Production wells east of the unnamed fault include wells 14N/3E-32F1, -32H1, 32J1, -32L1, and -32Q1. With the exception of wells 13N/3E-32L1 and

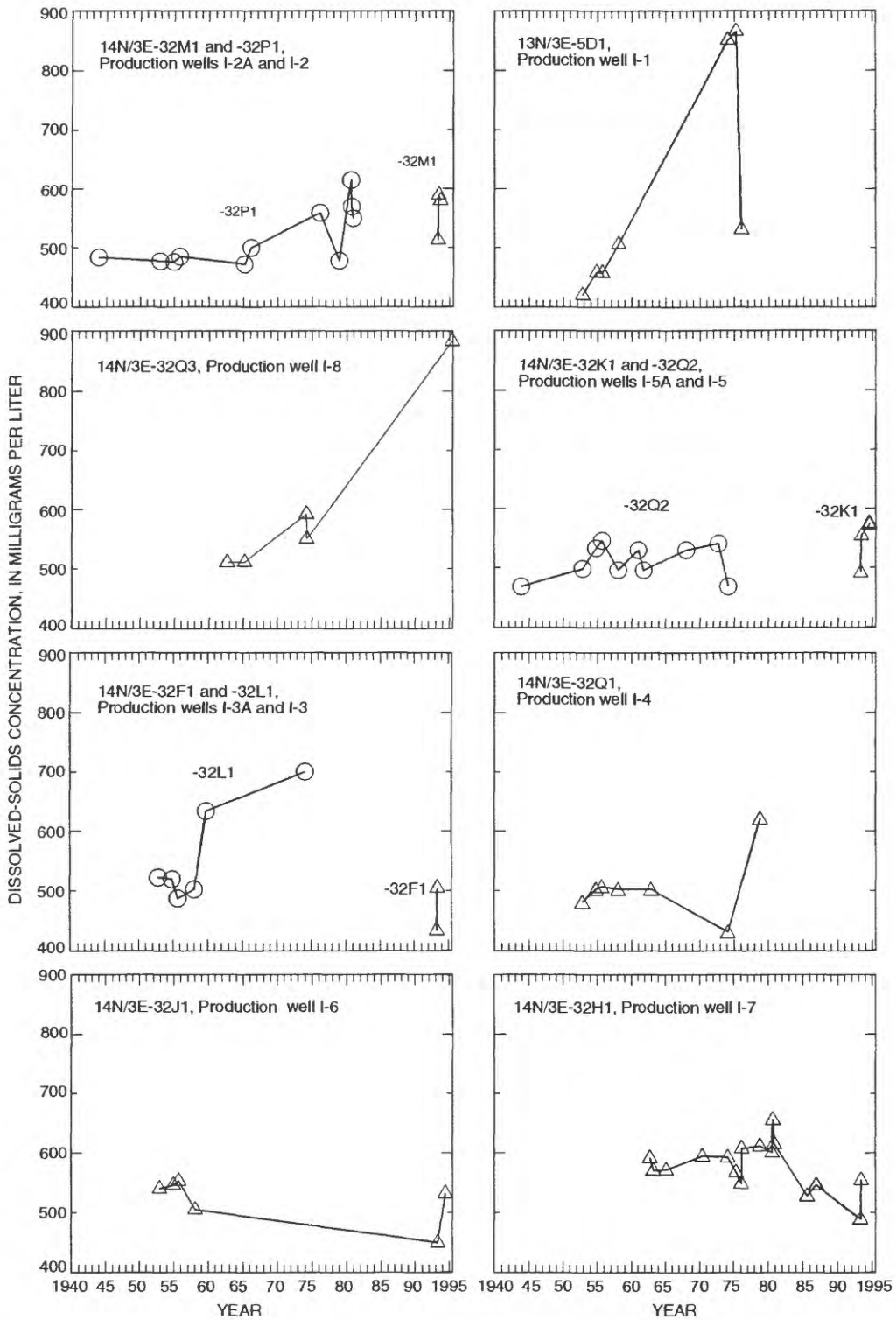


Figure 12. Time-series of dissolved-solids concentrations of ground water from selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1940–95.

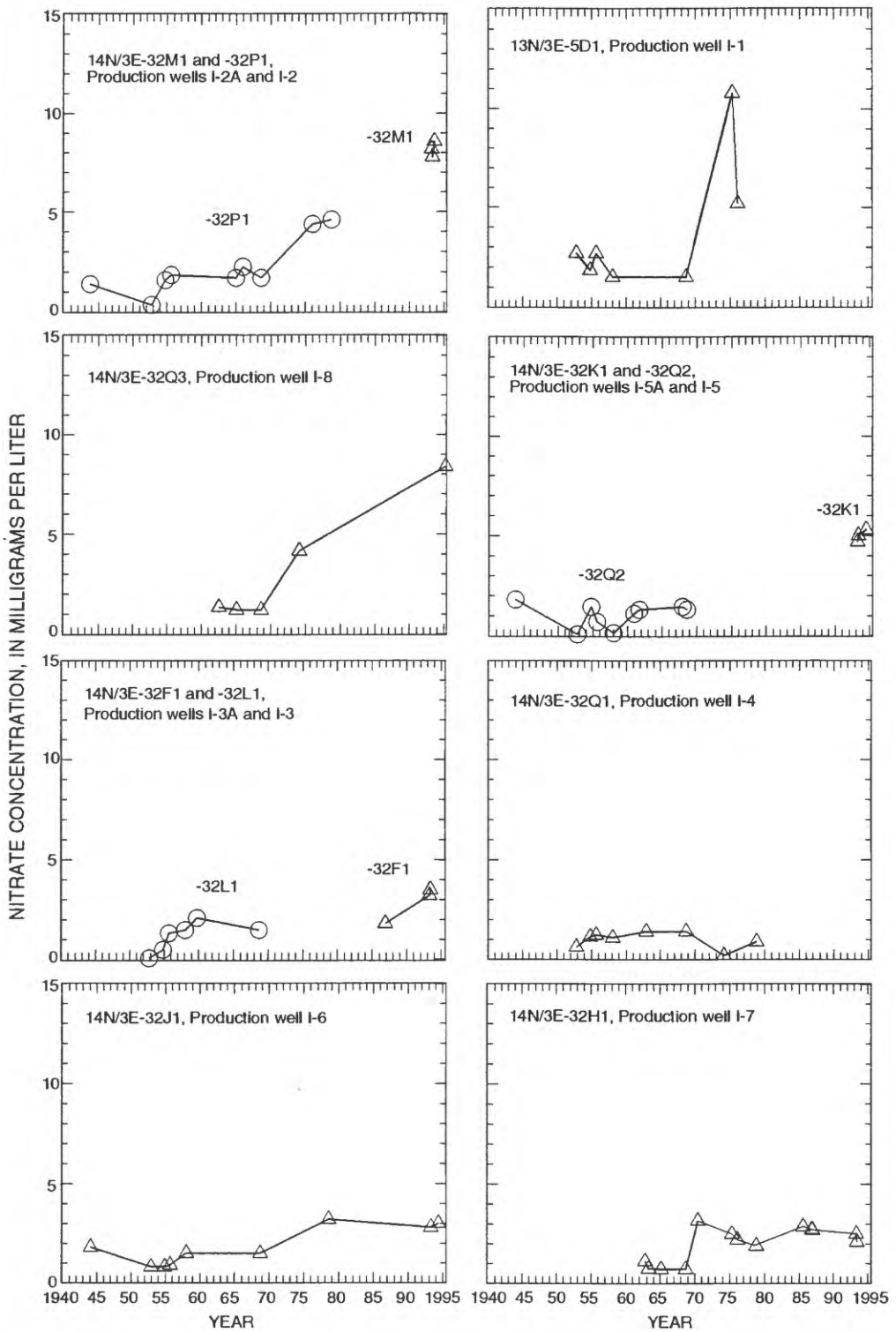


Figure 13. Time-series of nitrate concentrations of ground water from selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1940–95.

-32Q1, the dissolved-solids and nitrate-N concentrations of samples from these wells have remained relatively stable (figs. 12 and 13). Because these wells are farther from the base housing and playing fields, they have not been affected by the irrigation-return flows. The unnamed fault also may retard the lateral movement of the degraded ground water. The dissolved-solids concentrations in samples from wells 13N/3E-32L1 and -32Q1 increased from about 500 mg/L to more than 600 mg/L; however, the nitrate-N concentrations remained about or less than 3 mg/L (figs. 12 and 13). If the source of the increased dissolved-solids concentrations is the irrigation-return flow from the irrigated areas to the west, then the unnamed fault is not an effective barrier to ground-water flow in the upper aquifer. Continued monitoring is needed to determine the source and movement of the high dissolved-solids and nitrate concentrations.

Source and Age of Ground Water

Oxygen-18, deuterium, tritium, and ^{14}C data were analyzed from ground water to determine the source and relative age of ground water in Irwin Basin. A total of 111 water samples were collected from 39 wells drilled during this study, 22 existing wells, and one spring and were analyzed for oxygen-18 ($\delta^{18}O$) and deuterium (δD). Selected wells were analyzed for tritium (^{3}H), and(or) ^{14}C. The results of these isotopic analyses are given in table 8 (at back of report).

Oxygen-18 and Deuterium Isotopes

Oxygen-18 and deuterium are natural stable isotopes of oxygen and hydrogen, respectively. The ratios of isotopes of oxygen [oxygen-18 (^{18}O): oxygen-16 (^{16}O)] and hydrogen [deuterium, D (^{2}H): hydrogen (^{1}H)] in ground water are indicators of its hydrologic history. The isotopic ratios are expressed in delta notation (δ) as per mil (parts per thousand) differences relative to the standard known as Vienna Standard Mean Ocean Water (VSMOW) (Gonfiantini, 1978). Higher (less negative) concentrations of $\delta^{18}O$ and δD represent enrichment in the heavier isotope of oxygen (oxygen-18) and hydrogen (deuterium), respectively; and lower (more negative) δ concentrations represent enrichment in the lighter isotope (depletion in the heavier isotope). There is a linear relation between $\delta^{18}O$ and δD in meteoric waters throughout the world (Craig, 1961). This relation is referred to as the meteoric water line.

The $\delta^{18}O$ and δD composition of ground water relative to the meteoric water line and relative to the isotopic composition of water from other sources can be an indicator of the source of ground water. The isotopic composition of ocean water undergoes fractionation during the transfer from the ocean surface to the vapor phase. Further fractionation occurs as water vapor condenses from the atmosphere, leaving the remaining water vapor relatively depleted in the heavier isotopes. Latitude, air temperature, and altitude also affect the fractionation of water vapor. The net result is that precipitation from a given storm becomes isotopically lighter as the storm moves inland, and precipitation that forms at lower temperatures is lighter than precipitation that forms at higher temperatures (Fournier and Thompson, 1980).

Evaporation also causes isotopic fractionation. When water is evaporated, the lighter isotopes of oxygen and hydrogen are preferentially partitioned into the vapor phase, causing the remaining water to be isotopically heavier. There is no further change in isotopic composition at the low temperatures of most ground-water systems after the recharge water has migrated below the depth for evaporation. Therefore, any subsequent changes in the isotopic composition of ground water along a flow line generally reflect only the mixing in the aquifer system or concentration by evaporation in a discharge area.

Results of water analyses for oxygen and hydrogen isotopes are plotted graphically in figure 14. Springs generally are more suitable indicators of isotopic composition of recharge than are surface waters or precipitation because they represent shallow ground-water recharge after it is sufficiently below land surface to no longer be subjected to the effects of evaporation. The sample of Garlic Spring has -11.43 per mil $\delta^{18}O$ and -90.5 per mil δD (fig. 14). The spring-water sample plots below the meteoric water line. A volume-weighted sample of local precipitation (Friedman and others, 1992) plots near the meteoric water line (fig. 14). The local precipitation sample is isotopically heavier than the spring sample, indicating that present-day meteoric waters are not the source of recharge in this basin.

The oxygen and hydrogen isotopes for ground water of most of the production wells in Irwin Basin plot near the Garlic Spring sample, below the meteoric

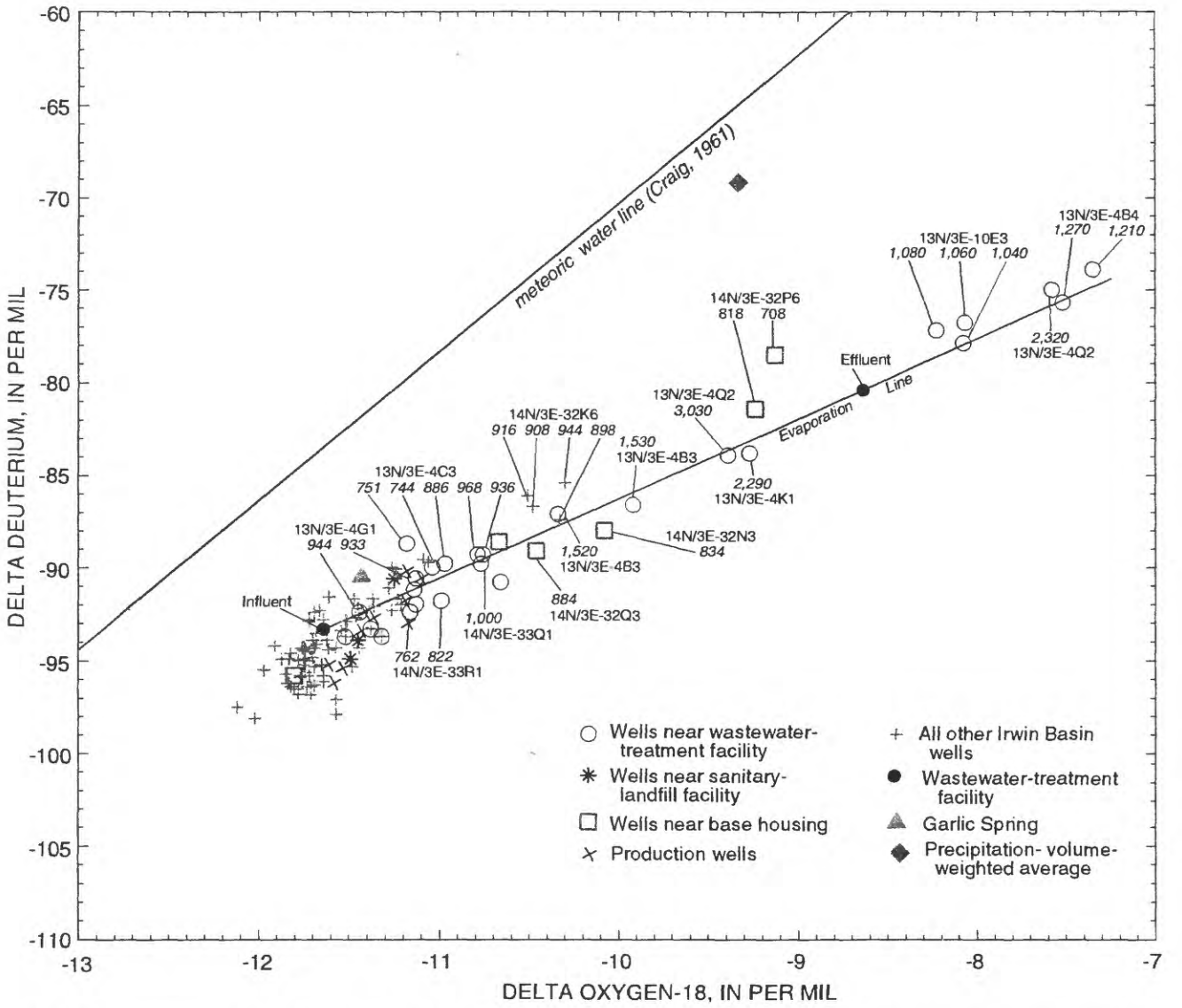


Figure 14. Stable-isotope ratios for samples of ground water, spring water, precipitation, and municipal wastewater at Fort Irwin National Training Center, California, 1992–95. (Wells referred to in the text are numbered on this figure; the number is the dissolved-solids concentration for the sample indicated.)

water line (fig. 14). However, samples from wells near the wastewater-treatment facility and near the base housing plot far to the right of the Garlic Spring sample.

A primary source of recent recharge to wells near the wastewater-treatment facility is wastewater effluent and, to a lesser extent, runoff from local precipitation. Two samples of wastewater were collected from the wastewater-treatment facility: (1) wastewater influent, which is the untreated wastewater before it enters the treatment facility; and (2) wastewater effluent, which is the treated wastewater after it leaves the oxidation ponds. The wastewater influent sample plots among the samples from the production wells in Irwin Basin (fig. 14). The sample of wastewater effluent is isotopically heavier (concentrations are less negative) and plots to the right of the influent sample and most samples from wells in Irwin Basin (fig. 14). Because the wastewater effluent is affected by evaporation while it is in oxidation ponds, an evaporation trend line can be determined for Irwin Basin by drawing a line connecting the two wastewater samples on figure 14. This line has a slope of 4.3; a slope between 3 and 6 is indicative of water that has been affected by evaporation (International Atomic Energy Agency, 1981).

Use of effluent for irrigation would result in further evaporation and would make the irrigation return of effluent isotopically heavier and plot further to the

right on the evaporation trend line. The isotopic composition of water samples from wells near the wastewater-treatment facility (13N/3E-4B3, -4B4, -4C3, -4G1, -4K1, -4Q2, -10E3, and 14N/3E-33R1) plot along the evaporation line, indicating that the water in these wells has been affected by evaporation (fig. 14). In conjunction with the water-quality data presented in a previous section of this report, the isotopic data indicate that recharge of wastewater effluent is a major source of water in the southeastern part of the basin. The samples that indicate the greatest evaporation are from wells 13N/3E-4B4, -4Q2, and -10E3. Wells 13N/3E-4B4 and -4Q2 are near the wastewater-effluent-irrigated golf course and sprinkler-pivot field, respectively. Irrigation-return flow would evaporate more than the wastewater effluent and would plot on or farther to the right of the evaporation trend line. Well 13N/3E-10E3 is downgradient of the duck ponds. Recharge from the duck ponds may evaporate more than the wastewater effluent because the effluent is the source of water to the ponds.

In general, dissolved-solids concentrations are high in samples from wells that have had some evaporation (fig. 14, 13N/3E-4B3, -4B4, -4C3, -4G1, -4K1, -4Q2, -10E3, 14N/3E-32N3, -32Q3, -33Q1). This observation, along with the fact that dissolved-solids concentrations increase with depth in samples from lysimeters beneath the sprinkler-pivot field, indicates that dissolution of evaporite minerals may be a source of the increasing dissolved-solids concentrations. The relation between dissolved solids and δD can be used to determine whether dissolution of soluble minerals or concentration by partial evaporation (evapoconcentration) is the predominant cause of increased salinity in ground water. If evaporation is the only process, δD should increase more rapidly with increasing dissolved-solids concentrations. If dissolution of evaporites is the only process, δD will not change. If dissolution of evaporites is the dominant process, δD increases less rapidly than with evaporation, and δD and dissolved-solids concentrations would not be well correlated. Two trends are evident in figure 15. Most of the samples lie along or near an evaporation line connecting the wastewater influent and effluent samples, indicating that evapoconcentration is the dominant cause of increased dissolved-solids concentrations in Irwin Basin. Some samples, however, plot above the evaporation line and have higher dissolved-solids concentrations in relation to δD, indicating that dissolution of evaporites may be an additional source of dissolved solids in these samples.

The isotopic ratios of ground water from three wells near the sanitary-landfill facility that contain high nitrate concentrations, but not high dissolved-solids concentrations, plot among the samples from the production wells in Irwin Basin (figs. 14 and 15). The samples from these three wells have less than 700 mg/L dissolved solids. The isotopic ratios of water from these wells, in conjunction with the water-quality data, indicate that the source water is similar to that of most wells in Irwin Basin and that it is not wastewater effluent.

The isotopic ratios of water from wells near the base housing plot along the evaporation trend line (fig. 14), indicating that the water is evaporated. Because ground water is more than 10 ft below land surface in the study area, evaporation from the water table is not the cause of the observed isotopic distribution. If the source water for these samples was untreated wastewater from leaking underground sewer pipes, these samples probably would not be evaporated because the sewer pipes are 5 to 10 ft below land surface. However, irrigation-return flow from green areas in the base housing would be partly evaporated. Therefore, irrigation-return flow from the base-housing area probably is the source of the high nitrate and dissolved-solids concentrations in this part of the basin. Preliminary nitrogen isotope data for these samples seem to support this conclusion.

Tritium and Carbon-14

Tritium (^3H) is a natural radioactive isotope of hydrogen having a half-life of 12.4 years. Tritium is measured in tritium units (TU) in the analyses presented here. Each tritium unit equals one atom of tritium in 10^{18} atoms of hydrogen. Approximately 800 kg of ^3H was released as a result of the atmospheric testing of nuclear weapons during 1952–62 (Michel, 1976). As a result, ^3H concentrations in precipitation and ground water that were recharged during that time increased. Because ^3H is part of the water molecule and concentrations are not strongly affected by reactions other than radioactive decay, it is an excellent tracer of the movement and relative age of water on time scales ranging from 0 to 45 years before present (1997).

Carbon-14 (^{14}C) is a natural radioactive isotope of carbon that has a half-life of about 5,730 years. The ^{14}C data are expressed as percent modern carbon by comparing ^{14}C activities to the specific activity of

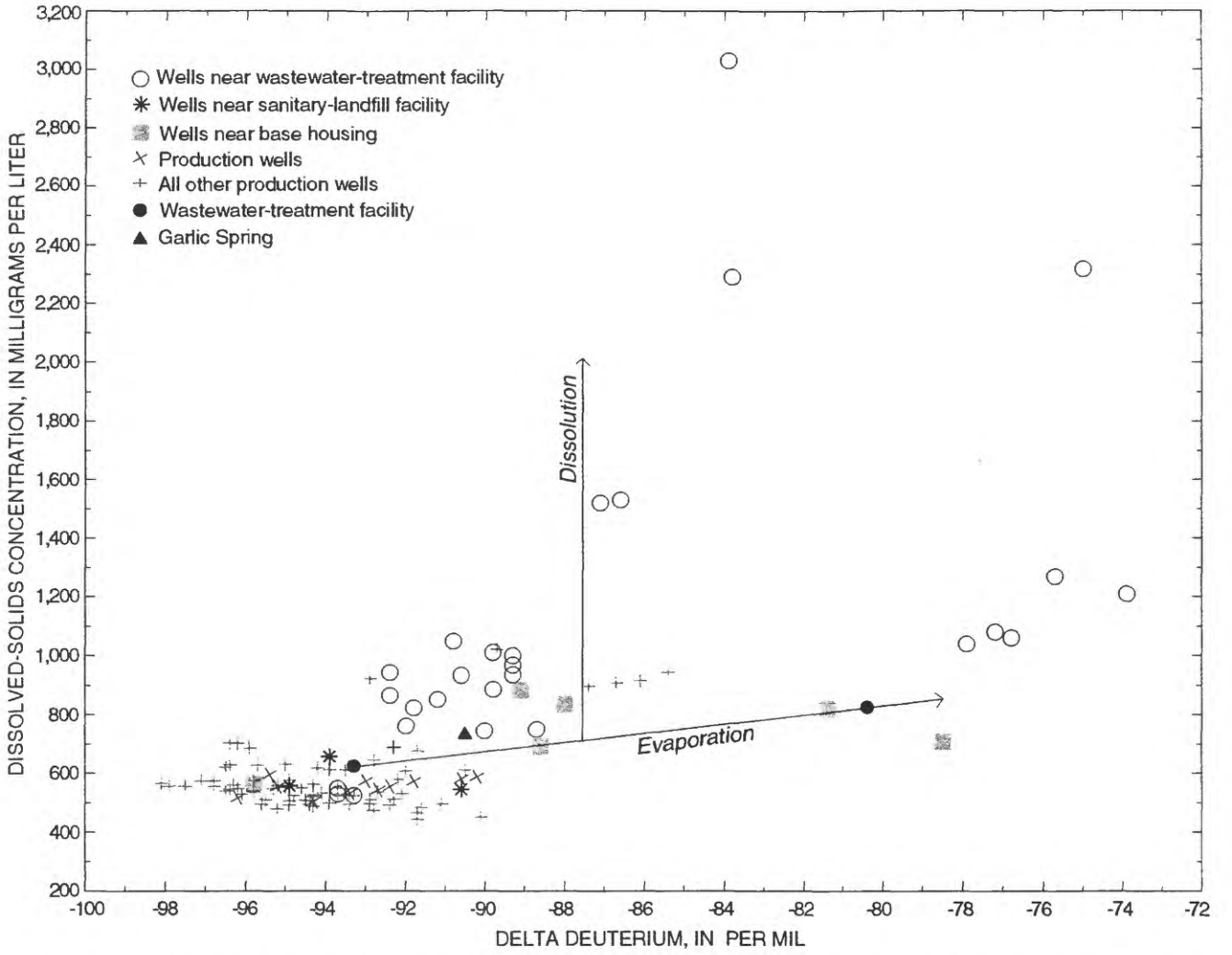


Figure 15. Relation between dissolved solids and delta deuterium in ground-water samples from wells in Irwin Basin at Fort Irwin National Training Center, California.

National Bureau of Standards oxalic acid (12.88 disintegrations per minute per gram of carbon in the year 1950 equals 100 percent modern carbon). Atmospheric testing of nuclear weapons also produced ^{14}C. As a result, ^{14}C activities can exceed 100 percent modern carbon in areas where ground water contains ^{3}H. The ^{14}C is a tracer of movement and of the relative age of water on time scales ranging from several hundred to more than 20,000 years before present (1997). Because ^{14}C is not part of the water molecule, ^{14}C activities are affected by chemical reactions between dissolved constituents and aquifer material. Relative ages must be corrected using carbon-13 (^{13}C) data to evaluate chemical reactions in an aquifer in order to get the actual age of the water. The ^{13}C composition is expressed in delta notation (δ) as parts per mil differences relative to the ratio of ^{13}C to carbon-12 (^{12}C) in standard Peedee belemnite, in a manner similar to that used for ^{18}O and D. Uncorrected ^{14}C data are used in this report to give an apparent age. In parts of the Mojave Desert outside the study area, apparent age can be as much as 10,000 years older than the corrected ^{14}C age (Izbicki and others, 1995).

In this paper, ground water having ^{3}H concentrations less than the detection limit of 0.2 TU is interpreted as water recharged before 1952; ground water having detectable levels of ^{3}H is interpreted as water recharged after 1952. Also, ground water having ^{14}C activities less than 90 percent modern carbon is interpreted as being recharged before 1952; ground water

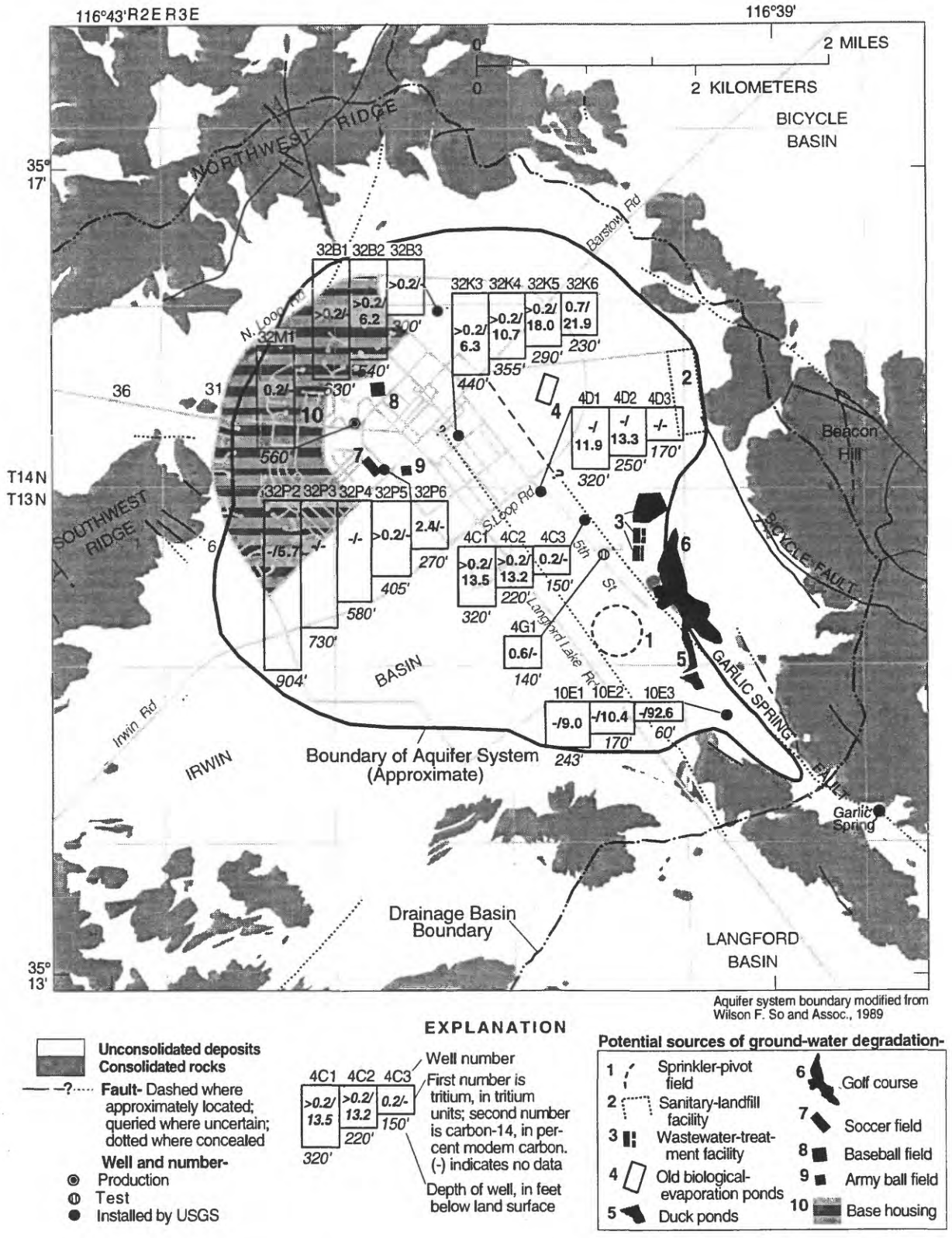


Figure 16. Tritium and carbon-14 data for ground water from selected wells in Irwin Basin at Fort Irwin National Training Center, California.

having ^{14}C activities greater than 90 percent modern carbon is interpreted as being recharged after 1952.

Water from only 3 of 14 wells sampled in Irwin Basin contains measurable concentrations of ^{3}H (fig. 16), indicating that water throughout most of Irwin Basin was recharged before 1952. The wells with water that contains ^{3}H (14N/3E-32K6, -32P6, 13N/3E-4G1), which indicates that there has been some recent recharge, are in areas where recent recharge might be expected. Wells 14N/3E-32K6 and -32P6 are in areas previously identified as being affected by irrigation-return flow from the base housing green areas. Well 14N/3E-4G1 is downgradient of the wastewater-treatment facility. All of these wells are perforated near the water table. Because ^{3}H in water vapor in the atmosphere exchanges with standing water with time, concentrations of 1 to 3 TU would not be uncommon for recharge from irrigation-return flow or from the oxidation ponds (Robert Michel, U.S. Geological Survey, oral commun., 1996). In addition, because ^{3}H in present-day precipitation is between 2 and 5 TU (Robert Michel, U.S. Geological Survey, oral commun., 1996), any precipitation during irrigation or directly into the oxidation ponds would increase the ^{3}H concentration of the recharge water.

Measured ^{14}C activities for water from 13 wells in Irwin Basin ranged from 5.7 to 92.6 percent modern carbon (fig. 16). In general, ^{14}C activities are higher where ^{3}H is present and lower where ^{3}H is low or absent. Eleven of the samples had ^{14}C activities of less than 20 percent modern carbon, indicating that most of the basin has not been readily recharged under current climatic conditions. The uncorrected ^{14}C data (relative age) indicate that ground water in Irwin Basin was recharged between 14,000 and greater than 40,000 years before present (1997). Two samples had ^{14}C activities of greater than 20 percent modern carbon. The sample from well 13N/3E-10E3 had a ^{14}C activity of 92.6 percent modern carbon. High nitrate and high dissolved-solids concentrations also were detected in this well. The high dissolved-solids and nitrate concentrations and the modern carbon in this well indicate that the recharge is wastewater effluent that infiltrates from the duck ponds. The sample from well 14N/3E-32K6 had a ^{14}C activity of 21.9 percent modern carbon, indicating relatively old water; however, water from this well also contained measurable ^{3}H (fig. 19), which indicates that there is mixing between old (as indicated by low ^{14}C activity) and young (as indicated by ^{3}H) water in this well. The recent water may be mounded at the top of the water table.

SUMMARY AND CONCLUSIONS

Fort Irwin National Training Center (NTC) is about 35 mi northeast of Barstow in the northern part of the Mojave Desert, California. Irwin Basin is one of three basins currently (1997) supplying water to the U.S. Army at Fort Irwin NTC with additional water being supplied by nearby Bicycle and Langford Basins.

Irwin Basin is surrounded and underlain by consolidated rocks which consist of igneous, metamorphic, and volcanic rocks. These rocks are mainly nonwater-bearing, except for the upper few tens of feet of the igneous and metamorphic bedrock in which a zone of secondary porosity has developed because of weathering and fracturing. These rocks are considered to be the base of the aquifer system in the basin. Overlying the bedrock, the basin is filled with as much as 950 ft of unconsolidated deposits consisting of older and younger alluvium and lacustrine deposits. The older alluvium yields moderate amounts of water but is less transmissive with depth. The younger alluvium overlies the older alluvium on most of the valley floor. Although most of the younger alluvium lies above the water table, these deposits, where saturated, are capable of yielding large quantities (as much as 1,000 gal/min) of water to wells.

The area has been dissected by numerous faults that seem to influence the shape of the basin. Most of these faults disappear beneath the unconsolidated deposits when they reach the margins of the valley floor. The Garlic Spring Fault has been mapped as extending out into the unconsolidated deposits and it probably cuts through the younger and older alluvium in the southeastern part of the basin. Water-quality data indicate that this fault is at least a partial barrier to ground-water flow. The bedrock surface deepens to the southwest across the Garlic Spring Fault and a parallel fault.

The aquifer system in Irwin Basin consists of an upper unconfined aquifer and lower confined aquifer. The upper aquifer is contained in the saturated younger alluvium and reaches a maximum thickness of about 200 ft. The lower aquifer is contained in the older alluvium and the underlying weathered/fractured bedrock and reaches a maximum thickness of more than 600 ft. The upper aquifer generally has higher transmissivities

than the lower aquifer and produces most of the water from the aquifer system.

Natural recharge in Irwin Basin is from precipitation in the drainage basin and has been estimated to be about 150 acre-ft /yr (C.F. Hostrup and Associates, 1955). The primary natural discharge from the ground-water system in Irwin Basin is underflow beneath the unnamed wash near Garlic Spring. Before 1941, prior to ground-water development, the underflow was equal to the natural recharge to the basin.

Ground-water pumpage in Irwin Basin has ranged from 33 acre-ft in 1941 to 1,927 acre-ft in 1987. Most of the water not used in the basin, about 58 to 70 percent of the water pumped at the base, is discharged to a wastewater-collection system and -treatment facility.

Wastewater was collected in biological-evaporation ponds from 1941 to 1955 and currently (1997) is treated and disposed of in evaporation ponds, through sprinkler systems to a driving range and golf course, and finally through sprinkler systems to the southeast part of the basin. Most of the wastewater that goes to the treatment facility is evaporated; however, some of the wastewater recharges the underlying ground water. Estimates of wastewater recharge from 1941 to 1993 ranged from 0 to 1,486 acre-ft/yr and averaged 650 acre-ft/yr for the minimum estimate of wastewater inflow and 780 acre-ft/yr for the maximum estimate. During 1942–45, 1951–55, 1957, and 1960–93, wastewater probably was recharging the basin, but, during 1969–70, 1972–80, 1983, 1985, and 1991–93, estimated ground-water recharge from wastewater approached or exceeded pumpage in Irwin Basin.

The infiltration of water used to irrigate lawns and playing fields that is not consumptively used by the plants is another source of recharge not present before the development of the base. Irrigation-return flows are estimated at about 90 acre-ft/yr during the 1960's to early 1980's and about 210 acre-ft/yr from the early 1980's to present (1997).

Ground-water levels in Irwin Basin respond directly to changes in pumpage. Water levels in the central part of Irwin Basin have declined slightly more than 30 ft since 1941, mostly between 1953 and the late 1960's. During the 1970's, water levels in the basin recovered because of the reduction of pumping from Irwin Basin, the importation of water from Bicycle Basin, and a decrease in activity at the base. In the early 1980's, pumping in the basin began increasing, and by 1993, water levels had declined to the levels measured in the late 1960's. Ground-water levels seemed stable between 1993 and 1995, but declining water levels during 1995-96 indicate that pumpage must have exceeded recharge during this time.

The 1994 water-table contour map indicates that a cone of depression has developed beneath Irwin Basin well field and that a ground-water mound has developed beneath the wastewater-effluent disposal sites. High water levels and a steep ground-water gradient near the wastewater-effluent disposal sites may result from several factors: (1) recharge from wastewater effluent being disposed of in this area; (2) the aquifer in this area is primarily composed of older alluvium, which has a lower transmissivity than the younger alluvium in the central part of the basin; and (3) the barrier effect of the Garlic Spring Fault, which separates this area from the central part of the basin. Water-level data from multiple-well monitoring sites indicate that a general downward vertical gradient exists between the upper and lower aquifer.

Ground-water quality in Irwin Basin varies areally in the water-bearing deposits. Water in most of Irwin Basin is sodium based with sulfate, chloride, and bicarbonate as the primary anions. Calcium and sodium are the primary cations from wells in the southeast part of the basin near the wastewater-treatment facility. Dissolved-solids and nitrate concentrations are used to describe the areal variation in water quality.

The dissolved-solids concentrations of water throughout Irwin Basin range from 433 to 6,380 mg/L and that of native ground water ranges from 540 to 645 mg/L. In general, dissolved-solids concentrations are higher in the upper aquifer than they are in the lower aquifer because the upper aquifer is more easily contaminated from surface infiltration. High dissolved-solids concentrations are in the southeastern part of Irwin Basin near the wastewater-treatment facility, golf course, and sprinkler-pivot field. The highest dissolved-solids concentrations (2,140-6,380 mg/L) are in porewater from four lysimeters and a water-table well beneath the sprinkler-pivot field. The fact that the dissolved-solids concentrations of the porewater increase with depth in the unsaturated zone beneath the sprinkler-pivot field suggests that the wastewater effluent leaches salts from the unsaturated zone. This area is the lowest part of the basin, and evaporite deposits are in the surface deposits as a result of evaporation from surface water collecting in this area. When water is added, the evaporite deposits are leached and migrate downward to the water table.

The ground water of high dissolved-solids concentration is migrating northwestward toward the pumping depression. Westward horizontal migration of the water is retarded at depth by the Garlic Spring Fault, which acts as a partial barrier to ground-water flow near the wastewater-treatment facility. Water from wells east of Garlic Spring Fault contains moderate to high dissolved-solids concentrations (863–1,523 mg/L) throughout the saturated thickness, whereas water from wells west of the fault contains high dissolved-solids concentrations (greater than 700 mg/L) in the upper aquifer and low dissolved-solids concentrations (less than 700 mg/L) in the lower aquifer. Downward vertical movement of high dissolved-solids concentration water seems to be impeded by the fine-grained deposits in the older alluvium in the southeastern part of the basin near the wastewater-treatment facility.

Nitrate-N concentrations in excess of 5 mg/L are in ground water in three areas of Irwin Basin: (1) near the wastewater-treatment facility, (2) near the northern end of and beneath the sanitary-landfill facility, and (3) in the west central part of the basin. Nitrate-N concentrations in excess of 10 mg/L, the maximum contaminant level of nitrate as nitrogen, are in water beneath and adjacent to the wastewater-treatment facility in a plume that extends about 0.5 mi northwest of the treatment facility and about 0.25 mi southeast of the duck ponds. No known horizontal barriers exist between the nitrate plume and the base production wells. The time required for the nitrate plume to reach the nearest production well was estimated at about 43 years by a Darcy's law calculation. Actual movement may take place faster or slower than calculated.

High nitrate concentrations are in water from wells north of and beneath the sanitary-landfill facility. High nitrate concentrations are an unlikely result of wastewater recharging the aquifer beneath the wastewater-treatment facility. High nitrate and dissolved-solids concentrations also are near the center of the base in Irwin Basin. Possible sources of the nitrate are wastewater leakage, fertilizer used on lawns and playing fields, and natural soil nitrate. Nitrogen isotopic data are being analyzed to help determine the source of the high nitrate concentrations.

Changes in dissolved-solids and nitrate concentrations have been observed since water-quality data collection began with the construction of the first production well in 1941. Dissolved-solids and nitrate-N concentrations in water from production wells that are west of an unnamed fault in Irwin Basin have increased since 1941. Irrigation-return flows and mobilized natural nitrate from the base housing area and the soccer and Army ball fields may be the source of the increased concentrations. With the exception of two wells, dissolved-solids and nitrate-N concentrations in water from production wells that are east of the unnamed fault have remained relatively stable. Although the unnamed fault may retard lateral movement of the degraded water, continued monitoring is needed to determine this.

The stable isotopes of oxygen and hydrogen, tritium, and ^{14}C data were collected to determine the source and relative age of ground water in Irwin Basin. Oxygen-18 and deuterium ratios in water from a spring and most of the production wells in Irwin Basin indicate that present-day precipitation is not a major source of recharge in this basin. Tritium data indicate that most water in Irwin Basin was recharged before 1952. The apparent age from the uncorrected ^{14}C data indicate that water in undisturbed areas of Irwin Basin is from 14,000 to more than 40,000 years old.

REFERENCES CITED

C.F. Hostrup and Associates, 1955, Water resources survey, Camp Irwin, California: 109 p.

Craig, H., 1961, Isotopic variation in meteoric waters: Science, v. 133, p. 1702-1703.

Driscoll, F.G., 1986, Groundwater and wells: St. Paul, Minnesota, Johnson Division, p. 168-200.

EarthInfo, Inc., 1994 [1995], EarthInfo CD2 reference manual—for all EarthInfo CD–ROM databases: Boulder, Colorado, EarthInfo, Inc.

———1995, National Climatic Data Center summary of the day—West 1994: Boulder, Colorado, EarthInfo, Inc. One CD-ROM.

Folk, R.L., 1954, The distinction between grain size and mineral composition in sedimentary-rock nomenclature: Journal of Geology, v. 62, no. 4, p. 344-359.

———1980, Petrology of sedimentary rocks: Austin, Texas, Hemphill Publishing, p. 25-28.

Fournier, R.O., and Thompson, J. M., 1980, The recharge area for the Coso, California, geothermal system deduced from δD and $\delta^{18}O$ in thermal and nonthermal waters in the region: U.S. Geological Survey Open-File Report 80-454, 27 p.

Friedman, Irving, Smith, G.I., Gleason, J.D., Warden, Augusta, and Harris, J.M., 1992, Stable isotope composition of waters in southeastern California, 1. Modern precipitation: Journal of Geophysical Research, v. 97, no. D5, p. 5795-5812.

Gonfiantini, R., 1978, Standards for stable isotope measurements in natural compounds: Nature, v. 271, p. 534-536.

International Atomic Energy Agency, 1981, Stable isotope hydrology: Deuterium and oxygen-18 in the water cycle, Gat, J.R., and Gonfiantini, R., (eds.):Vienna, International Atomic Energy Agency, p. 31.

Izbicki, J.A., Martin, P.M., and Michel, R.L., 1995, Source, movement, and age of ground water in the upper part of the Mojave River Basin, California, U.S.A., *in* Adar, E.M., and Leibundget, Christian, eds., Application of tracers in arid zone hydrology, p. 43-56.

James M. Montgomery and Associates, 1981, Water supply investigation, Fort Irwin, San Bernardino County, California. Phase II, Final report on ground water basin development and management: Consultant's report prepared for and in the files of the U.S. Army Corps of Engineers.

Keys, W.S., and MacCary, L.M., 1983, Application of borehole geophysics to water-resources investigations: U.S. Geological Survey Techniques of Water-Resources Investigations, book 2, chap. E1, 126 p.

Kunkel, Fred, and Riley, F.S., 1959, Geologic reconnaissance and test-well drilling, Camp Irwin, California: U.S. Geological Survey Water-Supply Paper 1460-F, 271 p.

Michel, R.L., 1976, Tritium inventories of the world oceans and their implications: Nature, v. 263, p. 103-106.

Munsell Color, 1975, Munsell soil color charts: Baltimore, Maryland, Munsell Color, Macbeth Division of Kollmorgen Corporation.

National Oceanic and Atmospheric Administration, 1994, Climatological data, annual summary, California, 1994: Asheville, North Carolina, v. 98, no. 13.

National Research Council, 1947, Report of the subcommittee on sediment terminology: Eos, Transactions of the American Geophysical Union, Abstracts, v. 28, no. 6, p. 936-938.

———1978, Nitrates: An environmental assessment: Washington, D.C., National Academy of Sciences, 723 p.

Stiff, H.A., Jr., 1951, The interpretation of chemical water analysis by means of patterns: Journal of Petroleum Technology, v. 3, no. 10, p. 15-17.

Umari, M.J., Martin, Peter, Schroeder, R.A., Duell, F.W., and Fay, R.G., 1993, Potential for ground-water contamination from movement of wastewater through the unsaturated zone, upper Mojave River Basin, California: U.S. Geological Survey Water-Resources Investigations Report 93-4137, 117 p.

U.S. Environmental Protection Agency, 1991, Drinking water standards and health advisory table: San Francisco Drinking Water and Groundwater Protection Branch, Region 9, 19 p.

———1994, Drinking water regulations and health advisories table: San Francisco Drinking Water and Groundwater Protection Branch, Region 9, 15 p.

Wilson F. So and Associates, 1989, U.S. Army National Training Center at Fort Irwin California, water basin development plan, final report, June 1989: Consultant's report prepared for and in the files of the Commander of the National Training Center at Fort Irwin, 85 p.

Yount, J.C., Schermer, E.R., Felger, T.J., Miller, D.M., and Stephens, K.A., 1994, Preliminary geologic map of Fort Irwin Basin, north-central Mojave Desert, California: U.S. Geological Survey Open-File Report 94-173, 25 p.

APPENDIX A

Lithologic Logs

Lithologic logs were compiled from descriptions of drill cuttings collected at each borehole and from observations recorded during logging. The cuttings, collected at 20-ft intervals and at distinguishable changes in lithology, were described by rock type, texture, sorting, rounding, color, mineralogy, and any other significant features. Texture descriptions follow the National Research Council (1947) grain-size classification. This classification allows for correlation of general grain-size terms (such as "sand") to size limits in millimeters or inches. Color, determined on moist samples, follows the numerical color designations in the Munsell Soil Color Charts (Munsell Color, 1975). Detailed lithologic descriptions for the boreholes are given in tables 9 through 25 (at back of report).

Generalized lithologic columns for each site were compiled by grouping similar lithologic units determined from the detailed lithologic logs (figs. 17-33). Borehole geophysical logs were used to identify the depths of contacts between the lithologic units. The lithologic units were categorized using the nomenclature of Folk (1954, 1980) for 15 textural groups (fig. 34).

Borehole Geophysics

Geophysical logs were made for the boreholes at each multiple-well monitoring site immediately after completion of drilling. The logs of the uncased boreholes, which were filled with drilling mud, include 16- and 64-in. normal resistivity, lateral (6-ft) resistivity, spontaneous potential, natural gamma, and caliper logs (fig. 17) and sonic logs for sites 9N/1W-10J12-15, -11K12-15, -12L2-5, and -12N4-7. The logs provide information on the character of the formations and on the presence and quality of ground water. Data from the geophysical logs were used in conjunction with the lithologic logs to determine the placement of the piezometers.

Resistivity devices measure the evident resistivity of a volume of rock under the direct application of an electric current (Keys and MacCary, 1983). Resistivity logs are used to determine formation resistivity, formation porosity, and fluid resistivity. In general, low resistivity indicates a presence of fine-grained deposits, such as silt, clay, and shale; whereas, high resistivity indicates a presence of coarse-grained materials, such as sand and gravel.

Spontaneous-potential (SP) devices measure voltage differences between the borehole fluid and the surrounding rock (Keys and MacCary, 1983). SP logs are used mainly for correlating geologic units, determining bed thickness, and differentiating between nonporous and porous beds. This type of log commonly has a baseline that corresponds to impermeable beds such as clay or shale. Deflections to the left of this baseline correspond to the positions of permeable strata if the formation water is less resistive (more saline) than the drilling mud. The opposite is true if the formation water is more resistive than the drilling mud.

Natural gamma logs measure the intensities of gamma-ray emissions resulting from the natural decay of potassium-40 and of the daughter products of uranium and thorium. The gamma logs are used primarily as lithology indicators and for geologic correlation. Clay and feldspar-rich gravel and granite generally emit higher intensity gamma rays (Driscoll, 1986). In the logs completed for this study, an increase in gamma intensity generally corresponds with an increase in granitic materials in the deposits.

Caliper devices measure the diameter of the borehole. The caliper log can be used to indicate "cave-in" in unconsolidated sand or to indicate swelling clay.

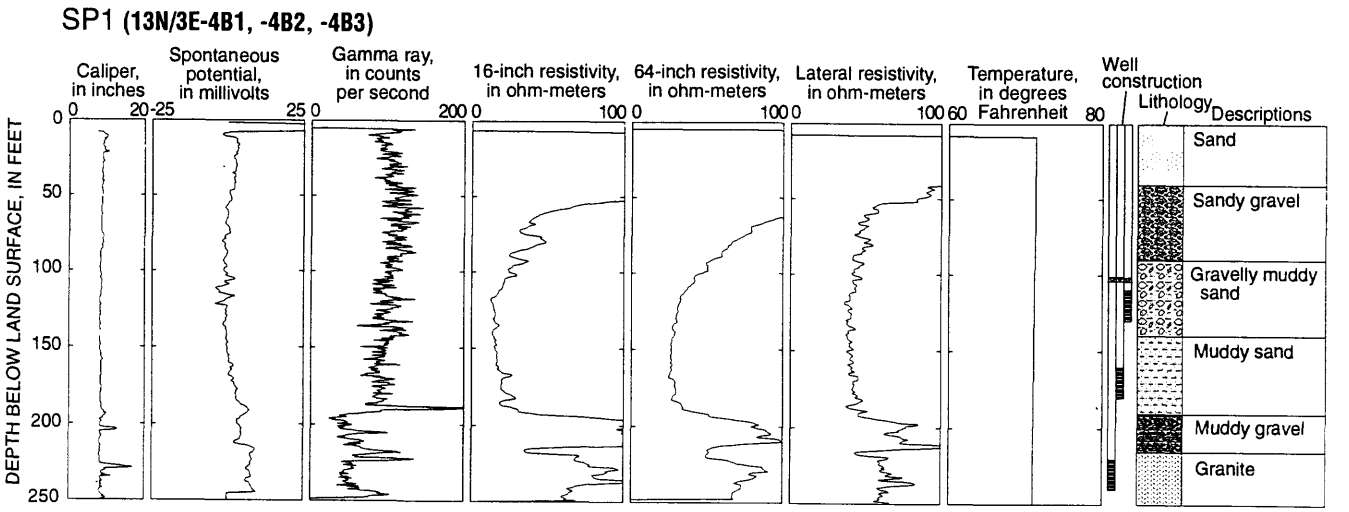


Figure 17. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: SP1 (13N/3E-4B1, -4B2, -4B3).

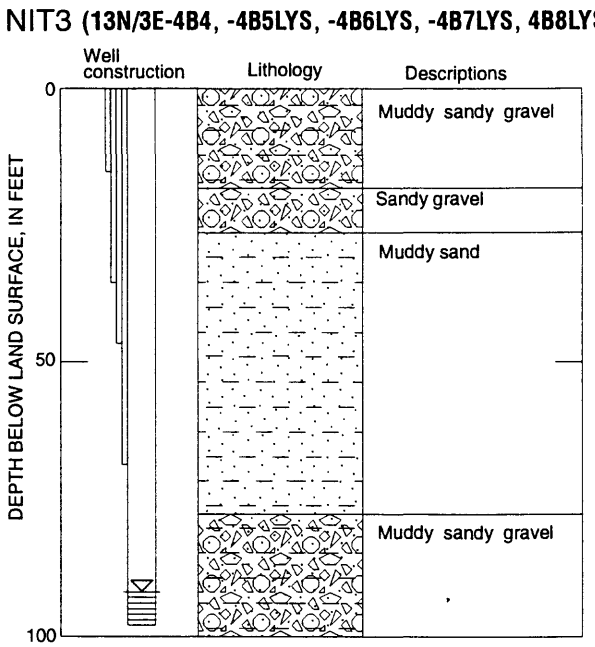


Figure 18. Well-construction diagram and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: NIT3 (13N/3E-4B4, -4B5LYS, -4B6LYS, -4B7LYS, -4B8LYS).

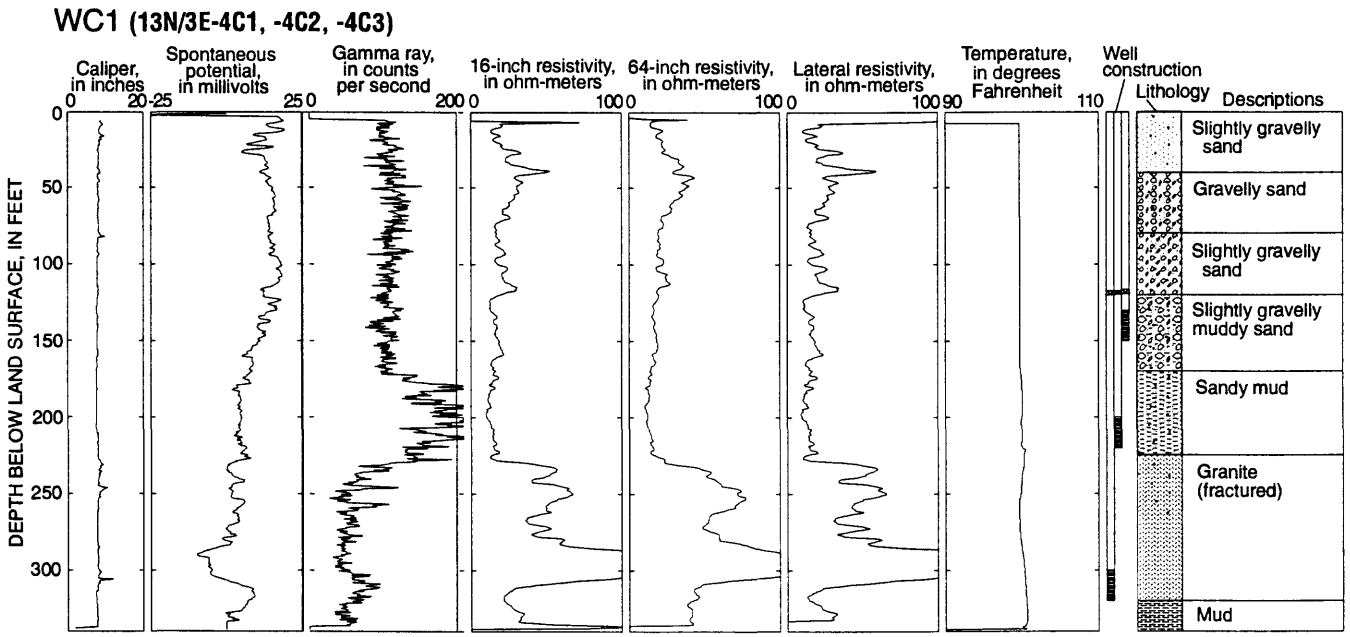


Figure 19. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: WC1 (13N/3E-4C1, -4C2, -4C3).

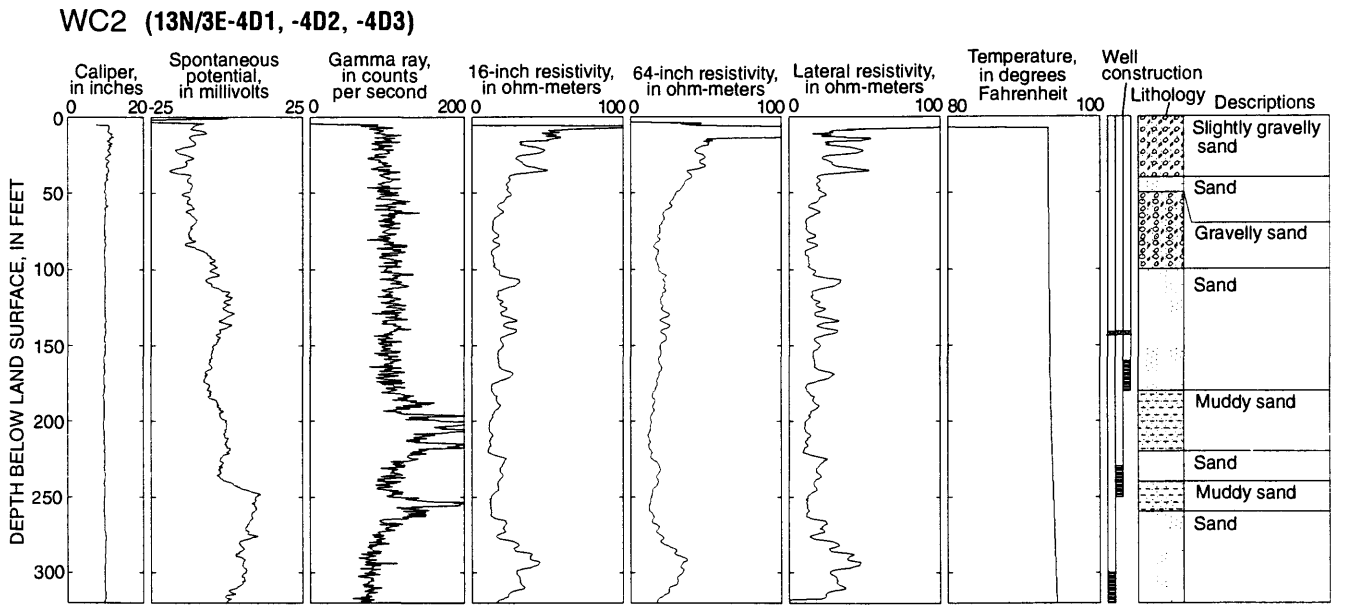


Figure 20. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: WC2 (13N/3E-4D1, -4D2, -4D3).

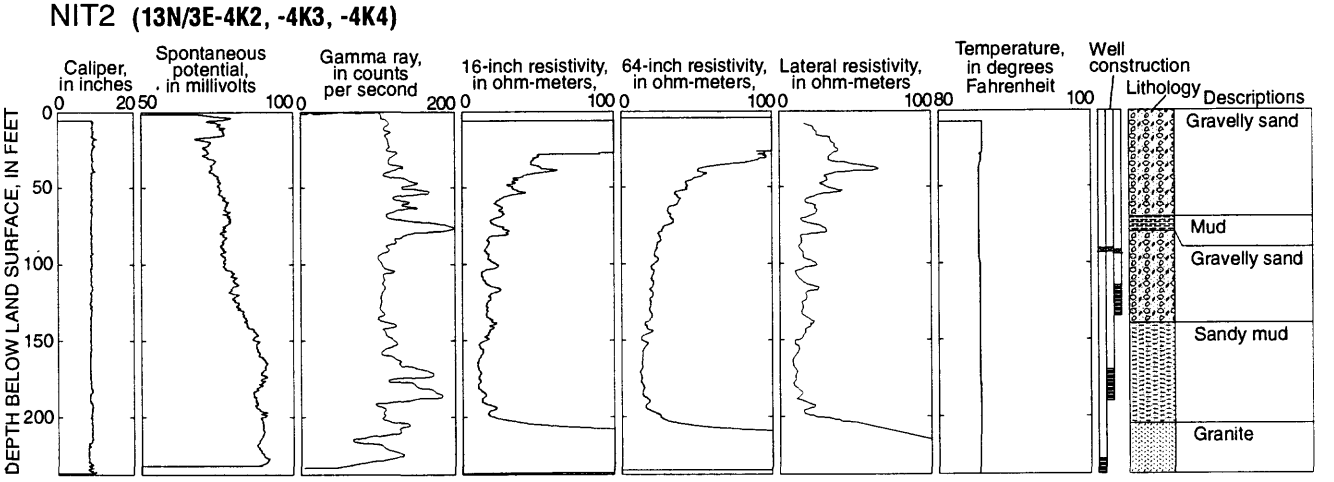


Figure 21. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: NIT2 (13N/3E-4K2, -4K3, -4K4).

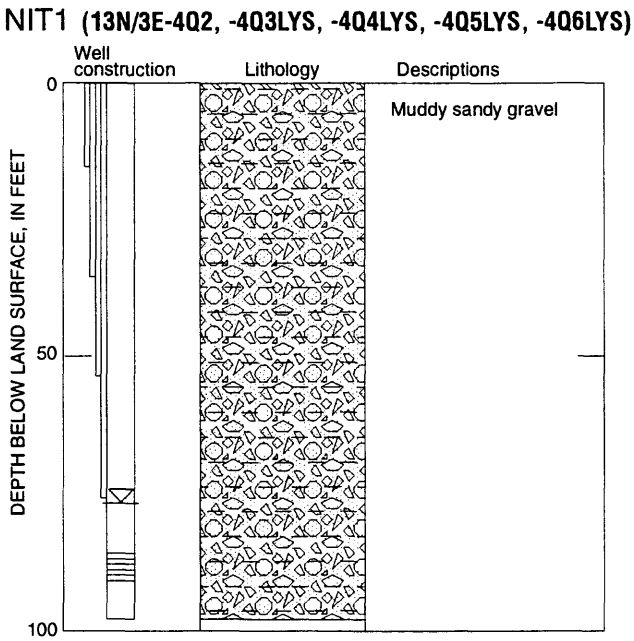


Figure 22. Well-construction diagram and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: NIT1 (13N/3E-4Q2, -4Q3LYS, -4Q4LYS, -4Q5LYS, -4Q6LYS).

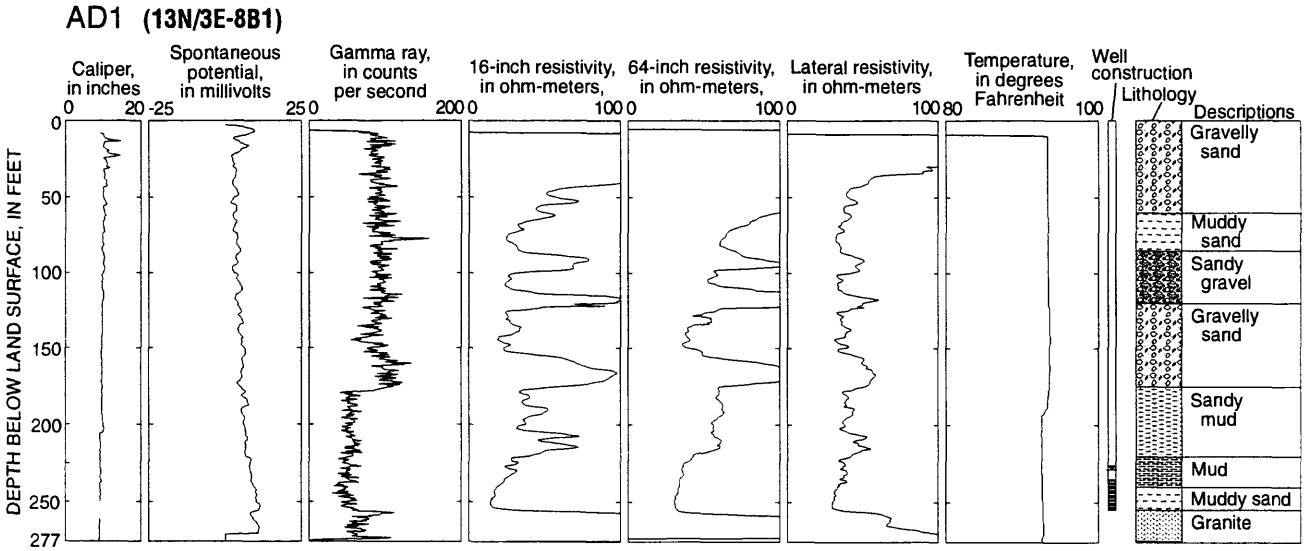


Figure 23. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: AD1 (13N/3E-8B1).

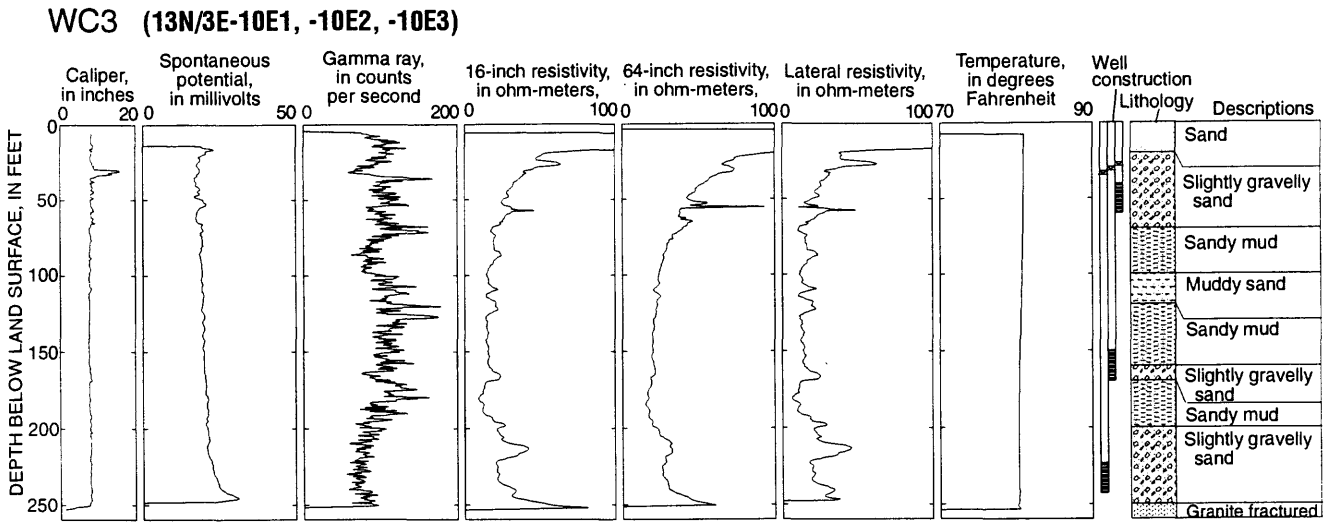


Figure 24. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: WC3 (13N/3E-10E1, -10E2, -10E3).

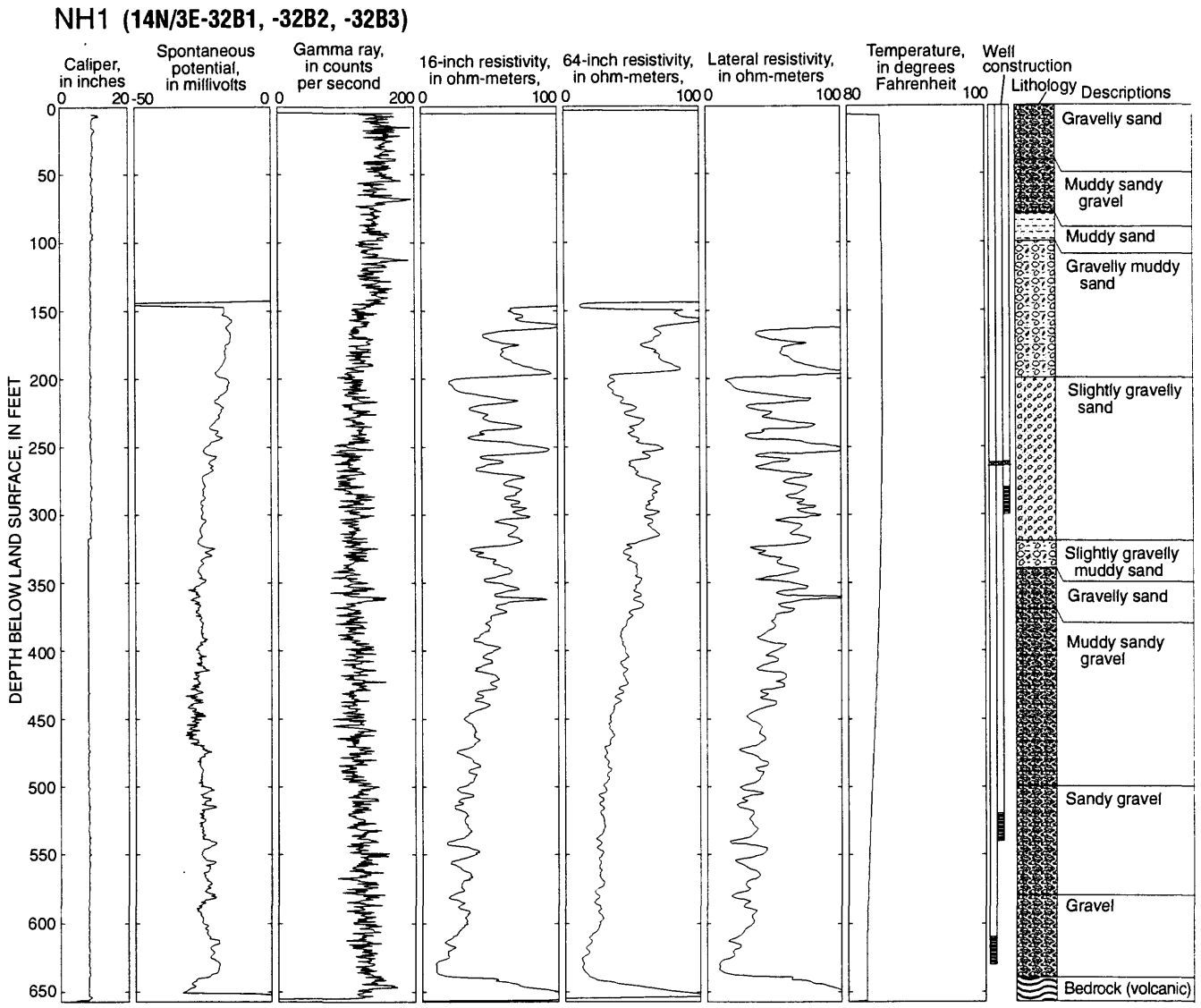


Figure 25. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: NH1 (14N/3E-32B1, -32B2, -32B3).

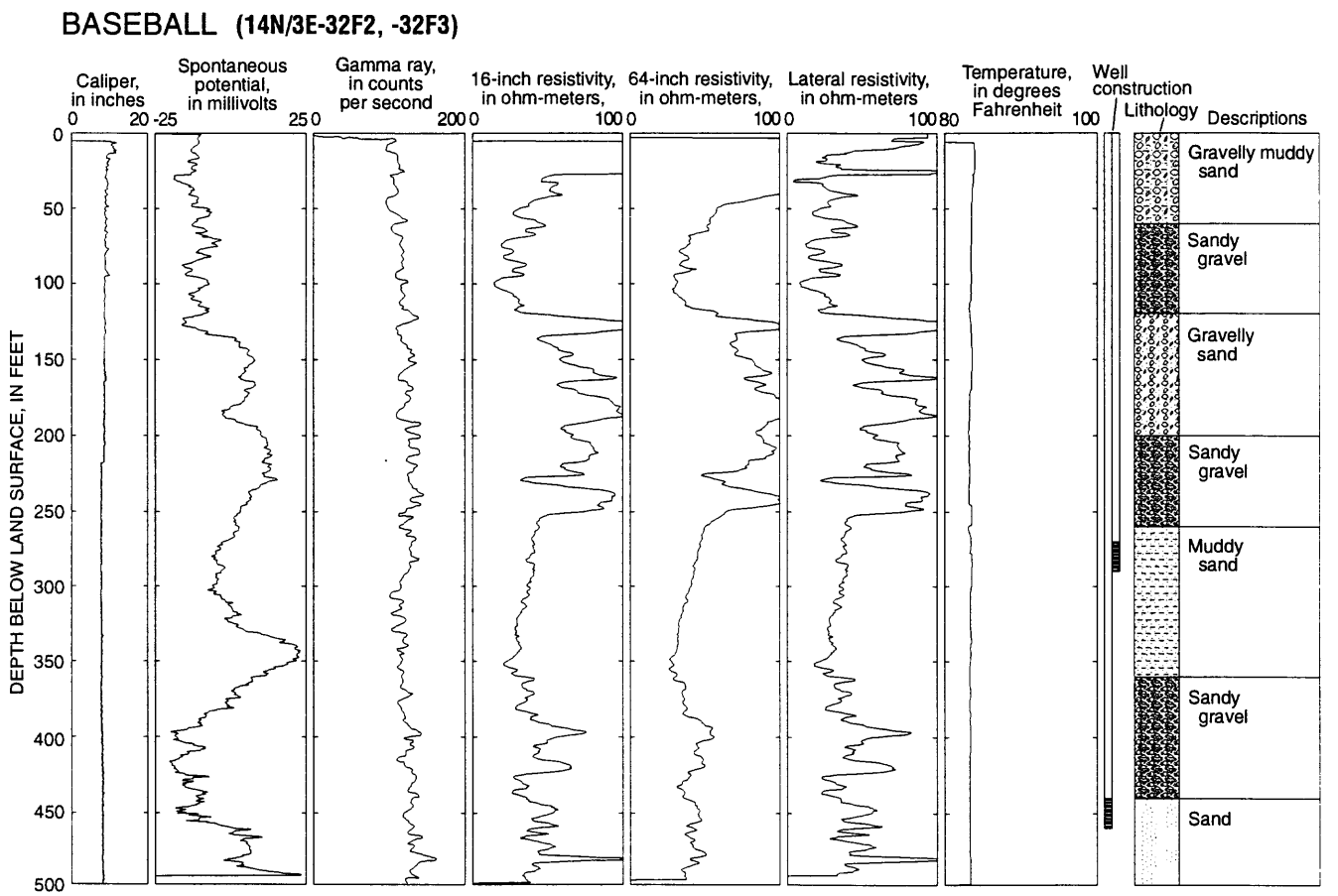


Figure 26. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: BASEBALL (14N/3E-32F2, -32F3).

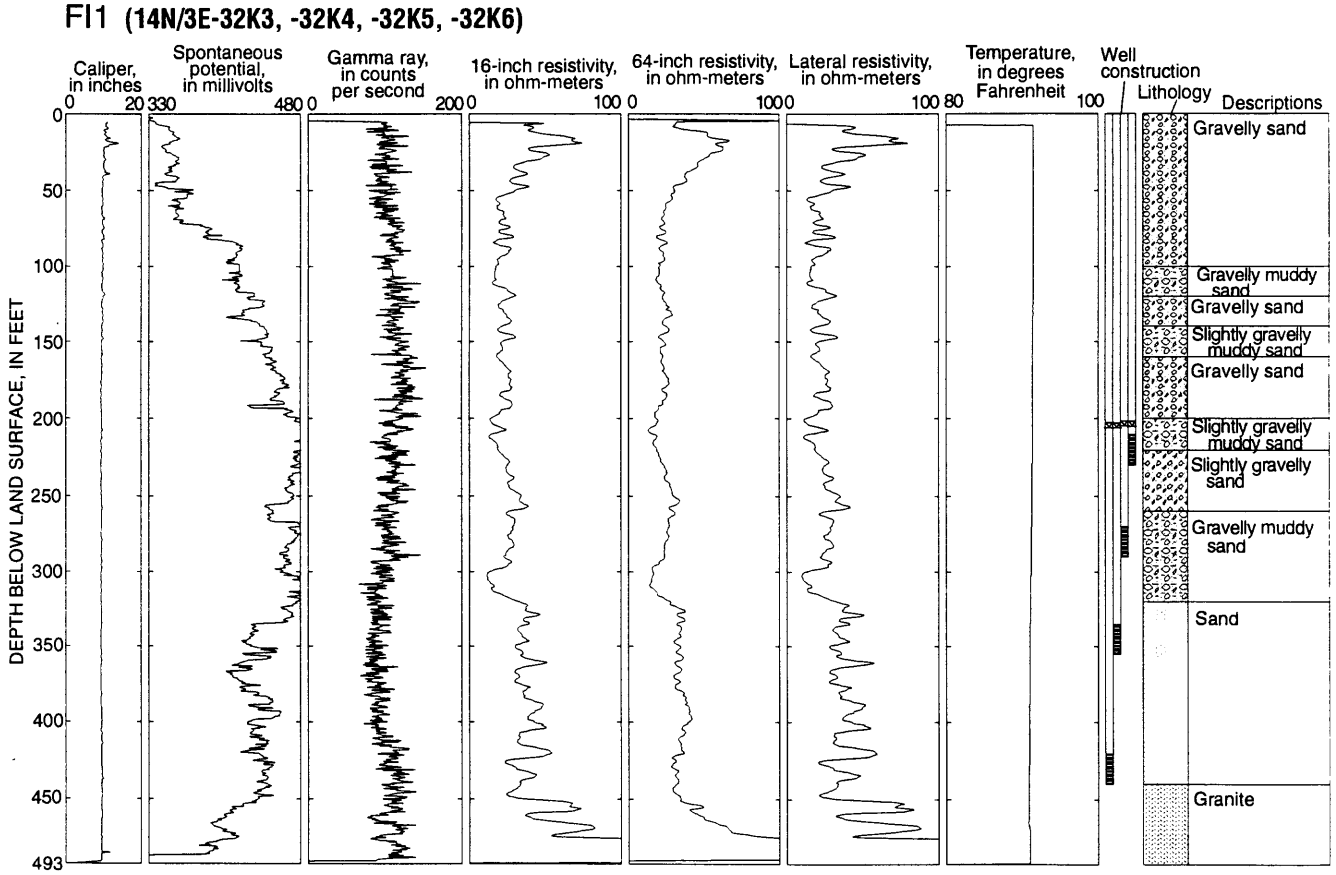


Figure 27. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: FI1 (14N/3E-32K3, -32K4, -32K5, -32K6).

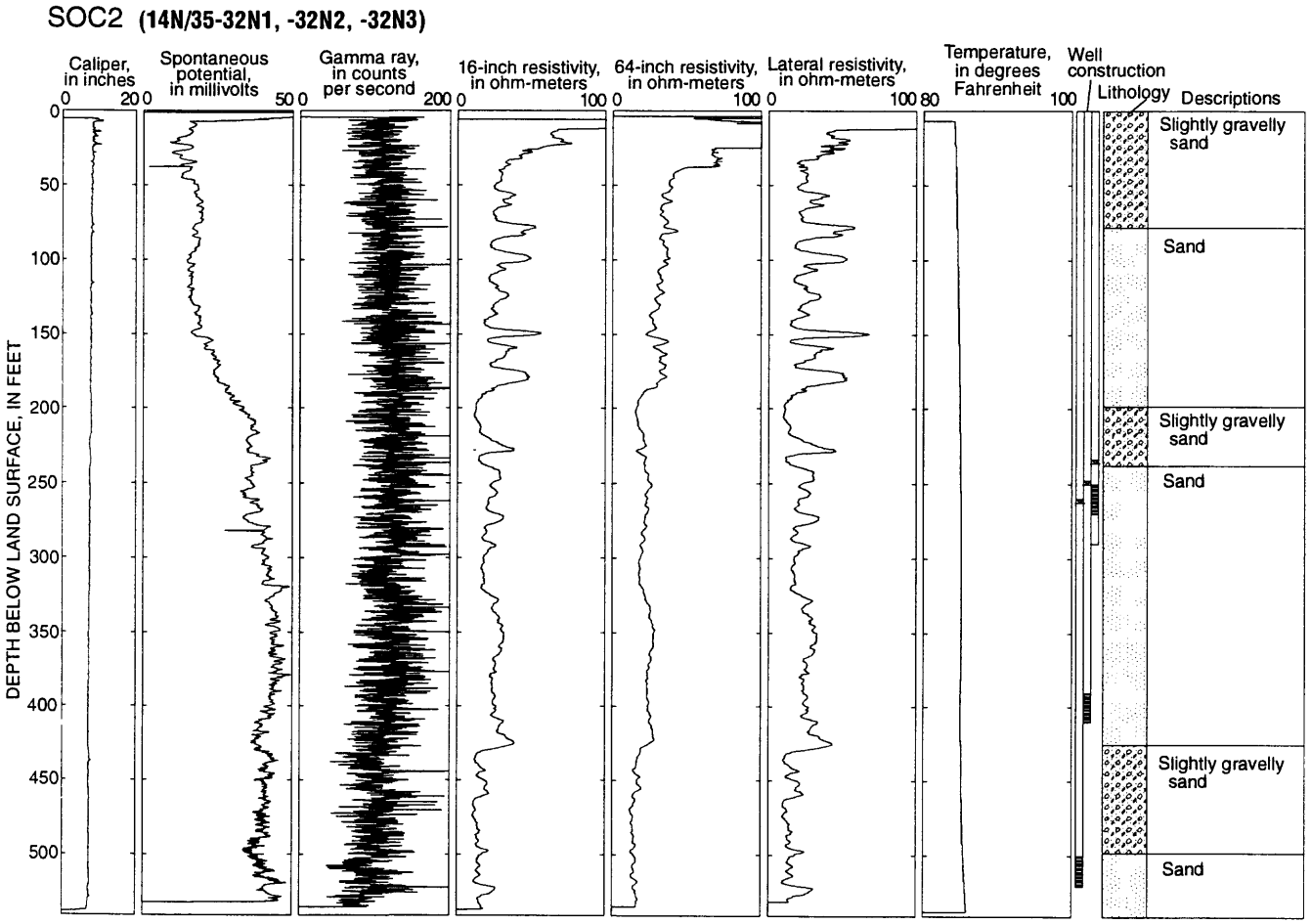


Figure 28. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: SOC2 (14N/3E-32N1, -32N2, -32N3).

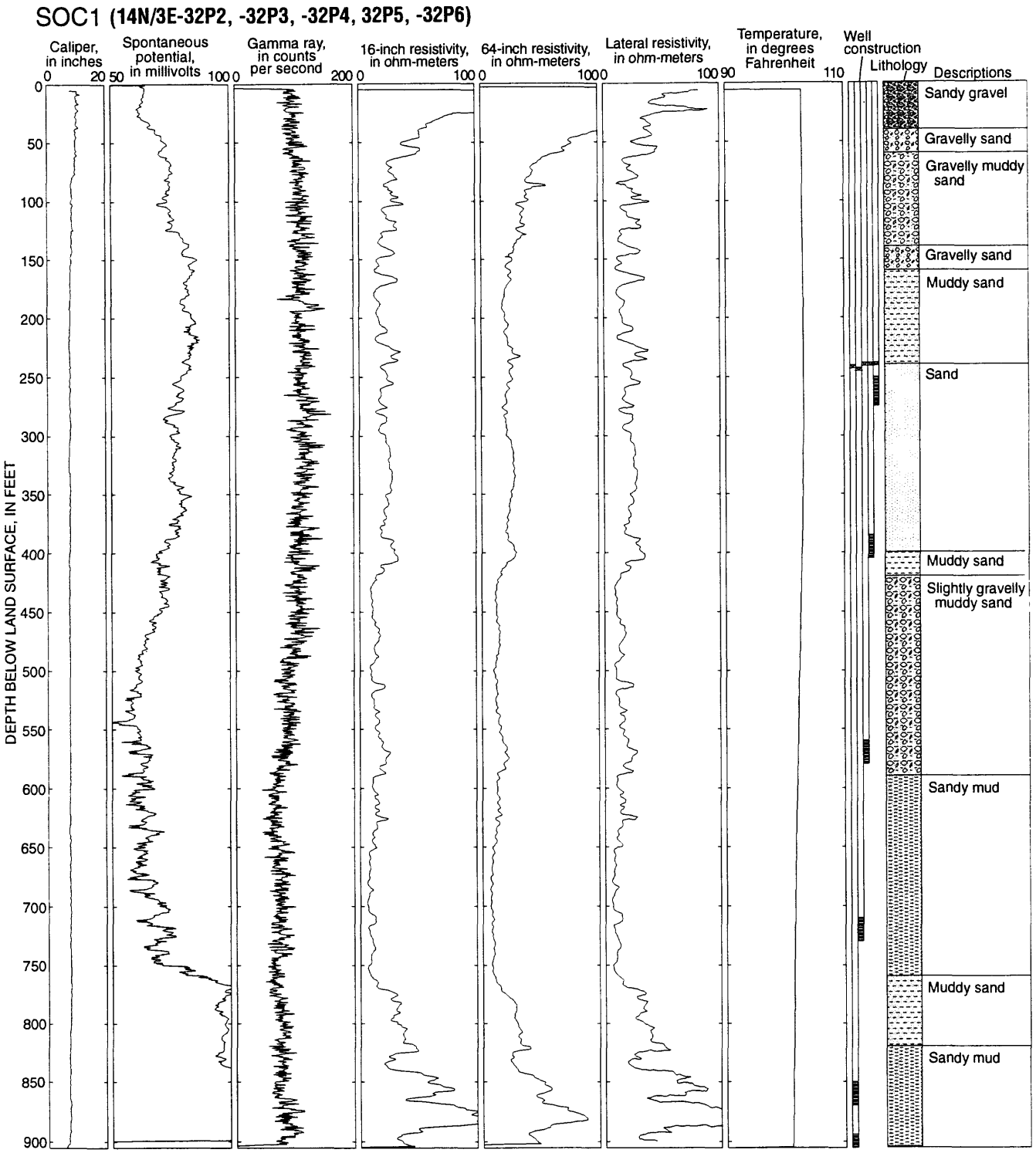


Figure 29. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: SOC1 (14N/3E-32P2, -32P3, -32P4, -32P5, -32P6).

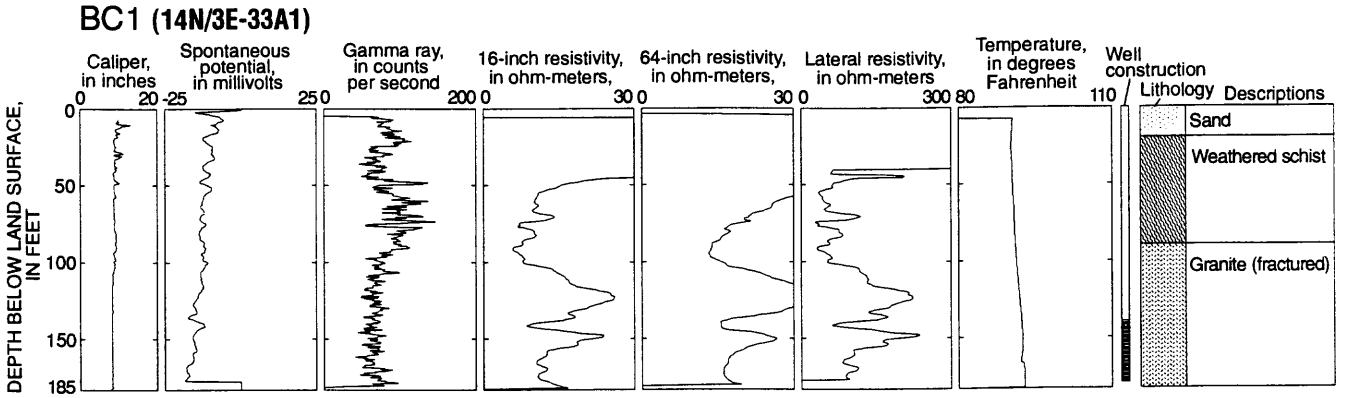


Figure 30. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: BC1 (14N/3E-33A1).

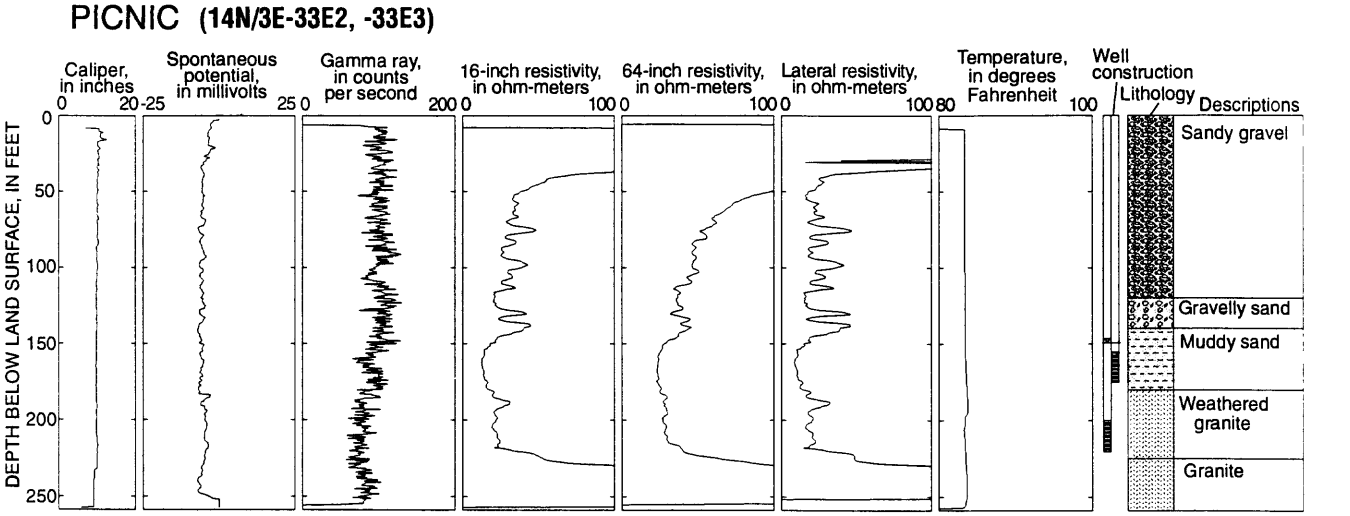


Figure 31. Geophysical log, well-construction diagram, and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: PICNIC (14N/3E-33E2, -33E3).

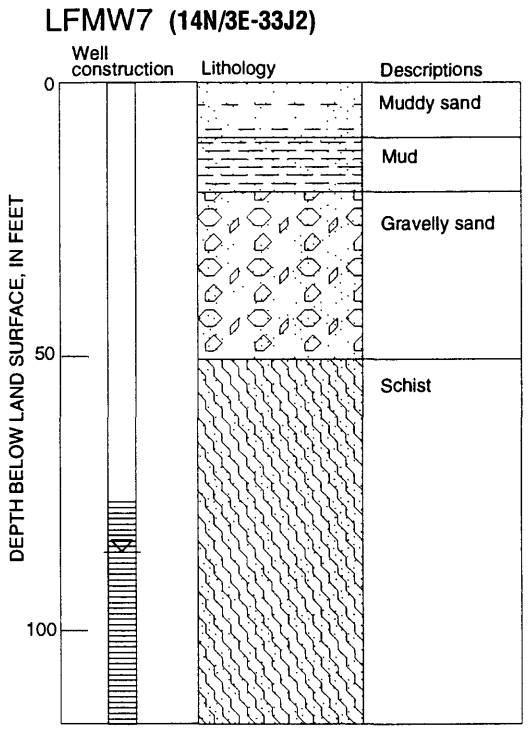


Figure 32. Well-construction diagram and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: LFMW7 (14N/3E-33J2).

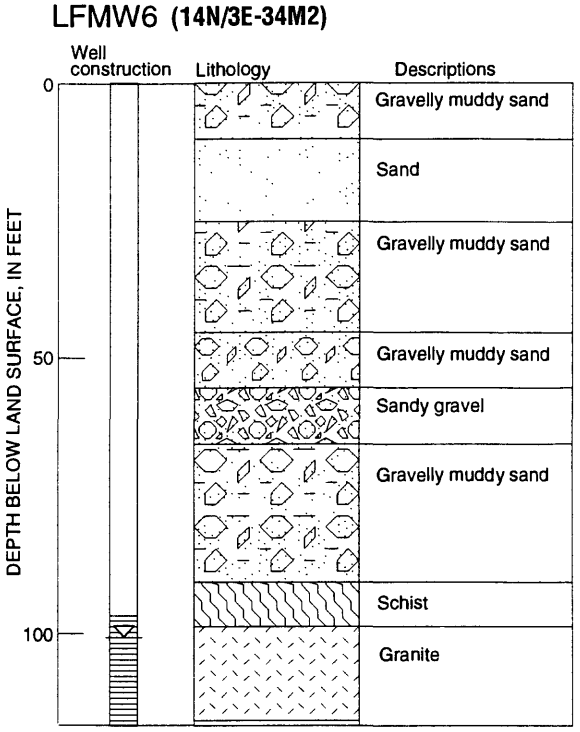


Figure 33. Well-construction diagram and stratigraphic column for borehole of monitoring site drilled in Irwin Basin at Fort Irwin National Training Center, California: LFMW6 (14N/3E-34M2).

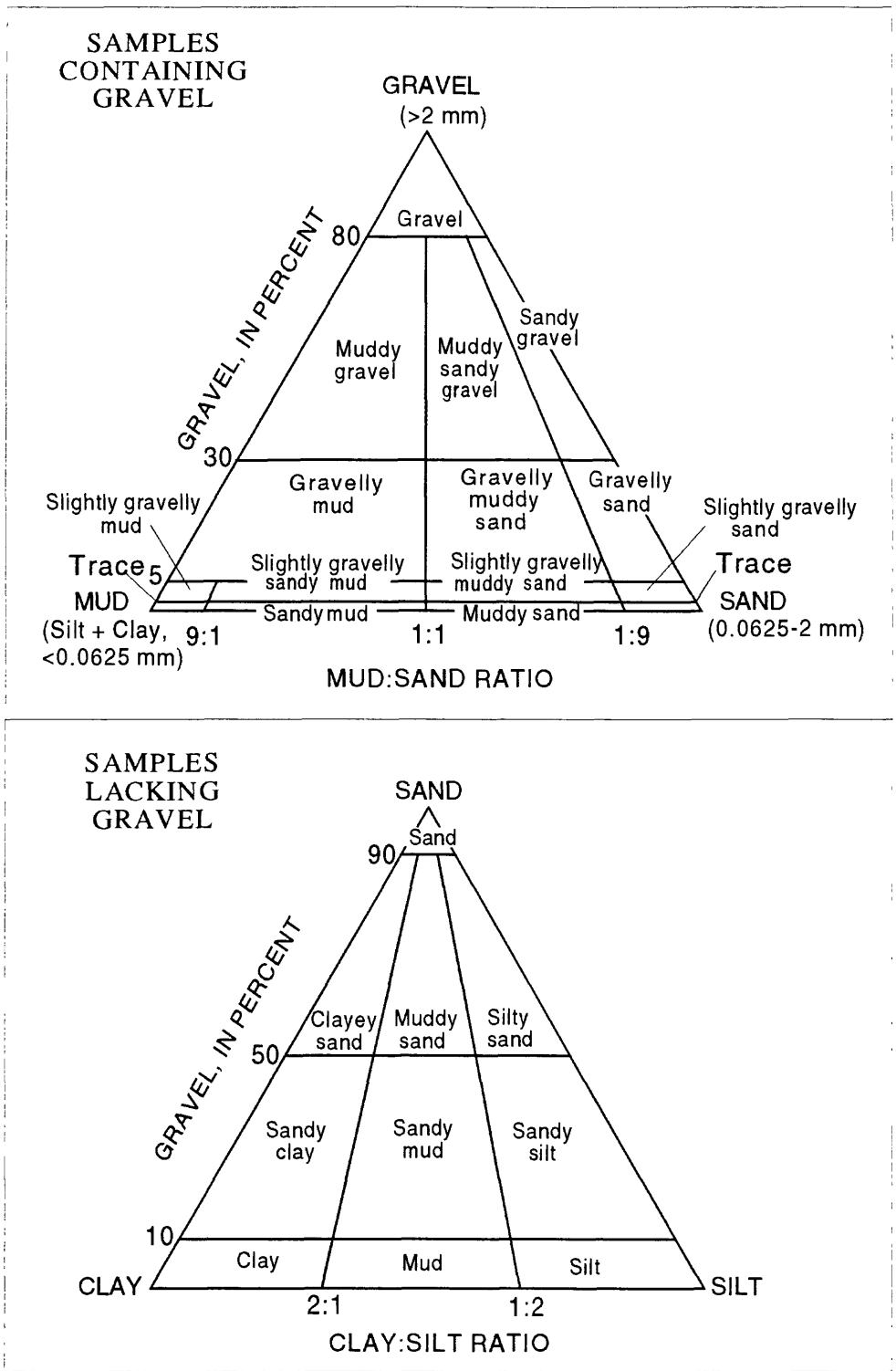


Figure 34. Rock type nomenclature for stratigraphic columns (figs. 17-33) at Fort Irwin National Training Center, California.

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96

[State well No.: See Well-Numbering System in text. Site identification number is the latitude, longitude, and sequence number of the site. Measurement method (column M): R, reported; S, steel tape; and V, calibrated electric tape. Site status (column S): D, dry; O, obstruction; P, pumping; R, recently pumped; S, nearby pumping; and T, nearby recently pumped]

State well number 13N/3E-4B1
Local name SP1-240
Site identification number 351521116400201
Top of perforations 220
Bottom of perforations 240
Altitude 2390
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 240 feet, perforated 220-240 feet. One of three wells at this site. Altitude of land-surface datum 2,390 feet. Water-level records available March 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 26, 1994	2286.	V	AUG 24, 1994	2287.	V	DEC 12, 1994	2287.	V	MAR 04, 1995	2287.	V
JUL 21	2287.	V	SEP 22	2287.	V	21	2287.	V	AUG 11	2288.	V
		LOWEST	2286.	MAY 26, 1994							
		HIGHEST	2288.	AUG 11, 1995							

State well number 13N/3E-4B2
Local name SP1-180
Site identification number 351521116400202
Top of perforations 160
Bottom of perforations 180
Altitude 2390
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 180 feet. Perforated 160-180 feet. One of three wells at this site. Altitude of land-surface datum 2,390 feet. Water-level records available March 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 26, 1994	2286.	V	AUG 24, 1994	2287.	V	DEC 12, 1994	2287.	V	MAR 04, 1995	2287.	V
JUL 21	2287.	V	SEP 22	2287.	V	21	2287.	V	AUG 11	2288.	V
		LOWEST	2286.	MAY 26, 1994							
		HIGHEST	2288.	AUG 11, 1995							

State well number 13N/3E-4B3
Local name SP1-130
Site identification number 351521116400203
Top of perforations 110
Bottom of perforations 130
Altitude 2390
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 130 feet, perforated 110-130 feet. One of three wells at this site. Altitude of land-surface datum 2,390 feet. Water-level records available March 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 26, 1994	2286.	V	AUG 24, 1994	2286.	V	DEC 12, 1994	2287.	V	MAR 04, 1995	2287.	V
JUL 21	2286.	V	SEP 22	2286.	V	21	2287.	V	AUG 11	2287.	V
		LOWEST	2286.	MAY 26, 1994	JUL 21, 1994	AUG 24, 1994	SEP 22, 1994				
		HIGHEST	2287.	DEC 12, 1994	DEC 21, 1994	MAR 04, 1995	AUG 11, 1995				

State well number 13N/3E-4B4
Local name NIT3
Site identification number 351515116395201
Top of perforations 92
Bottom of perforations 97
Altitude 2380
On Ft. Irwin Army Base. Drilled observation well. Diameter 2 inches, depth 97 feet, perforated 92-97 feet. Altitude of land-surface datum 2,380 feet. Water-level records available November 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS
NOV 02, 1995	2300.	V

State well number 13N/3E-4C1
Local name WC1-320
Site identification number 351514116401401
Top of perforations 300
Bottom of perforations 320
Altitude 2399.74
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 320 feet, perforated 300-320 feet. One of three wells at this site. Altitude of land-surface datum 2,399.74 feet. Water-level records available July 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 28, 1993	2279.89	V	MAY 23, 1994	2281.94	V	SEP 22, 1994	2281.99	V	AUG 11, 1995	2282.78	V
SEP 16	2278.02	S	JUL 21	2282.19	V	DEC 12	2282.10	V	MAY 16, 1996	2283.92	V
FEB 15, 1994	2281.11	V	JUL 28,	2282.30	V	DEC 28,	2281.67	V			
APR 03	2281.59	V	AUG 25	2282.13	V	MAR 08, 1995	2282.73	V			

LOWEST 2278.02 SEP 16, 1993
HIGHEST 2283.92 MAY 16, 1996

State well number 13N/3E-4C2
Local name WC1-220
Site identification number 351514116401402
Top of perforations 200
Bottom of perforations 220
Altitude 2399.74
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 220 feet, perforated 200-220 feet. One of three wells-this site. Altitude of land-surface datum 2,399.74 feet. Water-level records available July 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 28, 1993	2280.11	V	MAY 23, 1994	2281.97	V	DEC 12, 1994	2282.29	V	MAY 16, 1996	2284.22	V
SEP 16	2280.24	S	JUL 21	2282.25	V	28	2282.36	V			
FEB 15, 1994	2281.18	V	AUG 25	2282.23	V	MAR 08, 1995	2282.81	V			
APR 03	2281.60	V	SEP 22	2282.21	V	AUG 11	2283.01	V			

LOWEST 2280.11 JUL 28, 1993
HIGHEST 2284.22 MAY 16, 1996

State well number 13N/3E-4C3
Local name WC1-150
Site identification number 351514116401403
Top of perforations 130
Bottom of perforations 150
Altitude 2399.74
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 150 feet, perforated 130-150 feet. One of three wells-this site. Altitude of land-surface datum 2,399.74 feet. Water-level records available July 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 28, 1993	2280.67	V	MAY 23, 1994	2281.97	V	DEC 12, 1994	2282.65	V	MAY 16, 1996	2284.51	V
SEP 16	2280.56	S	JUL 21	2282.20	V	28	2282.99	V			
FEB 15, 1994	2281.30	V	AUG 25	2282.34	V	MAR 08, 1995	2282.97	V			
APR 03	2281.53	V	SEP 22	2282.56	V	AUG 11	2283.35	V			

LOWEST 2280.56 SEP 16, 1993
HIGHEST 2284.51 MAY 16, 1996

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 13N/3E-4D1
Local name WC2-320
Site identification number 351523116402801
Top of perforations 300
Bottom of perforations 320
Altitude 2419.85
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 320 feet, perforated 300-350 feet. On of three wells-this site. Altitude of land-surface datum 2,419.85 feet. Water-levels records available August 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 15, 1994	2276.21	V	JUL 21, 1994	2277.32	V	DEC 13, 1994	2276.43	V	AUG 08, 1995	2276.29	V
APR 03	2276.88	V	AUG 24	2277.24	V	28	2276.22	V	JUN 12, 1996	2278.53	V
MAY 24	2277.19	V	SEP 22	2276.81	V	MAR 08, 1995	2277.07	V			

LOWEST 2276.21 FEB 15, 1994
HIGHEST 2278.53 JUN 12, 1996

State well number 13N/3E-4D2
Local name WC2-250
Site identification number 351523116402802
Top of perforations 230
Bottom of perforations 250
Altitude 2419.85
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 250 feet, perforated 230-250 feet. One of three wells-this site. Altitude of land-surface 2,419.85 ft. Water-level records available August 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 15, 1994	2276.66	V	JUL 21, 1994	2277.81	V	DEC 13, 1994	2277.60	V	AUG 08, 1995	2276.90	V
APR 03	2277.25	V	AUG 24	2277.76	V	28	2276.99	V	JUN 12, 1996	2279.09	V
MAY 24	2277.57	V	SEP 22	2277.49	V	MAR 08, 1995	2277.58	V			

LOWEST 2276.66 FEB 15, 1994
HIGHEST 2279.09 JUN 12, 1996

State well number 13N/3E-4D3
Local name WC2-170
Site identification number 351523116402803
Top of perforations 150
Bottom of perforations 170
Altitude 2419.85
On Ft. Irwin Army Base. Drilled nested ovservation well. Diameter 2 inches, depth 170 feet. Perforated 150-170 feet. One of three wells-this site. Altitude of land-surface datum is 2,419.85 ft. Water-level records available August 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 22, 1993	2276.67	ST	JUL 21, 1994	2278.10	V	DEC 13, 1994	2278.10	V	JUN 12, 1996	2279.53	V
FEB 15, 1994	2277.05	V	28	2278.07	V	28	2277.45	V			
APR 03	2277.45	V	AUG 24	2278.29	V	MAR 08, 1995	2277.95	V			
MAY 24	2277.81	V	SEP 22	2278.04	V	AUG 08	2277.57	V			

LOWEST 2277.05 FEB 15, 1994
HIGHEST 2279.53 JUN 12, 1996

State well number 13N/3E-4G1
Local name STP-1
Site identification number 351504116400301
Top of perforations 90
Bottom of perforations 140
Altitude 2385.63

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 02, 1992	2282.54	V	FEB 04, 1994	2284.87	V	JUL 21, 1994	2286.15	V	FEB 07, 1995	2286.42	V
SEP 14, 1993	2284.17	V	15	2284.99	V	SEP 08	2286.11	V	AUG 08	2287.85	V
23	2284.29	S	APR 01	2285.25	V	DEC 06	2286.31	V			

LOWEST 2282.54 DEC 02, 1992
HIGHEST 2287.85 AUG 08, 1995

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 13N/3E-4K1
Local name STP-4
Site identification number 351456116395001
Top of perforations 65
Bottom of perforations 85
Altitude 2375.28

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 02, 1992	2300.85	V	FEB 15, 1994	2307.14	V	JUL 21, 1994	2308.92	V	NOV 16, 1994	2307.74	V
SEP 14, 1993	2305.61	V	APR 03	2307.89	V	SEP 08	2308.75	V	DEC 06	2307.64	V

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 03, 1995	2308.45	V	AUG 08, 1995	2311.01	V						

LOWEST 2300.85 DEC 02, 1992
HIGHEST 2311.01 AUG 08, 1995

State well number 13N/3E-4K2
Local name NIT2-238
Site identification number 351449116400501
Top of perforations 228
Bottom of perforations 238
Altitude 2385
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 238 feet, perforated 228-238 feet. One of three wells-this site. Altitude of land-surface datum 2,385 feet. Water-level records available from November 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
NOV 30, 1994	2290.	V	FEB 23, 1995	2292.	V	AUG 10, 1995	2293.	V	JUN 11, 1996	2293.	V

LOWEST 2290. NOV 30, 1994
HIGHEST 2293. AUG 10, 1995 JUN 11, 1996

State well number 13N/3E-4K3
Local name NIT2-190
Site identification number 351449116400502
Top of perforations 170
Bottom of perforations 190
Altitude 2385
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 190 feet, perforated 170-190 feet. One of three wells-this site. Altitude of land-surface datum 2,385 feet. Watr-level records available from November 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
NOV 30, 1994	2291.	V	FEB 23, 1995	2292.	V	AUG 10, 1995	2293.	V	JUN 11, 1996	2293.	V

LOWEST 2291. NOV 30, 1994
HIGHEST 2293. AUG 10, 1995 JUN 11, 1996

State well number 13N/3E-4K4
Local name NIT2-135
Site identification number 351449116400503
Top of perforations 115
Bottom of perforations 135
Altitude 2385
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 135 feet, perforated 115-135 feet. One of three wells-this site. Altitude of land-surface datum 2,385 feet. Water-level records available from November 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
NOV 30, 1994	2290.	V	FEB 23, 1995	2291.	V	AUG 10, 1995	2292.	V	JUN 11, 1996	2292.	V

LOWEST 2290. NOV 30, 1994
HIGHEST 2292. AUG 10, 1995 JUN 11, 1996

State well number 13N/3E-4M1
Local name IT-1
Site identification number 351450116402301
Top of perforations 141
Bottom of perforations 341
Altitude 2410

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 02, 1993	2283.	VR	FEB 15, 1994	2284.	SR	NOV 21, 1994	2284.	V			
SEP 23	2284.	VR	JUL 22	2286.	V						

LOWEST 2283. FEB 02, 1993
HIGHEST 2286. JUL 22, 1994

State well number 13N/3E-4Q1
Local name IX-3
Site identification number 351433116400501
Top of perforations 90
Bottom of perforations 290
Altitude 2385

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 01, 1992	2290.	V	FEB 15, 1994	2295.	V	SEP 07, 1994	2296.	V	AUG 03, 1995	2298.	V
JAN 25, 1993	2291.	V	APR 01	2296.	V	NOV 21	2296.	V			
SEP 23	2295.	V	JUL 22	2296.	V	MAR 08, 1995	2297.	V			

LOWEST 2290. DEC 01, 1992
HIGHEST 2298. AUG 03, 1995

State well number 13N/3E-4Q2
Local name NIT1
Site identification number 351441116400401
Top of perforations 85
Bottom of perforations 90
Altitude 2385
On Ft. Irwin Army Base. Drilled observation well. Diameter 2 inches, depth 90 feet, perforated 85-90 feet. Altitude of land-surface datum 2,385 feet. Water-level records available November 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
NOV 02, 1994	2309.	V	NOV 28, 1995	2318.	V	MAY 15, 1996	2311.	V	MAY 17, 1996	2311.	V

LOWEST 2309. NOV 02, 1994
HIGHEST 2318. NOV 28, 1995

State well number 13N/3E-5D1
Local name I-1
Site identification number 351524116412901
Top of perforations 235
Bottom of perforations 500
Altitude 2521.27

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 02, 1993	2271.25	V	FEB 16, 1994	2272.11	V	NOV 21, 1994	2270.77	V	AUG 04, 1995	2269.42	S
SEP 23	2271.87	V	APR 01	2272.30	VS	MAR 08, 1995	2270.82	V			

LOWEST 2269.42 AUG 04, 1995
HIGHEST 2272.307 APR 01, 1994

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 13N/3E-5G1
Local name TH-5
Site identification number 351505116405701
Top of perforations 210
380
Bottom of perforations 350
440
Altitude 2460

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JAN 25, 1993	2271.	V	SEP 14, 1993	2271.	V	JUL 22, 1994	2272.	V	MAR 08, 1995	2272.	V
JUL 13	2271.	V	FEB 15, 1994	2272.	V	SEP 07	2273.	V	AUG 08	2272.	V
28	2271.	V	APR 01	2270.	V	NOV 21	2272.	V			

LOWEST 2270. APR 01, 1994
HIGHEST 2273. SEP 07, 1994

State well number 13N/3E-5G2
Local name I-9
Site identification number 351504116405501
Top of perforations 210
Bottom of perforations 440
Altitude 2460

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 01, 1992	2271.	V	MAR 31, 1994	2273.	V	NOV 21, 1994	2273.	V	SEP 18, 1996	2273.	V
SEP 14, 1993	2272.	V	JUL 22	2278.	V	MAR 08, 1995	2273.	V			
FEB 15, 1994	2273.	V	SEP 07	2272.	V	AUG 08	2273.	V			

LOWEST 2271. DEC 01, 1992
HIGHEST 2278. JUL 22, 1994

State well number 13N/3E-6P1
Local name TH-1
Site identification number 351440116422301
Top of perforations
Bottom of perforations
Altitude 2700

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 01, 1992		VD	SEP 23, 1993		VD

LOWEST --
HIGHEST --

State well number 13N/3E-8B1
Local name AD1-255
Site identification number 351418116410201
Top of perforations 235
Bottom of perforations 255
Altitude 2500
On Ft. Irwin Army Base. Drilled observation well. Diameter 2 inches, depth 255 feet, perforated 235-255 feet.
Altitude of land-surface datum 2,500 feet. Water-level records available March 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 20, 1994	2271.	V	JUL 27, 1994	2274.	V	SEP 07, 1994	2276.	V	MAR 08, 1995	2276.	V
22	2276.	V	28	2276.	V	NOV 21	2276.	V	AUG 08	2276.	V

LOWEST 2271. JUL 20, 1994
HIGHEST 2276. JUL 22, 1994 JUL 28, 1994 SEP 07, 1994 NOV 21, 1994 MAR 08, 1995 AUG 08, 1995

State well number 13N/3E-9B1
Local name STP-5
Site identification number 351429116395401
Top of perforations 70
Bottom of perforations 120
Altitude 2378.27

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 01, 1992	2295.50	V	APR 01, 1994	2305.02	V	NOV 16, 1994	2306.26	S			
SEP 23, 1993	2301.69	V	JUL 22	2306.50	V	FEB 07, 1995	2306.61	V			
FEB 15, 1994	2304.29	V	SEP 07	2305.96	V	AUG 03	2309.05	V			

LOWEST 2295.50 DEC 01, 1992
HIGHEST 2309.05 AUG 03, 1995

State well number 13N/3E-10D1
Local name STP-6
Site identification number 351422116392501
Top of perforations 15
Bottom of perforations 65
Altitude 2344.85

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 02, 1992	2317.05	V	APR 01, 1994	2316.99	V	NOV 15, 1994	2316.25	V	MAY 15, 1996	2319.5	R
SEP 23, 1993	2318.10	V	JUL 22	2316.86	V	FEB 24, 1995	2320.15	V			
FEB 15, 1994	2316.64	V	SEP 08	2316.81	V	AUG 03	2321.60	V			

LOWEST 2316.25 NOV 15, 1994
HIGHEST 2321.60 AUG 03, 1995

State well number 13N/3E-10E1
Local name WC3-243
Site identification number 351416116392201
Top of perforations 223
Bottom of perforations 243
Altitude 2342.65
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 243 feet, perforated 223-243 feet. One of three wells-this site. Altitude of land-surface 2,350 feet. Water-level records available August 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 22, 1993	2307.95	S	MAY 25, 1994	2307.91	V	SEP 07, 1994	2308.35	V	MAR 08, 1995	2308.70	V
FEB 15, 1994	2307.76	V	JUL 22	2308.04	V	DEC 13	2308.06	V	AUG 10	2314.73	V
APR 01	2307.83	V	AUG 25	2308.04	V	28	2308.08	V	JUN 13, 1996	2310.94	V

LOWEST 2307.76 FEB 15, 1994
HIGHEST 2314.73 AUG 10, 1995

State well number 13N/3E-10E2
Local name WC3-170
Site identification number 351416116392202
Top of perforations 150
Bottom of perforations 170
Altitude 2342.65
On Ft. Irwin Army base. Drilled nested observation well. Diameter 2 inches, depth 170 feet, perforated 150-170 feet. One of three wells-this site. Altitude of land-surface datum 2,350 feet. Water-level records available August 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 23, 1993	2310.90	S	MAY 25, 1994	2310.44	V	SEP 07, 1994	2310.57	V	MAR 08, 1995	2311.39	V
FEB 15, 1994	2310.41	V	JUL 22	2310.43	V	DEC 13	2310.32	V	AUG 10	2312.83	V
APR 01	2310.39	V	AUG 25	2310.39	V	28	2310.30	V	JUN 13, 1996	2312.77	V

LOWEST 2310.30 DEC 28, 1994
HIGHEST 2312.83 AUG 10, 1995

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 13N/3E-10E3
Local name WC3-60
Site identification number 351416116392203
Top of perforations 40
Bottom of perforations 60
Altitude 2342.65
On Ft. Irwin Army base. Drilled nested observation well. Diameter 2 inches, depth 60 feet, perforated 40-60 feet. One of three wells-this site. Altitude of land-surface datum 2,350 feet. Water-level records available August 1993 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 23, 1993	2313.75	S	MAY 25, 1994	2312.44	V	SEP 07, 1994	2312.50	V	MAR 08, 1995	2313.39	V
FEB 15, 1994	2312.55	V	JUL 22	2312.25	V	DEC 13	2312.04	V	AUG 10	2314.73	V
APR 01	2312.39	V	AUG 25	2312.19	V	28	2311.98	V	JUN 13, 1996	2314.20	V

LOWEST 2311.98 DEC 28, 1994
HIGHEST 2314.73 AUG 10, 1995

State well number 14N/3E-31K1
Local name TH-3
Site identification number 351542116420601
Top of perforations 260
Bottom of perforations 405
Altitude 2610

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 01, 1992	2274.	V	FEB 15, 1994	2275.	V	MAY 23, 1994	2275.	V	SEP 07, 1994	2274.	V
SEP 23, 1993	2274.	V	APR 03	2275.	V	AUG 15	2274.	V	DEC 12		O

LOWEST 2274. DEC 01, 1992 SEP 23, 1993 AUG 15, 1994 SEP 07, 1994
HIGHEST 2275. FEB 15, 1994 APR 03, 1994 MAY 23, 1994

State well number 14N/3E-32B1
Local name NH1-630
Site identification number 351616116410701
Top of perforations 610
Bottom of perforations 630
Altitude 2530
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 630 feet, perforated 610-630 feet. One of three wells drilled-this site. Altitude of land-surface datum 2,530 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 20, 1993	2265.5	V	FEB 15, 1994	2267.2	V	SEP 08, 1994	2267.2	V	DEC 20, 1994	2266.2	S
21	2265.5	V	APR 01	2267.6	V	14	2265.5	V	MAY 21, 1996	2267.0	V
SEP 14	2265.5	V	MAY 23	2267.6	V	22	2266.1	V			
22	2264.9	V	JUL 19	2267.5	V	DEC 08	2264.9	V			

LOWEST 2264.9 SEP 22, 1993 DEC 08, 1994
HIGHEST 2267.6 APR 01, 1994 MAY 23, 1994

State well number 14N/3E-32B2
Local name NH1-540
Site identification number 351616116410702
Top of perforations 520
Bottom of perforations 540
Altitude 2530
On Fort Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 540 feet, perforated 520-540 feet. One of three wells drilled-this site. Altitude of land-surface datum 2,530 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 20, 1993	2265.8	V	FEB 15, 1994	2267.3	V	SEP 08, 1994	2267.3	V	MAY 21, 1996	2267.1	V
JUN 02	2265.6	V	APR 01	2267.6	V	14	2265.9	V			
SEP 14	2265.7	V	MAY 23	2267.7	V	22	2266.3	V			
22	2265.1	V	JUL 19	2267.1	V	DEC 08	2270.3	V			

LOWEST 2265.1 SEP 22, 1993
HIGHEST 2270.3 DEC 08, 1994

State well number 14N/3E-32B3
Local name NH1-300
Site identification number 351616116410703
Top of perforations 280
Bottom of perforations 300
Altitude 2530
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 300 feet, perforated 280-300 feet. One of three wells drilled-this site. Altitude of land-surface datum 2,530 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 20, 1993	2266.2	V	FEB 15, 1994	2267.3	V	JUL 20, 1994	2267.5	S	DEC 08, 1994	2266.3	V
JUN 02	2266.0	V	APR 01	2267.7	V	SEP 08	2267.4	V	MAY 21, 1996	2267.4	V
SEP 14	2266.1	V	MAY 23	2267.7	V	14	2266.8	V			
23	2265.8	V	JUL 19	2267.5	V	22	2266.9	V			

LOWEST 2265.8 SEP 23, 1993
HIGHEST 2267.7 APR 01, 1994 MAY 23, 1994

State well number 14N/3E-32F1
Local name I-3A
Site identification number 351553116411001
Top of perforations 300
360
380
Bottom of perforations 360
380
494
Altitude 2500

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JAN 27, 1993	2265.	VR	APR 01, 1994	2266.	V	SEP 07, 1994		P	MAR 08, 1995		P
FEB 16, 1994	2267.	S	AUG 15		P	DEC 20		P	AUG 10		P

LOWEST 2265. JAN 27, 1993
HIGHEST 2267. FEB 16, 1994

State well number 14N/3E-32F2
Local name BASEBALL-460
Site identification number 351558116412101
Top of perforations 440
Bottom of perforations 460
Altitude 2530
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 460 feet, perforated 440-460 feet. One of two wells-this site. Altitude of land-surface datum 2,530 feet. Watr-level records available November 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
NOV 30, 1994	2277.	V	FEB 22, 1995	2277.	V	SEP 18, 1996	2277.	V

LOWEST 2277. NOV 30, 1994 FEB 22, 1995 SEP 18, 1996
HIGHEST 2277. NOV 30, 1994 FEB 22, 1995 SEP 18, 1996

State well number 14N/3E-32F3
Local name BASEBALL-290
Site identification number 351558116412102
Top of perforations 270
Bottom of perforations 290
Altitude 2530
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 290 feet, perforated 270-290 feet. One of two wells-this site. Altitude of land-surface datum 2,530 feet. Water-level records available November 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
NOV 30, 1994	2276.	V	FEB 22, 1995	2277.	V	SEP 18, 1996	2277.	V

LOWEST 2276. NOV 30, 1994
HIGHEST 2277. FEB 22, 1995 SEP 18, 1996

State well number 14N/3E-32H1
Local name I-7
Site identification number 351556116404601
Top of perforations 220
Bottom of perforations 475
Altitude 2461.33

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JAN 27, 1993	2267.39	V	AUG 15, 1994	2270.74	V	DEC 20, 1994		P	AUG 10, 1995	2263.37	S
FEB 16, 1994	2270.20	S	SEP 08		P	MAR 08, 1995	2269.54	S			

LOWEST 2263.37 AUG 10, 1995
HIGHEST 2270.74 AUG 15, 1994

State well number 14N/3E-32J1
Local name I-6
Site identification number 351547116405001
Top of perforations 200.00
340.00
Bottom of perforations 310.00
536.00
Altitude 2468.41
On Camp Irwin. Drilled public supply water-table well. Diameter 14 inches, depth 550 feet, perforated 200-310, 340-536 feet. Altitude of land-surface datum 2468.41 feet. Records available 1945, 1955, 1978-80, 1982.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JAN 27, 1993	2267.39	VR	FEB 16, 1994	2269.64	S	APR 01, 1994	2269.28	V	DEC 20, 1994	2264.96	S

LOWEST 2264.96 DEC 20, 1994
HIGHEST 2269.64 FEB 16, 1994

State well number 14N/3E-32K1
Local name I-5A
Site identification number 351538116410301
Top of perforations 320
375
Bottom of perforations 340
535
Altitude 2483.76

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JAN 27, 1993	2269.45	S	APR 01, 1994	2265.70	V	DEC 20, 1994		P	AUG 10, 1995		P
FEB 16, 1994	2270.80	S	AUG 15	2263.16	V	MAR 08, 1995	2268.88	V			

LOWEST 2263.16 AUG 15, 1994
HIGHEST 2270.80 FEB 16, 1994

State well number 14N/3E-32K3
Local name FI1-440
Site identification number 351539116405603
Top of perforations 420
Bottom of perforations 440
Altitude 2472.43
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 440 feet, perforated 420-440 feet. One of four wells-this site. Altitude of land-surface datum 2,472.43 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAR 10, 1993	2269.01	V	FEB 03, 1994	2269.79	V	JUL 22, 1994	2268.68	V	DEC 22, 1994	2265.13	V
MAY 04	2268.64	V	16	2269.97	V	AUG 23	2266.54	V	MAR 08, 1995	2269.26	V
26	2266.43	V	APR 01	2268.81	V	SEP 22	2267.18	V	AUG 07	2268.33	V
SEP 14	2267.56	V	MAY 17	2267.58	V	DEC 13	2266.53	V			

LOWEST 2265.13 DEC 22, 1994
HIGHEST 2269.97 FEB 16, 1994

State well number 14N/3E-32K4
Local name FI1-355
Site identification number 351539116405604
Top of perforations 335
Bottom of perforations 355
Altitude 2472.43
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 355 feet, perforated 335-355 feet. One of four wells-this site. Altitude of land-surface datum 2,472.43 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAR 10, 1993	2268.95	V	FEB 03, 1994	2270.04	V	JUL 22, 1994	2268.68	V	DEC 22, 1994	2265.34	V
MAY 04	2268.49	V	16	2270.04	V	AUG 23	2266.66	V	MAR 08, 1995	2269.22	V
26	2266.69	V	APR 01	2269.41	V	SEP 22	2267.29	V	AUG 07	2268.38	V
SEP 15	2266.92	V	MAY 17	2267.83	V	DEC 13	2266.94	V			

LOWEST 2265.34 DEC 22, 1994
HIGHEST 2270.04 FEB 03, 1994 FEB 16, 1994

State well number 14N/3E-32K5
Local name FI1-290
Site identification number 351539116405605
Top of perforations 270
Bottom of perforations 290
Altitude 2472.43
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 290 feet, perforated 270-290 feet. One of four wells-this site. Altitude of land-surface datum 2,472.43 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAR 10, 1993	2269.33	V	SEP 15, 1993	2267.91	V	MAY 17, 1994	2267.80	V	DEC 13, 1994	2268.31	V
MAY 04	2268.76	V	FEB 03, 1994	2270.01	V	JUL 22	2268.78	V	22	2265.56	V
05	2266.78	VT	16	2270.04	V	AUG 23	2266.69	V	MAR 08, 1995	2268.88	V
26	2267.71	V	APR 01	2269.60	VT	SEP 22	2267.57	V	AUG 07	2268.51	V

LOWEST 2265.56 DEC 22, 1994
HIGHEST 2270.04 FEB 16, 1994

State well number 14N/3E-32K6
Local name FI1-230
Site identification number 351539116405606
Top of perforations 210
Bottom of perforations 230
Altitude 2472.43
On Ft. Irwin Army Base. Drilled nested observation well. Diameter inches, depth 230 feet, perforated 210-230 feet. One of four wells-this site. Altitude of land-surface datum 2,472.43 feet. Water-level records available March 1993 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAR 10, 1993	2269.33	V	SEP 15, 1993	2267.67	V	MAY 17, 1994	2268.33	V	DEC 13, 1994	2266.93	V
MAY 04	2268.71	V	FEB 03, 1994	2269.88	V	JUL 22	2268.46	V	22	2266.06	V
05	2267.66	VT	16	2269.91	V	AUG 23	2267.23	V	MAR 08, 1995	2269.06	V
26	2267.35	V	APR 01	2269.29	VT	SEP 22	2267.14	V	AUG 07	2268.35	V

LOWEST 2266.06 DEC 22, 1994
HIGHEST 2269.91 FEB 16, 1994

State well number 14N/3E-32M1
Local name I-2A
Site identification number 351543116413401
Top of perforations 290
Bottom of perforations 560
Altitude 2550

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 02, 1993	2280.	VR	APR 01, 1994		VP	MAR 08, 1995	2267.	S			
FEB 16, 1994	2281.	SR	DEC 20		P	AUG 10	2267.	S			

LOWEST 2267. MAR 08, 1995 AUG 10, 1995
HIGHEST 2281. FEB 16, 1994

State well number 14N/3E-32N1
Local name SOC2-520
Site identification number 351525116413001
Top of perforations 500
Bottom of perforations 520
Altitude 2523
On Ft. Irwin Training Center. Drilled nested observation well. Diameter 2 inches, depth 540 feet. Perforated 500-520 feet. One of three wells-this site. Altitude of land-surface datum, 2,523 feet. Water-level records available May 1995 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 16, 1995	2260.	V	AUG 11, 1995	2273.	V	MAY 14, 1996	2272.	V			
JUN 06	2272.	V	NOV 29	2272.	V						

LOWEST 2260. MAY 16, 1995
HIGHEST 2273. AUG 11, 1995

State well number 14N/3E-32N2
Local name SOC2-410
Site identification number 351525116413002
Top of perforations 390
Bottom of perforations 410
Altitude 2523
On Ft. Irwin Training Center. Drilled nested observation well. Diameter 2 inches, depth 540 feet. Perforated 390-410 feet. One of three wells-this site. Altitude of land-surface datum 2,523 feet. Water-level records available May 1995 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 19, 1995	2273.	V	AUG 11, 1995	2274.	V	MAY 14, 1996	2272.	V			
JUN 06	2272.	V	NOV 29	2272.	V						

LOWEST 2272. JUN 06, 1995 NOV 29, 1995 MAY 14, 1996
HIGHEST 2274. AUG 11, 1995

State well number 14N/3E-32N3
Local name SOC2-270
Site identification number 351525116413003
Top of perforations 250
Bottom of perforations 270
Altitude 2523
On Ft. Irwin Training Center. Drilled nested observation well. Diameter 2 inches, depth 540 feet, perforated 250-270 feet. One of 3 wells-this site. Altitude of land-surface datum,2,523 feet. Water-level records available May 1995 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAY 16, 1995	2287.	V	JUN 06, 1995	2274.	V	NOV 29, 1995	2274.	V	MAY 22, 1996	2274.	V
17	2287.	V	JUL 11	2273.	V	MAY 14, 1996	2274.	V			

LOWEST 2273. JUL 11, 1995
HIGHEST 2287. MAY 16, 1995 MAY 17, 1995

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 14N/3E-32P2
Local name SOC1-904
Site identification number 351527116412501
Top of perforations 894
850
Bottom of perforations 904
870
Altitude 2517
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 905 feet, perforated 894 to 904 feet. One of five wells-this site. Altitude of land-surface datum 2,517 feet. Water-level records available June 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 20, 1994	2274.	V	SEP 14, 1994	2277.	V	MAR 08, 1995	2277.	V	AUG 03, 1995	2277.	S
SEP 07	2277.	V	DEC 12	2277.	V	MAY 01	2277.	V	SEP 18, 1996	2277.	V

LOWEST 2274. JUL 20, 1994
HIGHEST 2277. SEP 07, 1994 SEP 14, 1994 DEC 12, 1994 MAR 08, 1995 MAY 01, 1995 AUG 03, 1995
SEP 18, 1996

State well number 14N/3E-32P3
Local name SOC1-730
Site identification number 351527116412502
Top of perforations 710
Bottom of perforations 730
Altitude 2517
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 730 feet, perforated 710-730 feet. One of five wells-this site. Altitude of land-surface datum 2,517 feet. Water-level records available June 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 20, 1994	2271.	V	SEP 14, 1994	2276.	V	MAR 08, 1995	2277.	V	AUG 03, 1995	2277.	S
SEP 07	2276.	V	DEC 12	2276.	V	MAY 01	2277.	V	SEP 18, 1996	2277.	V

LOWEST 2271. JUL 20, 1994
HIGHEST 2277. MAR 08, 1995 MAY 01, 1995 AUG 03, 1995 SEP 18, 1996

State well number 14N/3E-32P4
Local name SOC1-580
Site identification number 351527116412503
Top of perforations 560
Bottom of perforations 580
Altitude 2517
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 580 feet, perforated 560-580 feet. One of five wells-this site. Altitude of land-surface datum 2,517 feet. Water-level records available June 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 20, 1994	2276.	V	SEP 14, 1994	2274.	V	MAR 08, 1995	2276.	V	AUG 03, 1995	2276.	S
SEP 07	2274.	V	DEC 12	2275.	V	MAY 01	2275.	V	SEP 18, 1996	2276.	V

LOWEST 2274. SEP 07, 1994 SEP 14, 1994
HIGHEST 2276. JUL 20, 1994 MAR 08, 1995 AUG 03, 1995 SEP 18, 1996

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 14N/3E-32P5
Local name SOC1-405
Site identification number 351527116412504
Top of perforations 385
Bottom of perforations 405
Altitude 2517
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 405 feet. Perforated 385-405 feet. One of five wells-this site. Altitude of land-surface datum 2,517 feet. Water-level records available June 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 20, 1994	2276.	V	SEP 14, 1994	2275.	V	MAR 08, 1995	2276.	V	AUG 04, 1995	2276.	S
SEP 07	2276.	V	DEC 12	2275.	V	MAY 01	2276.	V	SEP 18, 1996	2276.	V

LOWEST 2275. SEP 14, 1994 DEC 12, 1994
HIGHEST 2276. JUL 20, 1994 SEP 07, 1994 MAR 08, 1995 MAY 01, 1995 AUG 04, 1995 SEP 18, 1996

State well number 14N/3E-32P6
Local name SOC1-270
Site identification number 351527116412505
Top of perforations 250
Bottom of perforations 270
Altitude 2517
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 270 feet, perforated 250-270 feet. One of five wells-this site. Altitude of land-surface datum 2,517 feet. Water-level records available June 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 20, 1994	2277.	V	SEP 07, 1994	2277.	V	DEC 12, 1994	2277.	V	AUG 04, 1995	2278.	S
26	2277.	V	14	2276.	V	MAR 08, 1995	2278.	V	SEP 18, 1996	2283.	V
27	2277.	V	20	2276.	V	MAY 01	2278.	V			

LOWEST 2276. SEP 14, 1994 SEP 20, 1994
HIGHEST 2283. SEP 18, 1996

State well number 14N/3E-32Q1
Local name I-4
Site identification number 351539116405601
Top of perforations 185
Bottom of perforations 392
Altitude 2471.30

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 02, 1993	2266.52	S	FEB 03, 1994	2269.77	S	AUG 15, 1994	2267.65	S	AUG 10, 1995	2268.13	S
SEP 23	2268.46	V	16	2269.86	S	MAR 08, 1995	2269.08	S			

LOWEST 2266.52 FEB 02, 1993
HIGHEST 2269.86 FEB 16, 1994

State well number 14N/3E-32Q3
Local name I-8
Site identification number 351525116411301
Top of perforations
Bottom of perforations
Altitude 2495

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 03, 1992	2258.91	VS	AUG 08, 1995	2259.58	V	SEP 18, 1996	2259.69	V

LOWEST 2258.91 DEC 03, 1992
HIGHEST 2259.69 SEP 18, 1996

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 14N/3E-33A1
Local name BC1
Site identification number 351614116394401
Top of perforations 145
Bottom of perforations 185
Altitude 2420
On Ft. Irwin Army Base. Drilled observation well. Diameter 2 inches, depth 185 feet, perforated 145-185 feet. Altitude of land-surface datum 2,420 feet above sea level. Water-level records available March 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUL 18, 1994	2274.	V	NOV 08, 1994	2274.	V	MAR 08, 1995	2274.	V	SEP 18, 1996	2274.	V
19	2274.	V	DEC 13	2274.	V	MAY 02	2274.	V			
SEP 07	2274.	V	JAN 31, 1995	2274.	V	JUL 31	2274.	V			
	LOWEST	2274.	JUL 18, 1994	JUL 19, 1994	SEP 07, 1994	NOV 08, 1994	DEC 13, 1994	JAN 31, 1995			
			MAR 08, 1995	MAY 02, 1995	JUL 31, 1995	SEP 18, 1996					
	HIGHEST	2274.	JUL 18, 1994	JUL 19, 1994	SEP 07, 1994	NOV 08, 1994	DEC 13, 1994	JAN 31, 1995			
			MAR 08, 1995	MAY 02, 1995	JUL 31, 1995	SEP 18, 1996					

State well number 14N/3E-33E2
Local name PICNIC-220
Site identification number 351556116402401
Top of perforations 200
Bottom of perforations 220
Altitude 2425
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 220 feet, perforated 200-220 feet. One of two wells-this site. Altitude of land-surface datum 2,425 feet. Water-level records available March 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 07, 1994	2276.	V	DEC 13, 1994	2276.	V	NOV 09, 1995	2275.	V			
21	2276.	V	AUG 08, 1995	2275.	V	SEP 18, 1996	2276.	V			
	LOWEST	2275.	AUG 08, 1995	NOV 09, 1995							
	HIGHEST	2276.	SEP 07, 1994	SEP 21, 1994	DEC 13, 1994	SEP 18, 1996					

State well number 14N/3E-33E3
Local name PICNIC-175
Site identification number 351556116402402
Top of perforations 155
Bottom of perforations 175
Altitude 2425
On Ft. Irwin Army Base. Drilled nested observation well. Diameter 2 inches, depth 175 feet, perforated 155-175 feet. One of two wells-this site. Altitude of land-surface datum 2,425 feet. Water-level records available March 1994 to present.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 07, 1994	2276.	V	DEC 13, 1994	2276.	V	NOV 09, 1995	2275.	V	SEP 18, 1996	2276.	V
21	2276.	V	AUG 08, 1995	2275.	V	30	2275.	V			
	LOWEST	2275.	AUG 08, 1995	NOV 09, 1995	NOV 30, 1995						
	HIGHEST	2276.	SEP 07, 1994	SEP 21, 1994	DEC 13, 1994	SEP 18, 1996					

State well number 14N/3E-33F1
Local name IX-1
Site identification number 351602116401101
Top of perforations 179
Bottom of perforations 259
Altitude 2416.28

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 03, 1992	2274.65	V	FEB 01, 1994	2276.31	V	MAR 30, 1994	2276.62	V	AUG 15, 1994	2277.48	V
SEP 23, 1993	2276.76	V	15	2276.35	V	MAY 19	2276.84	V	SEP 07	2273.62	V

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
MAR 10, 1995	2277.21	V	AUG 08, 1995	2277.42	V	SEP 18, 1996	2278.47	V			
	LOWEST	2273.62	SEP 07, 1994								
	HIGHEST	2278.47	SEP 18, 1996								

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 14N/3E-33H1
Local name MW2
Site identification number 351603116393801
Top of perforations
Bottom of perforations
Altitude 2411.59

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 14, 1993	2289.07	V	MAR 30, 1994	2287.53	V	SEP 08, 1994	2287.82	V	MAY 04, 1995	2288.06	V
FEB 01, 1994	2287.42	V	JUN 07	2287.67	V	NOV 10	2287.64	V	AUG 06	2288.12	V
15	2287.44	V	JUL 22	2288.64	V	FEB 02, 1995	2287.96	V	SEP 18, 1996	2288.85	V

LOWEST 2287.42 FEB 01, 1994
HIGHEST 2289.07 SEP 14, 1993

State well number 14N/3E-33H2
Local name MW3
Site identification number 351559116393701
Top of perforations 138
Bottom of perforations 188
Altitude 2404.34

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 14, 1993	2287.07	VR	MAR 30, 1994	2287.52	V	SEP 08, 1994	2287.68	V	MAY 03, 1995	2288.13	V
23	2293.09	V	JUN 07	2287.67	V	NOV 14	2287.69	S	AUG 01	2288.22	V
FEB 16, 1994	2287.45	V	JUL 22	2287.67	V	FEB 01, 1995	2287.90	V			

LOWEST 2287.07 SEP 14, 1993
HIGHEST 2293.09 SEP 23, 1993

State well number 14N/3E-33J1
Local name MW5
Site identification number 351549116393801
Top of perforations
Bottom of perforations
Altitude 2389.21

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 14, 1993	2299.37	V	JUN 07, 1994	2300.86	V	DEC 05, 1994	2300.71	V	AUG 02, 1995	2301.48	V
FEB 16, 1994	2299.83	V	SEP 08	2300.13	V	FEB 02, 1995	2300.82	V	SEP 18, 1996	2303.63	V
MAR 30	2299.92	V	NOV 14	2301.01	V	MAY 02	2302.07	V			

LOWEST 2299.37 SEP 14, 1993
HIGHEST 2303.63 SEP 18, 1996

State well number 14N/3E-33J2
Local name LFMW7
Site identification number 351542116393702
Top of perforations 76
Bottom of perforations 116
Altitude 2390
On Ft. Irwin Army Base. Drilled observation well. Diameter 5 inches, depth 116 feet, perforated 76-116 feet. Altitude of land-surface datum 2,390 feet. Water-level records available June 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUN 07, 1994	2305.	V	SEP 08, 1994	2305.	V	FEB 01, 1995	2305.	V	AUG 01, 1995	2306.	V
JUL 19	2305.	V	NOV 09	2305.	V	MAY 03	2306.	V			

LOWEST 2305. JUN 07, 1994 JUL 19, 1994 SEP 08, 1994 NOV 09, 1994 FEB 01, 1995
HIGHEST 2306. MAY 03, 1995 AUG 01, 1995

Appendix B. Water-level data for selected wells in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

State well number 14N/3E-33N1
Local name I-10
Site identification number 351525116402901
Top of perforations 160
Bottom of perforations 320
Altitude 2424.69

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 03, 1992	2272.62	V	FEB 03, 1994	2275.54	V	JUL 21, 1994	2276.79	V	MAR 08, 1995	2276.79	V
JUL 13, 1993	2275.00	V	15	2275.61	V	SEP 07	2276.65	V	AUG 08	2276.06	V
SEP 14	2274.45	V	APR 03	2276.19	V	DEC 13	2281.38	V			

LOWEST 2272.62 DEC 03, 1992
HIGHEST 2281.38 DEC 13, 1994

State well number 14N/3E-33Q1
Local name TH-4
Site identification number 351527116395201
Top of perforations 98
Bottom of perforations 158
Altitude 2385.03

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
FEB 01, 1993	2290.23	V	FEB 15, 1994	2292.37	V	SEP 07, 1994	2293.24	V			
JUL 13	2290.28	V	MAR 30	2292.52	V	MAR 08, 1995	2293.94	V			
SEP 14	2292.25	V	JUL 22	2293.04	V	NOV 02	2294.72	V			

LOWEST 2290.23 FEB 01, 1993
HIGHEST 2294.72 NOV 02, 1995

State well number 14N/3E-33R1
Local name STP-3
Site identification number 351530116394401
Top of perforations 72
Bottom of perforations 112
Altitude 2379.13

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
DEC 02, 1992	2314.71	V	FEB 15, 1994	2316.32	V	SEP 08, 1994	2316.79	V	AUG 03, 1995	2317.87	V
JUL 13, 1993	2318.24	V	MAR 30	2316.40	V	DEC 06	2317.10	V	SEP 18, 1996	2320.	V
SEP 14	2316.42	V	JUL 21	2316.94	V	FEB 06, 1995	2317.50	V			

LOWEST 2314.71 DEC 02, 1992
HIGHEST 2320. SEP 18, 1996

State well number 14N/3E-34D1
Local name MW1
Site identification number 351604116393101
Top of perforations
Bottom of perforations
Altitude 2437.15

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 14, 1993	2290.63	VR	MAR 30, 1994	2291.05	V	NOV 09, 1994	2290.96	V	AUG 01, 1995	2291.26	V
23	2291.81	V	JUN 07	2291.21	V	FEB 01, 1995	2291.11	V			
FEB 15, 1994	2290.97	V	SEP 22	2291.11	V	MAY 10	2296.22	V			

LOWEST 2290.63 SEP 14, 1993
HIGHEST 2296.22 MAY 10, 1995

State well number 14N/3E-34M1
Local name MW4
Site identification number 351550116393101
Top of perforations
Bottom of perforations
Altitude 2398.39

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
SEP 14, 1993	2287.66	V	JUN 07, 1994	2288.35	V	NOV 14, 1994	2288.29	V	AUG 02, 1995	2288.97	V
FEB 16, 1994	2288.03	V	JUL 22	2288.37	V	FEB 02, 1995	2288.61	V			
MAR 30	2288.15	V	SEP 08	2288.39	V	MAY 02	2287.09	V			

LOWEST 2287.09 MAY 02, 1995
HIGHEST 2288.97 AUG 02, 1995

State well number 14N/3E-34M2
Local name LFMW6
Site identification number 351539116393001
Top of perforations 96
Bottom of perforations 116
Altitude 2420
On Fort Irwin National Training Center. Driller observation well. Diameter 5 inches, depth 116 feet, perforated 96-116 feet. Altitude of land-surface datum 2,420 feet. Water-level records available 1994 to current year.

ALTITUDE, IN FEET ABOVE SEA LEVEL

DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS	DATE	WATER LEVEL	MS
JUN 07, 1994	2320.8	V	NOV 08, 1994	2321.3	V	MAY 02, 1995	2322.0	V			
JUL 20	2319.9	V	DEC 13	2321.4	V	AUG 01	2327.3	V			
SEP 08	2321.1	V	JAN 31, 1995	2321.7	V	SEP 18, 1996	2324.7	V			

LOWEST 2319.9 JUL 20, 1994
HIGHEST 2327.3 AUG 01, 1995

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96

[ft, foot; µS/cm, microsiemens per centimeter; red, yellow, green, and blue are the tape colors that were used to mark the lysimeter tubing at the surface, and indicate the deepest (red) through the shallowest (blue) lysimeter]

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)
13N/3E-4B1	SP1-240	351521116400201	05-26-94	1315	103.93	240.00	2390	1610	1600	7.5
			08-24-94	1430	103.48	240.00	2390	1660	1650	7.9
			12-21-94	1415	103.11	240.00	2390	1520	1680	7.7
13N/3E-4B2	SP1-180	351521116400202	05-26-94	1400	104.06	180.00	2390	1350	1350	7.5
			08-24-94	1600	103.47	180.00	2390	1370	1360	7.9
			12-21-94	1320	103.08	180.00	2390	1360	1370	7.8
13N/3E-4B3	SP1-130	351521116400203	05-26-94	1145	104.26	130.00	2390	2360	2150	7.9
			08-24-94	1730	103.76	130.00	2390	2320	2290	7.8
			12-21-94	1530	103.10	130.00	2390	2230	2270	7.8
13N/3E-4B4	NIT3	351515116395201	01-10-95	1600	--	97.00	2380	--	--	--
			02-14-95	1230	--	97.00	2380	1860	1890	7.5
			11-02-95	1340	--	97.00	2380	1970	1990	7.3
13N/3E-4B5LYS	NIT3 (RED)	351515116395202	12-07-94	1440	--	68.00	2380	--	--	--
13N/3E-4B6LYS	NIT3 (YELLOW)	351515116395203	12-07-94	1441	--	46.00	2380	--	--	--
			12-20-94	1515	--	46.00	2380	--	--	--
			12-23-94	1035	--	46.00	2380	--	--	--
			01-10-95	1015	--	46.00	2380	--	--	--
			02-14-95	1130	--	46.00	2380	--	1070	--
			04-12-95	0904	--	46.00	2380	--	--	--
			01-24-96	1410	--	46.00	2380	1360	--	6.9
13N/3E-4B7LYS	NIT3 (GREEN)	351515116395204	12-07-94	1442	--	35.00	2380	--	--	--
13N/3E-4C1	WC1-320	351514116401401	07-28-93	1320	119.85	320.00	2400	811	833	8.2
			09-16-93	1315	121.72	320.00	2400	825	829	8.2
			11-05-93	1055	--	320.00	2400	808	818	8.2
			05-24-94	1100	117.80	320.00	2400	808	816	8.1
			08-25-94	1012	117.61	320.00	2400	805	811	8.1
			12-28-94	1150	118.07	320.00	2400	800	811	8.2
			05-16-96	1200	115.82	320.00	2400	1020	1000	8.3
13N/3E-4C2	WC1-220	351514116401402	07-28-93	1745	119.63	220.00	2400	695	723	7.9
			09-16-93	1530	119.50	220.00	2400	725	547	8.0
			11-05-93	1135	--	220.00	2400	719	724	8.1
			05-24-94	1430	117.77	220.00	2400	752	751	8.0
			08-25-94	0915	117.51	220.00	2400	734	737	8.0
			12-28-94	1345	117.38	220.00	2400	723	733	8.0
			05-16-96	1345	115.52	220.00	2400	725	719	8.2
13N/3E-4C3	WC1-150	351514116401403	07-28-93	1915	119.07	150.00	2400	1430	1470	7.5
			09-16-93	1730	119.18	150.00	2400	1440	1450	7.6
			11-05-93	1237	--	150.00	2400	1450	1480	7.7
			05-26-94	1330	--	150.00	2400	1150	1140	7.5
			09-22-94	1630	117.18	150.00	2400	1170	1140	7.9

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	CAR-BONATE WAT.DIS FET FIELD CO3 (MG/L)
13N/3E-4B1	05-26-94	7.8	--	26.0	--	48	5.6	250	16	--
	08-24-94	7.8	--	26.5	--	52	6.0	260	17	--
	12-21-94	7.6	18.5	24.0	2.0	55	6.0	260	16	--
13N/3E-4B2	05-26-94	7.7	--	26.0	--	32	3.8	220	15	--
	08-24-94	7.8	--	27.0	--	35	4.0	220	15	--
	12-21-94	7.9	18.0	24.0	3.2	37	4.1	220	7.5	--
13N/3E-4B3	05-26-94	7.8	--	25.5	--	120	16	350	24	--
	08-24-94	7.7	--	25.5	--	110	15	340	23	--
	12-21-94	7.5	12.0	22.5	4.6	110	15	330	24	--
13N/3E-4B4	01-10-95	--	--	--	--	--	--	--	--	--
	02-14-95	7.5	17.0	17.5	2.4	76	9.7	300	22	--
	11-02-95	7.4	24.0	20.0	3.8	82	9.7	300	22	--
13N/3E-4B5LYS	12-07-94	--	--	--	--	--	--	--	--	--
13N/3E-4B6LYS	12-07-94	--	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-14-95	8.3	--	--	--	34	12	240	7.8	--
	04-12-95	--	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	34	14	250	10	--
13N/3E-4B7LYS	12-07-94	--	--	--	--	--	--	--	--	--
13N/3E-4C1	07-28-93	8.1	--	27.5	--	12	2.2	160	8.5	--
	09-16-93	7.9	--	25.5	--	13	1.9	150	9.0	--
	11-05-93	8.1	23.5	25.5	--	14	1.8	150	<7.9	--
	05-24-94	8.0	--	26.5	--	14	1.7	150	9.0	--
	08-25-94	8.0	--	26.5	--	14	1.8	150	8.3	--
	12-28-94	8.0	7.5	26.0	3.8	16	1.8	150	9.9	--
	05-16-96	8.0	27.0	25.0	3.7	29	4.4	170	10	--
13N/3E-4C2	07-28-93	8.0	35.5	26.5	--	13	2.1	140	9.2	--
	09-16-93	8.2	--	25.0	--	14	2.1	130	9.8	--
	11-05-93	8.0	24.0	25.0	--	15	2.0	130	9.3	--
	05-24-94	7.9	--	26.0	--	15	1.8	130	9.7	--
	08-25-94	7.9	--	26.5	--	15	1.9	130	9.7	--
	12-28-94	7.9	7.0	26.0	7.8	15	2.0	130	9.7	--
	05-16-96	8.0	28.5	24.5	6.2	16	2.1	130	8.6	--
13N/3E-4C3	07-28-93	7.5	32.5	--	--	48	10	230	17	--
	09-16-93	8.2	--	23.0	--	52	11	220	17	--
	11-05-93	7.6	25.0	24.0	--	60	11	210	14	--
	05-26-94	7.4	--	26.5	--	37	7.1	170	15	--
	09-22-94	7.8	35.0	27.0	--	40	7.4	170	15	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L-CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
13N/3E-4B1	05-26-94	--	110	114	123	260	210	5.5	0.77	0.029
	08-24-94	--	120	123	125	280	220	6.5	.85	.029
	12-21-94	--	120	115	126	280	230	5.5	.79	.027
13N/3E-4B2	05-26-94	--	97	98	100	220	180	6.2	.60	.046
	08-24-94	--	85	84	97	220	180	5.9	.71	.042
	12-21-94	--	100	102	96	220	190	6.3	.71	.040
13N/3E-4B3	05-26-94	--	140	132	76	460	390	4.5	1.3	.024
	08-24-94	--	62	62	71	480	360	5.2	1.2	.051
	12-21-94	--	68	68	71	470	360	4.5	1.1	.053
13N/3E-4B4	01-10-95	--	--	--	--	--	--	--	--	--
	02-14-95	--	150	147	254	190	260	2.0	.55	.063
	11-02-95	--	230	230	235	220	300	2.2	--	--
13N/3E-4B5LYS	12-07-94	--	--	--	--	2.0	5.0	<.20	<.20	--
13N/3E-4B6LYS	12-07-94	--	--	--	--	330	220	20	1.4	--
	12-20-94	--	--	--	--	290	190	34	.70	--
	12-23-94	--	--	--	--	260	160	31	<1.0	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-14-95	--	--	--	--	140	84	12	.25	.073
	04-12-95	--	--	--	--	180	100	9.6	<.30	--
	01-24-96	--	250	242	--	220	120	13	<.40	--
13N/3E-4B7LYS	12-07-94	--	--	--	--	12	4.0	<.20	<.20	--
13N/3E-4C1	07-28-93	--	130	126	126	150	62	9.3	.25	.023
	09-16-93	--	120	123	130	150	57	9.1	.24	.022
	11-05-93	--	130	129	133	150	58	9.2	.23	.020
	05-24-94	--	130	127	131	140	56	9.5	.23	.027
	08-25-94	--	120	124	127	140	57	12	.24	.022
	12-28-94	--	130	128	130	130	58	9.6	.24	.018
	05-16-96	--	120	--	123	180	99	8.9	.36	.022
13N/3E-4C2	07-28-93	--	130	132	133	110	52	7.7	.22	.014
	09-16-93	--	120	124	135	110	50	7.5	.21	.012
	11-05-93	--	130	130	136	110	48	7.1	.21	.011
	05-24-94	--	130	126	131	120	53	8.2	.23	.014
	08-25-94	--	130	127	132	120	51	7.9	.22	.014
	12-28-94	--	130	126	132	110	51	7.8	.22	.013
	05-16-96	--	120	--	131	110	48	8.1	.21	.013
13N/3E-4C3	07-28-93	--	89	87	86	250	200	4.3	.45	.033
	09-16-93	--	79	79	85	240	190	4.0	.73	.039
	11-05-93	--	83	82	85	250	200	4.1	.73	.038
	05-26-94	--	88	88	101	190	150	5.0	.55	.026
	09-22-94	--	93	93	97	190	150	5.0	.57	.026

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
13N/3E-4B1	05-26-94	69	1010	--	<0.010	10.0	0.030	<0.20	0.010	<0.010
	08-24-94	72	1050	--	--	--	--	--	--	--
	12-21-94	73	1080	--	<.010	11.0	<.015	<.20	<.010	.020
13N/3E-4B2	05-26-94	69	852	--	<.010	7.50	<.010	<.20	.840	.340
	08-24-94	75	866	--	--	--	--	--	--	--
	12-21-94	74	872	--	<.010	7.50	<.015	<.20	.230	.210
13N/3E-4B3	05-26-94	73	1520	--	<.010	7.70	.030	<.20	.060	.040
	08-24-94	78	1530	--	--	--	--	--	--	--
	12-21-94	61	1520	--	<.010	9.20	<.015	<.20	.040	.040
13N/3E-4B4	01-10-95	--	--	18.8	.150	19.0	.050	.60	.050	.040
	02-14-95	65	1210	--	<.010	22.0	<.015	.80	.020	.030
	11-02-95	68	1270	--	<.010	17.0	<.015	.50	<.010	.020
13N/3E-4B5LYS	12-07-94	--	--	.050	<.020	--	--	--	--	1.90
13N/3E-4B6LYS	12-07-94	--	--	3.73	.970	4.70	.002	.50	--	.800
	12-20-94	--	--	2.53	.970	3.50	.030	.30	--	2.30
	12-23-94	--	--	3.22	.580	3.80	.020	<.20	--	.900
	01-10-95	--	--	2.73	.470	3.20	.020	<.20	.650	.710
	02-14-95	65	720	2.15	.250	2.40	.015	.20	.540	.570
	04-12-95	--	--	.150	.030	--	--	--	--	<.400
	01-24-96	72	--	.040	.030	--	--	--	--	.400
13N/3E-4B7LYS	12-07-94	--	--	.020	.020	--	--	--	--	1.20
13N/3E-4C1	07-28-93	57	562	2.47	.030	2.50	<.010	<.20	.090	.090
	09-16-93	67	549	--	.010	2.40	.010	<.20	.070	.070
	11-05-93	77	540	--	<.010	2.30	<.010	<.20	.070	.090
	05-24-94	66	526	--	<.010	2.40	<.010	<.20	.050	.050
	08-25-94	69	528	--	--	--	--	--	--	--
	12-28-94	69	529	--	<.010	2.30	<.015	<.20	.050	.060
	05-16-96	72	668	--	<.010	3.50	<.015	<.20	.090	.080
13N/3E-4C2	07-28-93	79	511	--	<.010	3.10	<.010	<.20	.890	.690
	09-16-93	82	491	--	<.010	3.00	.020	<.20	.260	.270
	11-05-93	71	497	--	<.010	3.00	<.010	<.20	.180	.200
	05-24-94	78	520	--	--	--	--	--	--	--
	08-25-94	84	494	--	--	--	--	--	--	--
	12-28-94	83	503	--	<.010	2.80	<.015	<.20	.020	.020
	05-16-96	79	502	--	<.010	2.80	<.015	<.20	.020	.010
13N/3E-4C3	07-28-93	72	968	12.0	.030	12.0	<.010	<.20	3.30	2.00
	09-16-93	72	886	--	<.010	12.0	.030	<.20	.950	.650
	11-05-93	87	936	--	<.010	12.0	<.010	<.20	.770	.780
	05-26-94	63	744	1.39	.010	1.40	.020	.20	.080	<.010
	09-22-94	71	751	--	.010	6.90	.020	<.20	.490	.500

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
13N/3E-4B1	05-26-94	--	--	--	--	--	1800	--	--
	08-24-94	--	--	--	--	--	1700	--	--
	12-21-94	--	--	17	57	--	1800	--	--
13N/3E-4B2	05-26-94	--	--	--	--	--	1400	--	--
	08-24-94	--	--	--	--	--	1300	--	--
	12-21-94	--	--	24	38	--	1400	--	--
13N/3E-4B3	05-26-94	--	--	--	--	--	1300	--	--
	08-24-94	--	--	--	--	--	1200	--	--
	12-21-94	--	--	19	<100	--	1300	--	--
13N/3E-4B4	01-10-95	--	--	--	--	--	--	--	--
	02-14-95	--	--	12	33	--	4900	--	--
	11-02-95	--	--	--	--	--	5900	--	--
13N/3E-4B5LYS	12-07-94	--	--	--	--	--	--	--	--
13N/3E-4B6LYS	12-07-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-14-95	--	--	<1	10	--	1900	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
13N/3E-4B7LYS	12-07-94	--	--	--	--	--	--	--	--
13N/3E-4C1	07-28-93	--	--	45	9.0	--	1400	--	--
	09-16-93	9.0	<1.0	48	9.0	<1.0	1300	<1.0	7.0
	11-05-93	28	<1.0	48	11	<1.0	1300	<1.0	6.0
	05-24-94	--	--	--	--	--	1300	--	--
	08-25-94	--	--	--	--	--	1200	--	--
	12-28-94	--	--	43	12	--	1200	--	--
	05-16-96	--	--	43	<100	--	1200	--	--
13N/3E-4C2	07-28-93	--	--	53	11	--	1100	--	--
	09-16-93	14	<1.0	41	16	<1.0	1100	<1.0	10
	11-05-93	9.0	<1.0	40	20	<1.0	980	<1.0	8.0
	05-24-94	--	--	--	--	--	1100	--	--
	08-25-94	--	--	--	--	--	1000	--	--
	12-28-94	--	--	37	24	--	1000	--	--
	05-16-96	--	--	46	<100	--	1000	--	--
13N/3E-4C3	07-28-93	--	--	19	35	--	1100	--	--
	09-16-93	37	<1.0	16	46	<1.0	1000	<1.0	5.0
	11-05-93	7.0	<1.0	14	60	<1.0	990	<1.0	4.0
	05-26-94	--	--	--	--	--	1100	--	--
	09-22-94	--	--	21	39	--	990	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
13N/3E-4B1	05-26-94	--	--	<3.0	--	--	1.0	--	--
	08-24-94	--	--	<3.0	--	--	<1.0	--	--
	12-21-94	--	--	<3.0	--	88	<1.0	--	--
13N/3E-4B2	05-26-94	--	--	21	--	--	11	--	--
	08-24-94	--	--	<3.0	--	--	2.0	--	--
	12-21-94	--	--	<3.0	--	69	<1.0	--	--
13N/3E-4B3	05-26-94	--	--	20	--	--	<10	--	--
	08-24-94	--	--	<10	--	--	<10	--	--
	12-21-94	--	--	<10	--	100	<10	--	--
13N/3E-4B4	01-10-95	--	--	--	--	--	--	--	--
	02-14-95	--	--	10	--	130	10	--	--
	11-02-95	--	--	<3.0	--	--	13	--	--
13N/3E-4B5LYS	12-07-94	--	--	--	--	--	--	--	--
13N/3E-4B6LYS	12-07-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-14-95	--	--	4.0	--	74	<1.0	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	83	--	--	<10	--	--
13N/3E-4B7LYS	12-07-94	--	--	--	--	--	--	--	--
13N/3E-4C1	07-28-93	--	--	7.0	--	33	4.0	--	--
	09-16-93	<1.0	<1.0	<3.0	<1.0	40	1.0	62	<1.0
	11-05-93	<1.0	<1.0	28	<1.0	30	<1.0	59	<1.0
	05-24-94	--	--	<3.0	--	--	<1.0	--	--
	08-25-94	--	--	<3.0	--	--	<1.0	--	--
	12-28-94	--	--	<3.0	--	33	<1.0	--	--
	05-16-96	--	--	4.0	--	45	<1.0	--	--
13N/3E-4C2	07-28-93	--	--	7.0	--	32	3.0	--	--
	09-16-93	<1.0	<1.0	8.0	<1.0	40	<1.0	58	<1.0
	11-05-93	<1.0	<1.0	8.0	<1.0	40	<1.0	57	<1.0
	05-24-94	--	--	<3.0	--	--	<1.0	--	--
	08-25-94	--	--	<3.0	--	--	<1.0	--	--
	12-28-94	--	--	4.0	--	33	<1.0	--	--
	05-16-96	--	--	9.0	--	35	<1.0	--	--
13N/3E-4C3	07-28-93	--	--	34	--	85	49	--	--
	09-16-93	<1.0	<1.0	19	<1.0	90	18	30	<1.0
	11-05-93	<1.0	1.0	21	2.0	100	5.0	28	1.0
	05-26-94	--	--	<3.0	--	--	3.0	--	--
	09-22-94	--	--	<3.0	--	69	<1.0	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
13N/3E-4B1	05-26-94	--	--	--	--	--	--	--	--
	08-24-94	--	--	--	--	--	--	--	--
	12-21-94	--	--	420	--	--	--	--	--
13N/3E-4B2	05-26-94	--	--	--	--	--	--	--	--
	08-24-94	--	--	--	--	--	--	--	--
	12-21-94	--	--	310	--	--	--	--	--
13N/3E-4B3	05-26-94	--	--	--	--	--	--	--	--
	08-24-94	--	--	--	--	--	--	--	--
	12-21-94	--	--	860	--	--	--	--	--
13N/3E-4B4	01-10-95	--	--	--	--	--	--	--	--
	02-14-95	--	--	600	--	--	--	--	--
	11-02-95	--	--	--	--	--	--	--	--
13N/3E-4B5LYS	12-07-94	--	--	--	--	--	--	--	--
13N/3E-4B6LYS	12-07-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-14-95	--	--	200	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
13N/3E-4B7LYS	12-07-94	--	--	--	--	--	--	--	--
13N/3E-4C1	07-28-93	--	--	99	--	--	--	--	--
	09-16-93	1	<1.0	120	<0.50	3.0	5.0	<0.3	<0.2
	11-05-93	<1	<1.0	110	--	2.0	6.0	--	--
	05-24-94	--	--	--	--	--	--	--	--
	08-25-94	--	--	--	--	--	--	--	--
	12-28-94	--	--	120	--	--	--	--	--
	05-16-96	--	--	240	--	--	--	--	--
13N/3E-4C2	07-28-93	--	--	110	--	--	--	--	--
	09-16-93	1	<1.0	130	<0.50	<1.0	7.0	<0.3	<.2
	11-05-93	<1	<1.0	110	--	1.0	8.0	--	--
	05-24-94	--	--	--	--	--	--	--	--
	08-25-94	--	--	--	--	--	--	--	--
	12-28-94	--	--	120	--	--	--	--	--
	05-16-96	--	--	130	--	--	--	--	--
13N/3E-4C3	07-28-93	--	--	490	--	--	--	--	--
	09-16-93	<1	<1.0	540	<0.50	2.0	3.0	0.7	<.21
	11-05-93	1	<1.0	590	--	2.0	3.0	--	--
	05-26-94	--	--	--	--	--	--	--	--
	09-22-94	--	--	370	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13/ C-12 STABLE ISOTOPE RATIO PER MIL	H-2/ H-1 STABLE ISOTOPE RATIO PER MIL	O-18/ O-16 STABLE ISOTOPE RATIO PER MIL
13N/3E-4B1	05-26-94	--	--	--	--	--	-89.8	-10.77
	08-24-94	--	--	--	--	--	-90.8	-10.66
	12-21-94	--	--	--	--	--	--	--
13N/3E-4B2	05-26-94	--	--	--	--	--	-91.2	-11.14
	08-24-94	--	--	--	--	--	-92.4	-11.16
	12-21-94	--	--	--	--	--	--	--
13N/3E-4B3	05-26-94	--	--	--	--	--	-87.1	-10.34
	08-24-94	--	--	--	--	--	-86.6	-9.92
	12-21-94	--	--	--	--	--	--	--
13N/3E-4B4	01-10-95	--	--	--	--	--	--	--
	02-14-95	--	--	--	--	--	-73.9	-7.35
	11-02-95	--	--	--	--	--	-75.7	-7.52
13N/3E-4B5LYS	12-07-94	--	--	--	--	--	--	--
13N/3E-4B6LYS	12-07-94	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--
	02-14-95	--	--	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--
13N/3E-4B7LYS	12-07-94	--	--	--	--	--	--	--
13N/3E-4C1	07-28-93	--	--	--	--	--	-94.3	-11.76
	09-16-93	.1	.40	13.5	--	-10.10	-94.6	-11.82
	11-05-93	--	--	--	--	--	-95.8	-11.77
	05-24-94	--	--	--	--	--	-94.3	-11.69
	08-25-94	--	--	--	--	--	-96.1	-11.64
	12-28-94	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--
13N/3E-4C2	07-28-93	--	--	--	--	--	-92.3	-11.66
	09-16-93	.1	.40	13.2	--	-9.00	-92.4	-11.69
	11-05-93	--	--	--	--	--	-93.9	-11.70
	05-24-94	--	--	--	--	--	-94.3	-11.57
	08-25-94	--	--	--	--	--	-93.4	-11.54
	12-28-94	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--
13N/3E-4C3	07-28-93	--	--	--	--	--	-89.3	-10.79
	09-16-93	.1	.40	--	--	-9.50	-89.8	-10.97
	11-05-93	--	--	--	--	--	-89.3	-10.76
	05-26-94	--	--	--	--	--	-90.0	-11.04
	09-22-94	--	--	--	11.4	--	-88.7	-11.18

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)
13N/3E-4C3	WC1-150	351514116401403	05-16-96	1610	115.23	150.00	2400	1460	1430	8.1
13N/3E-4D1	WC2-320	351523116402801	08-25-93	1600	145.64	320.00	2420	899	920	8.2
			05-24-94	1330	142.66	320.00	2420	833	821	8.2
			08-24-94	1200	142.61	320.00	2420	829	830	8.3
			12-28-94	1600	143.63	320.00	2420	821	823	8.2
13N/3E-4D2	WC2-250	351523116402802	08-26-93	1130	144.93	250.00	2420	764	778	8.1
			05-24-94	1700	142.28	250.00	2420	768	758	8.2
			08-24-94	0930	142.09	250.00	2420	756	755	8.1
			12-28-94	1835	142.86	250.00	2420	753	758	8.2
			06-12-96	1330	140.76	250.00	2420	764	--	8.2
13N/3E-4D3	WC2-170	351523116402803	08-25-93	1100	144.37	170.00	2420	729	--	8.0
			09-24-93	0900	--	170.00	2420	1060	992	7.5
			05-24-94	1100	142.04	170.00	2420	--	806	--
			09-22-94	1200	141.81	170.00	2420	867	854	7.6
			06-12-96	1520	140.32	170.00	2420	844	--	8.0
			06-12-96	1525	140.32	170.00	2420	844	--	8.0
13N/3E-4G1	STP-1	351504116400301	12-29-92	1435	--	140.00	2386	--	--	--
			09-23-93	1630	101.34	140.00	2386	1450	1470	8.2
			11-04-93	1040	--	140.00	2386	1420	1450	7.8
			11-15-94	1630	99.21	140.00	2386	1320	1340	7.9
			12-06-94	1145	--	140.00	2386	1320	1330	8.0
			02-07-95	1245	99.21	140.00	2386	1320	1340	7.8
			08-08-95	1350	97.80	140.00	2386	1390	1300	7.9
13N/3E-4K1	STP-4	351456116395001	11-04-93	1245	--	85.00	2375	360	3400	7.4
			11-16-94	1445	67.54	--	2375	3060	3120	7.3
			12-06-94	1450	--	--	2375	3010	3080	7.1
			02-03-95	0935	66.83	--	2375	3070	3100	7.2
			08-08-95	1110	64.30	--	2375	3050	3010	7.2
13N/3E-4K2	NIT2-238	351449116400501	02-23-95	1030	--	238.00	2385	832	840	7.8
			06-11-96	1015	92.37	238.00	2385	882	--	8.2
13N/3E-4K3	NIT2-190	351449116400502	02-23-95	1545	--	190.00	2385	776	781	7.8
			06-11-96	1200	91.92	190.00	2385	851	--	8.0
13N/3E-4K4	NIT2-135	351449116400503	02-23-95	1400	--	135.00	2385	776	782	7.5
			06-11-96	1335	93.10	135.00	2385	815	812	8.0
			06-11-96	1340	93.10	135.00	2385	815	810	8.0
13N/3E-4M1	IT-1	351450116402301	05-20-93	1545	--	351.00	2410	695	709	8.1
13N/3E-4Q2	NIT1	351441116400401	01-10-95	1600	--	90.00	2385	--	--	--
			02-24-95	1110	--	90.00	2385	3940	4040	7.6
			11-28-95	1530	67.25	90.00	2385	2600	2590	7.8
			05-17-96	1120	73.83	90.00	2385	2830	2830	7.7

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	CAR-BONATE WAT.DIS FET FIELD CO3 (MG/L)
13N/3E-4C3	05-16-96	7.8	--	24.0	5.0	60	11	200	17	--
13N/3E-4D1	08-25-93	8.2	41.5	28.0	--	13	2.4	170	8.0	--
	05-24-94	8.0	--	27.5	--	11	2.0	150	8.6	--
	08-24-94	8.1	--	26.5	--	11	1.7	150	8.2	--
	12-28-94	8.0	6.0	26.0	2.8	12	1.7	150	9.5	--
13N/3E-4D2	08-26-93	8.0	30.0	27.5	--	12	1.8	140	7.7	--
	05-24-94	7.9	--	27.0	--	11	1.7	140	8.8	--
	08-24-94	7.9	--	26.5	--	12	1.8	140	8.4	--
	12-28-94	7.9	7.0	26.0	4.8	13	1.8	140	9.8	--
	06-12-96	--	36.0	26.5	4.6	--	--	--	--	--
13N/3E-4D3	08-25-93	--	34.0	26.5	--	--	--	--	--	--
	09-24-93	7.2	--	--	--	52	17	150	7.9	--
	05-24-94	7.5	--	--	--	--	--	--	--	--
	09-22-94	7.5	35.5	--	--	12	3.3	160	9.7	--
	06-12-96	--	37.0	27.5	6.6	--	--	--	--	--
	06-12-96	--	37.0	27.5	6.6	--	--	--	--	--
13N/3E-4G1	12-29-92	7.2	--	23.5	--	--	--	212	--	--
	09-23-93	7.9	--	25.0	--	60	10	210	19	--
	11-04-93	7.7	24.0	23.0	--	63	10	210	17	--
	11-15-94	7.7	--	24.5	--	--	--	--	--	--
	12-06-94	7.7	--	--	--	51	8.6	190	18	--
	02-07-95	7.8	19.0	23.5	3.8	50	8.6	190	18	--
	08-08-95	7.7	42.0	25.0	3.6	53	9.0	200	16	--
13N/3E-4K1	11-04-93	7.5	24.0	22.5	--	210	31	480	30	--
	11-16-94	7.3	--	23.5	--	--	--	--	--	--
	12-06-94	7.1	--	--	--	170	27	480	6.1	--
	02-03-95	7.4	18.5	22.0	4.4	170	26	490	31	--
	08-08-95	7.2	37.5	23.5	3.4	170	27	470	30	--
13N/3E-4K2	02-23-95	8.0	22.5	23.0	4.0	17	2.7	150	9.9	--
	06-11-96	--	31.0	26.0	4.0	--	--	--	--	--
13N/3E-4K3	02-23-95	7.9	23.5	22.0	4.8	20	3.2	133	11	--
	06-11-96	--	35.0	26.0	4.6	--	--	--	--	--
13N/3E-4K4	02-23-95	7.7	23.5	23.5	4.2	26	5.0	120	11	--
	06-11-96	7.8	37.0	26.5	4.6	33	5.6	120	13	--
	06-11-96	7.7	37.0	26.5	4.6	34	5.7	120	14	--
13N/3E-4M1	05-20-93	8.1	--	25.5	--	25	4.2	110	10	--
13N/3E-4Q2	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	7.2	23.0	20.0	--	390	60	430	29	--
	11-28-95	7.5	20.0	19.0	--	230	35	350	21	--
	05-17-96	7.5	--	22.0	--	280	37	340	22	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L-CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
13N/3E-4C3	05-16-96	--	78	--	84	250	210	4.6	0.52	0.045
13N/3E-4D1	08-25-93	--	110	109	114	190	74	10	.26	.022
	05-24-94	--	110	110	112	150	63	10	.25	.021
	08-24-94	--	110	112	116	150	63	12	.25	.021
	12-28-94	--	110	107	114	150	62	11	.24	.018
13N/3E-4D2	08-26-93	--	120	122	124	140	59	9.5	.23	.015
	05-24-94	--	130	136	126	120	53	9.0	.23	.013
	08-24-94	--	120	125	126	120	53	11	.23	.015
	12-28-94	--	120	120	127	120	53	9.6	.23	.013
	06-12-96	--	120	--	--	--	--	--	--	--
13N/3E-4D3	08-25-93	--	--	--	--	--	--	--	--	--
	09-24-93	--	--	--	140	240	94	3.3	.12	.038
	05-24-94	--	--	--	--	--	--	--	--	--
	09-22-94	--	130	132	143	120	78	5.3	.31	.025
	06-12-96	--	97	--	--	--	--	--	--	--
	06-12-96	--	97	--	--	--	--	--	--	--
13N/3E-4G1	12-29-92	--	--	--	--	220	200	--	--	--
	09-23-93	--	92	92	91	250	210	4.1	.76	.044
	11-04-93	--	91	91	94	260	200	4.0	.72	.021
	11-15-94	--	100	98	95	210	180	4.4	--	--
	12-06-94	--	90	--	95	210	180	4.4	--	--
	02-07-95	--	94	91	94	200	190	4.4	--	--
	08-08-95	--	86	88	93	210	180	4.0	--	--
13N/3E-4K1	11-04-93	--	370	372	307	560	570	3.3	1.6	.063
	11-16-94	--	410	412	411	470	430	4.0	--	--
	12-06-94	--	400	408	415	490	440	4.0	--	--
	02-03-95	--	410	411	409	480	430	4.3	--	--
	08-08-95	--	390	391	394	460	410	3.8	--	--
13N/3E-4K2	02-23-95	--	130	128	127	130	73	7.6	.29	.023
	06-11-96	--	120	--	--	--	--	--	--	--
13N/3E-4K3	02-23-95	--	120	119	124	120	67	5.3	.27	.015
	06-11-96	--	120	--	--	--	--	--	--	--
13N/3E-4K4	02-23-95	--	120	121	122	130	71	3.4	.28	.020
	06-11-96	--	110	--	116	130	82	3.4	.34	.014
	06-11-96	--	110	--	116	130	82	3.4	.34	.016
13N/3E-4M1	05-20-93	--	120	123	126	120	55	3.7	.24	.014
13N/3E-4Q2	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	58	58	69	1100	630	1.6	1.6	.270
	11-28-95	--	53	51	62	910	210	2.1	.47	.085
	05-17-96	--	60	--	65	1100	220	2.1	.48	.091

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
13N/3E-4C3	05-16-96	76	926	--	<0.010	9.30	<0.015	<0.20	0.040	0.020
13N/3E-4D1	08-25-93	71	630	1.86	.040	1.90	.030	<.20	.110	.080
	05-24-94	58	536	--	<.010	1.30	<.010	<.20	.040	.060
	08-24-94	71	548	--	--	--	--	--	--	--
	12-28-94	72	544	--	<.010	1.20	<.015	<.20	.050	.060
13N/3E-4D2	08-26-93	71	532	2.48	.020	2.50	.040	<.20	.560	.220
	05-24-94	72	480	--	<.010	2.40	.010	<.20	.180	.170
	08-24-94	72	493	--	--	--	--	--	--	--
	12-28-94	74	506	--	<.010	2.30	<.015	<.20	.060	.070
	06-12-96	--	--	--	<.010	2.40	.040	<.20	.020	.030
13N/3E-4D3	08-25-93	--	--	--	--	--	--	--	--	--
	09-24-93	37	688	.510	.260	.770	.110	3.5	7.70	5.30
	05-24-94	--	--	--	--	--	--	--	--	--
	09-22-94	64	610	--	<.010	2.70	<.010	<.20	19.0	14.0
	06-12-96	--	--	--	<.010	3.20	.050	<.20	.070	.080
	06-12-96	--	--	--	<.010	3.30	.050	<.20	.070	.080
13N/3E-4G1	12-29-92	--	900	--	--	7.60	--	--	--	--
	09-23-93	73	933	9.69	.010	9.70	.020	.30	.160	.090
	11-04-93	83	944	--	<.010	8.70	.010	<.20	.020	.030
	11-15-94	78	--	--	<.010	14.0	<.010	<.20	<.010	<.010
	12-06-94	75	914	--	<.010	16.0	.020	<.20	.010	<.010
	02-07-95	78	942	16.0	.020	16.0	<.015	<.20	<.010	.020
	08-08-95	66	862	16.6	.002	16.6	.003	.11	.006	.011
13N/3E-4K1	11-04-93	83	2290	--	<.010	22.0	.020	.50	<.010	.010
	11-16-94	80	--	--	<.010	21.0	.010	<.20	<.010	<.010
	12-06-94	81	2100	--	<.010	21.0	<.015	.30	<.010	<.010
	02-03-95	78	2080	--	<.010	20.0	<.015	.20	<.010	<.010
	08-08-95	66	1900	18.2	.002	18.2	.004	.23	.00	.009
13N/3E-4K2	02-23-95	69	547	--	<.010	2.50	<.015	<.20	.070	.080
	06-11-96	--	--	--	<.010	2.80	.040	<.20	.020	.020
13N/3E-4K3	02-23-95	77	524	--	<.010	2.70	<.015	<.20	.160	.120
	06-11-96	--	--	--	<.010	2.90	.040	<.20	.010	.010
13N/3E-4K4	02-23-95	74	528	--	<.010	2.60	<.015	<.20	1.50	1.10
	06-11-96	74	552	--	<.010	3.10	.040	<.20	.020	.020
	06-11-96	74	546	--	<.010	3.00	.040	<.20	.020	.010
13N/3E-4M1	05-20-93	69	482	--	<.010	2.70	.020	<.20	<.010	.010
13N/3E-4Q2	01-10-95	--	--	29.9	.070	30.0	.180	.70	.070	.070
	02-24-95	62	3030	25.0	.040	25.0	.080	.50	<.010	.020
	11-28-95	68	2320	--	<.010	22.0	.030	.40	.040	<.010
	05-17-96	65	2250	--	<.010	23.0	<.015	.30	.020	.010

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
13N/3E-4C3	05-16-96	--	--	15	<100	--	990	--	--
13N/3E-4D1	08-25-93	--	--	3	16	--	1400	--	--
	05-24-94	--	--	--	--	--	1300	--	--
	08-24-94	--	--	--	--	--	1300	--	--
	12-28-94	--	--	43	17	--	1300	--	--
13N/3E-4D2	08-26-93	--	--	56	18	--	1300	--	--
	05-24-94	--	--	--	--	--	1300	--	--
	08-24-94	--	--	--	--	--	1300	--	--
	12-28-94	--	--	47	21	--	1200	--	--
	06-12-96	--	--	--	--	--	--	--	--
13N/3E-4D3	08-25-93	--	--	--	--	--	--	--	--
	09-24-93	--	--	--	--	--	570	--	--
	05-24-94	--	--	--	--	--	--	--	--
	09-22-94	--	--	59	8.0	--	1000	--	--
	06-12-96	--	--	--	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--	--
13N/3E-4G1	12-29-92	--	--	--	--	--	--	--	--
	09-23-93	113	<1.0	13	55	<1.0	1100	<1.0	6.0
	11-04-93	7.0	<1.0	13	66	<1.0	1000	<1.0	3.0
	11-15-94	--	--	--	--	--	1000	--	--
	12-06-94	--	--	--	--	--	1000	--	--
	02-07-95	--	--	--	--	--	1000	--	--
	08-08-95	--	--	--	--	--	1000	--	--
13N/3E-4K1	11-04-93	5.0	<1.0	7	40	<1.0	5200	1.0	2.0
	11-16-94	--	--	--	--	--	4800	--	--
	12-06-94	--	--	--	--	--	5200	--	--
	02-03-95	--	--	--	--	--	5000	--	--
	08-08-95	--	--	--	--	--	4900	--	--
13N/3E-4K2	02-23-95	--	--	32	19	--	1000	--	--
	06-11-96	--	--	--	--	--	--	--	--
13N/3E-4K3	02-23-95	--	--	20	29	--	740	--	--
	06-11-96	--	--	--	--	--	--	--	--
13N/3E-4K4	02-23-95	--	--	15	21	--	680	--	--
	06-11-96	--	--	11	<100	--	715	--	--
	06-11-96	--	--	11	<100	--	693	--	--
13N/3E-4M1	05-20-93	<10	5.0	12	39	<.50	720	<1.0	--
13N/3E-4Q2	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	4	100	--	660	--	--
	11-28-95	--	--	4	<100	--	680	--	--
	05-17-96	--	--	4	<100	--	750	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
13N/3E-4C3	05-16-96	--	--	8.0	--	88	<1.0	--	--
13N/3E-4D1	08-25-93	--	--	200	--	--	12	--	--
	05-24-94	--	--	<3.0	--	--	6.0	--	--
	08-24-94	--	--	<3.0	--	--	<1.0	--	--
	12-28-94	--	--	<3.0	--	28	1.0	--	--
13N/3E-4D2	08-26-93	--	--	28	--	--	8.0	--	--
	05-24-94	--	--	14	--	--	3.0	--	--
	08-24-94	--	--	5.0	--	--	<1.0	--	--
	12-28-94	--	--	8.0	--	46	<1.0	--	--
	06-12-96	--	--	--	--	--	--	--	--
13N/3E-4D3	08-25-93	--	--	--	--	--	--	--	--
	09-24-93	--	--	22	--	--	140	--	--
	05-24-94	--	--	--	--	--	--	--	--
	09-22-94	--	--	35	--	51	110	--	--
	06-12-96	--	--	--	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--	--
13N/3E-4G1	12-29-92	--	--	--	--	--	--	--	[--
	09-23-93	<1.0	<1.0	250	<1.0	80	3.0	31	3.0
	11-04-93	<1.0	1.0	6.0	2.0	80	5.0	27	2.0
	11-15-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	<3.0	--	--	<1.0	--	--
	02-07-95	--	--	<3.0	--	--	<1.0	--	--
	08-08-95	--	--	<3.0	--	--	<1.0	--	--
13N/3E-4K1	11-04-93	<1.0	3.0	40	10	160	3.0	27	12
	11-16-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	<10	--	--	20	--	--
	02-03-95	--	--	20	--	--	<10	--	--
	08-08-95	--	--	<10	--	--	<10	--	--
13N/3E-4K2	02-23-95	--	--	<3.0	--	39	5.0	--	--
	06-11-96	--	--	--	--	--	--	--	--
13N/3E-4K3	02-23-95	--	--	8.0	--	44	4.0	--	--
	06-11-96	--	--	--	--	--	--	--	--
13N/3E-4K4	02-23-95	--	--	21	--	52	23	--	--
	06-11-96	--	--	<3.0	--	45	<1.0	--	--
	06-11-96	--	--	4.0	--	44	<1.0	--	--
13N/3E-4M1	05-20-93	<1.0	<1.0	10	<1.0	35	<1.0	36	<1.0
13N/3E-4Q2	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	<10	--	90	400	--	--
	11-28-95	--	--	<9.0	--	80	6.0	--	--
	05-17-96	--	--	<9.0	--	84	27	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
13N/3E-4C3	05-16-96	--	--	500	--	--	--	--	--
13N/3E-4D1	08-25-93	--	--	110	--	--	--	--	--
	05-24-94	--	--	--	--	--	--	--	--
	08-24-94	--	--	--	--	--	--	--	--
	12-28-94	--	--	93	--	--	--	--	--
13N/3E-4D2	08-26-93	--	--	95	--	--	--	--	--
	05-24-94	--	--	--	--	--	--	--	--
	08-24-94	--	--	--	--	--	--	--	--
	12-28-94	--	--	98	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--	--
13N/3E-4D3	08-25-93	--	--	--	--	--	--	--	--
	09-24-93	--	--	--	--	--	--	--	--
	05-24-94	--	--	--	--	--	--	--	--
	09-22-94	--	--	180	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--	--
13N/3E-4G1	12-29-92	--	--	--	--	--	--	--	--
	09-23-93	<1	<1.0	500	--	<1.0	5.0	2.1	0.65
	11-04-93	<1	<1.0	530	--	2.0	5.0	--	--
	11-15-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--	--
	02-07-95	--	--	--	--	--	--	--	--
	08-08-95	--	--	--	--	--	--	--	--
13N/3E-4K1	11-04-93	1	<1.0	1700	--	4.0	188	--	--
	11-16-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--	--
	02-03-95	--	--	--	--	--	--	--	--
	08-08-95	--	--	--	--	--	--	--	--
13N/3E-4K2	02-23-95	--	--	150	--	--	--	--	--
	06-11-96	--	--	--	--	--	--	--	--
13N/3E-4K3	02-23-95	--	--	180	--	--	--	--	--
	06-11-96	--	--	--	--	--	--	--	--
13N/3E-4K4	02-23-95	--	--	310	--	--	--	--	--
	06-11-96	--	--	340	--	--	--	--	--
	06-11-96	--	--	330	--	--	--	--	--
13N/3E-4M1	05-20-93	<1	<1.0	250	--	14	6.0	--	--
13N/3E-4Q2	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	4000	--	--	--	--	--
	11-28-95	--	--	2100	--	--	--	--	--
	05-17-96	--	--	2600	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13/ C-12 STABLE ISOTOPE RATIO PER MIL	H-2/ H-1 STABLE ISOTOPE RATIO PER MIL	O-18/ O-16 STABLE ISOTOPE RATIO PER MIL
13N/3E-4C3	05-16-96	--	--	--	--	--	--	--
13N/3E-4D1	08-25-93	--	--	--	--	--	-95.0	-11.78
	05-24-94	--	--	11.9	--	-6.60	-95.8	-11.64
	08-24-94	--	--	--	--	--	-95.3	-11.69
	12-28-94	--	--	--	--	--	--	--
13N/3E-4D2	08-26-93	--	--	--	--	--	-94.1	-11.68
	05-24-94	--	--	13.3	--	-8.30	-95.2	-11.65
	08-24-94	--	--	--	--	--	-94.4	-11.61
	12-28-94	--	--	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--
13N/3E-4D3	08-25-93	--	--	--	--	--	-90.0	-11.26
	09-24-93	--	--	--	--	--	-92.3	-11.26
	05-24-94	--	--	--	--	--	-89.6	-11.09
	09-22-94	--	--	--	8.0	--	-90.5	-11.23
	06-12-96	--	--	--	--	--	--	--
	06-12-96	--	--	--	--	--	--	--
13N/3E-4G1	12-29-92	--	--	--	--	--	--	--
	09-23-93	0.2	0.64	--	--	--	-90.6	-11.13
	11-04-93	--	--	--	--	--	-92.4	-11.44
	11-15-94	--	--	--	17.5	--	--	--
	12-06-94	--	--	--	--	--	--	--
	02-07-95	--	--	--	--	--	--	--
	08-08-95	--	--	--	--	--	--	--
13N/3E-4K1	11-04-93	--	--	--	--	[--	-83.8	-9.27
	11-16-94	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--
	02-03-95	--	--	--	--	--	--	--
	08-08-95	--	--	--	--	--	--	--
13N/3E-4K2	02-23-95	--	--	--	--	--	-93.7	-11.52
	06-11-96	--	--	--	--	--	--	--
13N/3E-4K3	02-23-95	--	--	--	--	--	-93.3	-11.38
	06-11-96	--	--	--	--	--	--	--
13N/3E-4K4	02-23-95	--	--	--	--	--	-93.7	-11.32
	06-11-96	--	--	--	--	--	--	--
	06-11-96	--	--	--	--	--	--	--
13N/3E-4M1	05-20-93	--	--	--	--	--	-91.6	-11.61
13N/3E-4Q2	01-10-95	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	-83.9	-9.39
	11-28-95	--	--	--	--	--	-75.0	-7.58
	05-17-96	--	--	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)
13N/3E-4Q3LYS	NIT1 (RED)	351441116400402	12-08-94	0918	--	75.00	2385	--	--	--
			12-20-94	1430	--	75.00	2385	--	--	--
			12-23-94	1000	--	75.00	2385	--	--	--
			01-10-95	1700	--	75.00	2385	--	--	--
			02-24-95	1130	--	75.00	2385	--	--	--
			04-12-95	1033	--	75.00	2385	--	--	--
			01-24-96	1330	--	75.00	2385	5650	--	7.2
			05-14-96	1420	--	75.00	2385	--	--	--
			05-16-96	1725	--	75.00	2385	--	--	--
			05-21-96	0735	--	75.00	2385	--	--	--
			05-23-96	0900	--	75.00	2385	--	--	--
13N/3E-4Q4LYS	NIT1 (YELLOW)	351441116400403	12-08-94	0917	--	53.50	2385	--	--	--
			12-20-94	1431	--	53.50	2385	--	--	--
			12-23-94	1001	--	53.50	2385	--	--	--
			01-10-95	1701	--	53.50	2385	--	--	--
			02-24-95	1140	--	53.50	2385	--	--	--
			04-12-95	1053	--	53.50	2385	--	--	--
			01-24-96	1340	--	53.50	2385	2690	--	7.1
			05-15-96	1425	--	53.50	2385	--	--	--
			05-16-96	1730	--	53.50	2385	--	--	--
			05-17-96	1245	--	53.50	2385	--	--	--
			05-21-96	0740	--	53.50	2385	--	--	--
			05-23-96	0900	--	53.50	2385	--	--	--
13N/3E-4Q5LYS	NIT1 (GREEN)	351441116400404	12-08-94	0916	--	35.00	2385	--	--	--
			12-20-94	1432	--	35.00	2385	--	--	--
			12-23-94	1002	--	35.00	2385	--	--	--
			01-10-95	1702	--	35.00	2385	--	--	--
			02-24-95	1150	--	35.00	2385	--	--	--
			04-12-95	1118	--	35.00	2385	--	--	--
			01-24-96	1345	--	35.00	2385	2250	--	7.8
			05-15-96	1430	--	35.00	2385	--	--	--
			05-16-96	1735	--	35.00	2385	--	--	--
			05-17-96	1250	--	35.00	2385	--	--	--
			05-21-96	0755	--	35.00	2385	--	--	--
			05-23-96	0900	--	35.00	2385	--	--	--
13N/3E-4Q6LYS	NIT1 (BLUE)	351441116400405	12-08-94	0915	--	15.00	2385	--	--	--
			12-20-94	1433	--	15.00	2385	--	--	--
			12-23-94	1003	--	15.00	2385	--	--	--
			01-10-95	1703	--	15.00	2385	--	--	--
			02-24-95	1200	--	15.00	2385	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STANDARD UNITS)	TEMPERATURE AIR (DEG C)	TEMPERATURE WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	CARBONATE WAT.DIS FET FIELD CO3 (MG/L)
13N/3E-4Q3LYS	12-08-94	--	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	310	60	1500	22	--
	04-12-95	--	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	380	71	1000	22	--
	05-14-96	--	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--	--
13N/3E-4Q4LYS	12-08-94	--	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	300	54	1200	24	--
	04-12-95	--	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	110	16	570	1.0	--
	05-15-96	--	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--	--
13N/3E-4Q5LYS	12-08-94	--	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	27	8.0	780	9.3	--
	04-12-95	--	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	26	4.3	490	2.4	--
	05-15-96	--	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--	--
13N/3E-4Q6LYS	12-08-94	--	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	12	3.3	750	4.2	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L-CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
13N/3E-4Q3LYS	12-08-94	--	--	--	--	3100	610	<2.5	<2.5	--
	12-20-94	--	--	--	--	3800	630	<1.0	.90	--
	12-23-94	--	--	--	--	3900	610	<1.0	.70	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	<.10	460	1.7	.72	0.530
	04-12-95	--	--	--	--	3500	360	<.20	.30	--
	01-24-96	--	100	106	--	3000	230	<4.0	--	--
	05-14-96	--	--	--	--	2900	220	<3.0	<2.0	--
	05-16-96	--	--	--	--	--	230	<3.0	<2.0	--
	05-21-96	--	--	--	--	3000	240	<3.0	<2.0	--
	05-23-96	--	--	--	--	3200	240	<3.0	<2.0	--
13N/3E-4Q4LYS	12-08-94	--	--	--	--	2600	440	23	<2.5	--
	12-20-94	--	--	--	--	3200	480	28	<1.0	--
	12-23-94	--	--	--	--	3300	390	19	1.4	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	--	--	.39	.280
	04-12-95	--	--	--	--	2200	250	<.20	<.30	--
	01-24-96	--	290	294	--	860	290	<4.0	<4.0	--
	05-15-96	--	--	--	--	760	270	<3.0	<2.0	--
	05-16-96	--	--	--	--	750	270	<3.0	<2.0	--
	05-17-96	--	--	--	--	740	270	<3.0	<2.0	--
	05-21-96	--	--	--	--	710	260	<3.0	<2.0	--
	05-23-96	--	--	--	--	710	260	<3.0	<2.0	--
13N/3E-4Q5LYS	12-08-94	--	--	--	--	1300	250	16	.80	--
	12-20-94	--	--	--	--	1800	390	27	4.3	--
	12-23-94	--	--	--	--	1200	350	22	2.1	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	760	280	9.4	.48	.220
	04-12-95	--	--	--	--	710	300	30	<.30	--
	01-24-96	--	410	406	--	380	200	<2.0	1.6	--
	05-15-96	--	--	--	--	370	220	<1.2	<.80	--
	05-16-96	--	--	--	--	380	220	<1.2	<.80	--
	05-17-96	--	--	--	--	370	220	<1.2	<.80	--
	05-21-96	--	--	--	--	380	220	<1.2	1.2	--
	05-23-96	--	--	--	--	380	220	<1.2	1.1	--
13N/3E-4Q6LYS	12-08-94	--	--	--	--	520	390	53	1.2	--
	12-20-94	--	--	--	--	630	440	21	1.4	--
	12-23-94	--	--	--	--	610	380	8.5	1.0	--
	01-10-95	--	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	600	300	6.6	.46	.220

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
13N/3E-4Q3LYS	12-08-94	--	--	27.7	6.30	34.0	0.250	1.3	--	<5.00
	12-20-94	--	--	32.1	1.90	34.0	.040	.70	--	<2.00
	12-23-94	--	--	1.00	9.00	10.0	.130	.80	--	<2.00
	01-10-95	--	--	1.10	5.10	6.20	.070	.80	0.060	.010
	02-24-95	53	6380	.300	1.50	1.80	<.015	.70	<.010	<.010
	04-12-95	--	--	1.90	1.29	3.19	--	--	--	<.400
	01-24-96	51	--	7.80	.300	8.10	--	--	--	--
	05-14-96	--	--	5.30	.300	5.60	--	--	--	<3.00
	05-16-96	--	--	4.70	<.200	4.70	--	--	--	<3.00
	05-21-96	--	--	5.90	<.200	5.90	--	--	--	<3.00
	05-23-96	--	--	6.60	<.200	6.60	--	--	--	<3.00
13N/3E-4Q4LYS	12-08-94	--	--	10.5	.450	11.0	.050	.80	--	3.40
	12-20-94	--	--	9.75	.150	9.90	.040	.70	--	<2.00
	12-23-94	--	--	8.59	.210	8.80	.040	.70	--	<2.00
	01-10-95	--	--	8.70	1.30	10.0	.030	.70	.350	.390
	02-24-95	--	4930	2.80	.700	3.50	<.015	.80	.130	.170
	04-12-95	--	--	3.52	.550	4.07	--	--	--	<.400
	01-24-96	73	--	15.0	<.200	15.0	--	--	--	<4.00
	05-15-96	--	--	11.9	<.200	11.9	--	--	--	<3.00
	05-16-96	--	--	12.6	<.200	12.6	--	--	--	<3.00
	05-17-96	--	--	12.8	<.200	12.8	--	--	--	<3.00
	05-21-96	--	--	12.6	<.200	12.6	--	--	--	<3.00
	05-23-96	--	--	12.7	<.200	12.7	--	--	--	<3.00
13N/3E-4Q5LYS	12-08-94	--	--	10.3	.680	11.0	<.015	.60	--	<5.00
	12-20-94	--	--	31.9	.140	32.0	<.015	.60	--	3.40
	12-23-94	--	--	31.9	.120	32.0	<.015	.50	--	2.80
	01-10-95	--	--	28.8	.190	29.0	.020	.60	1.90	1.90
	02-24-95	74	2460	27.5	.510	28.0	<.015	.70	1.70	1.70
	04-12-95	--	--	25.1	.630	25.7	--	--	--	<.400
	01-24-96	58	--	17.8	<.200	17.8	--	--	--	<2.00
	05-15-96	--	--	21.5	<.080	21.5	--	--	--	<1.20
	05-16-96	--	--	22.1	<.080	22.1	--	--	--	<1.20
	05-17-96	--	--	22.4	<.080	22.4	--	--	--	<1.20
	05-21-96	--	--	22.3	<.080	22.3	--	--	--	<1.20
	05-23-96	--	--	22.1	<.080	22.1	--	--	--	<1.20
13N/3E-4Q6LYS	12-08-94	--	--	13.0	2.00	15.0	.020	.60	--	1.70
	12-20-94	--	--	31.2	1.80	33.0	.040	.70	--	2.40
	12-23-94	--	--	31.0	2.00	33.0	.020	.60	--	<2.00
	01-10-95	--	--	28.6	3.40	32.0	.020	.60	.970	1.00
	02-24-95	61	2140	24.5	3.50	28.0	<.015	.60	.610	.610

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
13N/3E-4Q3LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	14	100	--	480	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-14-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q4LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	160	--	--	5600	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q5LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	210	<100	--	12000	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q6LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	130	<100	--	4000	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
13N/3E-4Q3LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	<10	--	280	50	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	24	--	--	<4.0	--	--
	05-14-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q4LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	<10	--	200	30	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	20	--	--	4.0	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q5LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	<10	--	150	20	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	31	--	--	5.0	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q6LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	<10	--	160	<10	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
13N/3E-4Q-3LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	4100	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-14-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q4LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q5LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	400	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-4Q6LYS	12-08-94	--	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--	--
	02-24-95	--	--	330	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL
13N/3E-4Q3LYS	12-08-94	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--
	05-14-96	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--
13N/3E-4Q4LYS	12-08-94	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--
13N/3E-4Q5LYS	12-08-94	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	--	--
	04-12-95	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--
13N/3E-4Q6LYS	12-08-94	--	--	--	--	--	--	--
	12-20-94	--	--	--	--	--	--	--
	12-23-94	--	--	--	--	--	--	--
	01-10-95	--	--	--	--	--	--	--
	02-24-95	--	--	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND ARD UNITS)
13N/3E-4Q6LYS	NIT1 (BLUE)	351441116400405	04-12-95	1105	--	15.00	2385	--	--	--
			01-24-96	1350	--	15.00	2385	2150	--	7.8
			05-15-96	1435	--	15.00	2385	--	--	--
			05-16-96	1740	--	15.00	2385	--	--	--
			05-17-96	1255	--	15.00	2385	--	--	--
			05-21-96	0750	--	15.00	2385	--	--	--
			05-23-96	0900	--	15.00	2385	--	--	--
13N/3E-5G1	TH-5	351505116405701	07-28-93	1525	188.99	450.00	2460	667	661	7.9
13N/3E-8B1	AD1-255	351418116410201	07-20-94	1540	--	255.00	2500	770	765	8.1
13N/3E-9B1	STP-5	351429116395401	12-30-92	1000	--	120.00	2378	900	--	--
			11-28-94	0945	72.39	120.00	2378	674	--	8.0
			12-06-94	1200	--	120.00	2378	672	680	8.0
			02-07-95	1630	71.66	120.00	2378	678	686	8.0
			08-03-95	1930	69.22	120.00	2378	693	673	8.0
13N/3E-10D1	STP-6	351422116392501	12-30-92	0855	--	65.00	2345	3000	--	--
			11-15-94	1200	28.60	65.00	2345	2220	2250	7.5
			12-05-94	1700	--	65.00	2345	2230	2280	7.6
			02-06-95	1000	--	65.00	2345	2110	2060	7.6
			08-03-95	1230	23.25	65.00	2345	2390	2370	7.5
13N/3E-10E1	WC3-243	351416116392201	09-22-93	0945	34.70	243.00	2343	788	791	8.2
			05-25-94	1530	34.74	243.00	2343	757	751	8.2
			08-25-94	1330	34.61	243.00	2343	752	752	8.0
			12-27-94	1100	34.57	243.00	2343	742	755	8.0
13N/3E-10E2	WC3-170	351416116392202	09-23-93	1105	31.75	170.00	2343	771	776	8.0
			05-25-94	1200	32.21	170.00	2343	755	755	8.1
			08-25-94	1400	32.26	170.00	2343	755	755	7.9
			12-27-94	1230	32.35	170.00	2343	752	758	8.0
			06-13-96	1130	29.88	170.00	2343	755	--	8.0
13N/3E-10E3	WC3-60	351416116392203	09-23-93	1155	28.90	60.00	2343	1680	1700	7.9
			05-25-94	1830	30.31	60.00	2343	1650	1670	7.7
			08-25-94	1510	30.46	60.00	2343	1640	1650	7.6
			12-27-94	1400	30.67	60.00	2343	1020	1630	7.7
			06-13-96	1250	28.45	60.00	2343	1630	--	7.6
13N/3E-11NS1	GARLIC SPRING	351348116382701	06-30-93	1145	--	--	2310	1180	1160	8.9
14N/3E-31K1	TH-3	351542116420601	05-25-94	1900	335.10	410.00	2610	689	708	7.2
14N/3E-32B1	NH1-630	351616116410701	05-21-93	1330	264.51	630.00	2530	828	842	8.8
			09-22-93	1300	265.00	630.00	2530	849	845	8.7
			07-19-94	1230	262.45	630.00	2530	842	808	8.5
			09-22-94	1330	263.94	630.00	2530	779	837	8.5
			12-20-94	1455	263.78	630.00	2530	844	838	8.6

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	CAR-BONATE WAT.DIS FET FIELD CO3 (MG/L)
13N/3E-4Q6LYS	04-12-95	--	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	5.6	1.7	480	2.5	--
	05-15-96	--	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--	--
13N/3E-5G1	07-28-93	8.0	35.0	25.5	--	23	4.5	100	9.0	--
13N/3E-8B1	07-20-94	8.0	33.0	26.5	--	15	4.2	120	6.9	--
13N/3E-9B1	12-30-92	7.0	--	20.0	--	--	--	112	--	--
	11-28-94	--	23.5	--	--	--	--	--	--	--
	12-06-94	7.8	--	--	--	24	4.7	110	5.8	--
	02-07-95	8.0	19.5	22.5	4.0	23	4.6	110	5.6	--
	08-03-95	7.9	38.5	24.5	3.8	23	4.7	110	5.5	--
13N/3E-10D1	12-30-92	--	--	20.0	--	--	--	405	--	--
	11-15-94	7.5	--	25.0	--	--	--	--	--	--
	12-05-94	7.5	--	--	--	73	13	390	20	--
	02-06-95	7.7	16.0	19.5	--	74	12	390	19	--
	08-03-95	7.5	41.5	21.5	.6	87	14	410	18	--
13N/3E-10E1	09-22-93	8.2	--	25.0	--	14	2.8	140	7.5	--
	05-25-94	7.9	--	27.0	--	15	2.5	130	8.2	--
	08-25-94	7.9	--	27.0	--	17	2.6	130	7.8	--
	12-27-94	7.9	14.0	23.0	3.6	17	2.6	130	10	--
13N/3E-10E2	09-23-93	8.2	--	25.0	--	16	2.6	140	8.8	--
	05-25-94	7.8	--	26.0	--	16	2.3	130	8.8	--
	08-25-94	7.9	--	26.5	--	17	2.4	140	8.8	--
	12-27-94	7.8	15.0	24.0	3.4	17	2.4	130	9.5	--
	06-13-96	--	--	26.0	3.8	--	--	--	--	--
13N/3E-10E3	09-23-93	7.8	--	24.0	--	61	10	270	18	--
	05-25-94	7.6	--	23.5	--	72	9.3	240	17	--
	08-25-94	7.7	--	23.5	--	72	9.3	240	18	--
	12-27-94	7.6	16.0	22.0	5.6	73	8.9	240	20	--
	06-13-96	--	--	24.5	5.2	--	--	--	--	--
13N/3E-11NS1	06-30-93	9.1	35.5	33.0	--	31	4.9	200	8.2	19
14N/3E-31K1	05-25-94	7.2	--	26.5	--	20	6.5	110	9.5	--
14N/3E-32B1	05-21-93	8.7	25.5	28.5	--	8.8	.30	160	8.1	12
	09-22-93	8.7	--	29.5	--	9.5	.14	160	8.1	7.7
	07-19-94	7.7	38.0	26.5	--	8.4	.10	160	8.5	--
	09-22-94	8.5	--	26.0	--	9.0	.08	160	7.8	--
	12-20-94	8.5	20.0	28.0	1.3	8.7	.07	160	8.3	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L - CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
13N/3E-4Q6LYS	04-12-95	--	--	--	--	610	260	<0.20	0.30	--
	01-24-96	--	500	501	--	290	170	3.3	3.4	--
	05-15-96	--	--	--	--	380	200	<1.2	<0.80	--
	05-16-96	--	--	--	--	360	210	<1.2	<0.80	--
	05-17-96	--	--	--	--	340	210	<1.2	<0.80	--
	05-21-96	--	--	--	--	340	210	<1.2	<0.80	--
	05-23-96	--	--	--	--	340	210	<1.2	<0.80	--
13N/3E-5G1	07-28-93	--	120	118	117	110	51	3.1	0.23	0.015
13N/3E-8B1	07-20-94	--	100	100	105	140	69	2.6	0.32	0.051
13N/3E-9B1	12-30-92	--	--	--	--	110	50	--	--	--
	11-28-94	--	130	127	--	--	--	--	--	--
	12-06-94	--	120	118	131	110	52	2.2	--	--
	02-07-95	--	130	128	130	100	51	2.0	--	--
	08-03-95	--	130	127	130	110	51	2.2	--	--
13N/3E-10D1	12-30-92	--	--	--	--	210	330	--	--	--
	11-15-94	--	370	368	298	280	300	6.3	--	--
	12-05-94	--	--	--	376	300	310	5.7	--	--
	02-06-95	--	380	382	388	230	290	6.6	--	--
	08-03-95	--	390	388	374	300	300	5.1	--	--
13N/3E-10E1	09-22-93	--	--	--	136	130	59	7.5	0.25	0.013
	05-25-94	--	140	138	133	120	52	7.3	0.25	0.015
	08-25-94	--	130	129	133	120	52	9.3	0.24	0.017
	12-27-94	--	130	132	134	120	53	2.0	0.24	0.013
13N/3E-10E2	09-23-93	--	--	--	136	120	57	7.3	0.24	0.009
	05-25-94	--	140	142	137	120	51	7.2	0.23	0.013
	08-25-94	--	120	123	135	120	53	6.6	0.24	0.015
	12-27-94	--	120	114	139	110	52	3.6	0.24	0.013
	06-13-96	--	130	--	--	--	--	--	--	--
13N/3E-10E3	09-23-93	--	270	269	237	250	210	4.5	0.52	0.063
	05-25-94	--	220	214	235	240	210	4.3	0.61	0.024
	08-25-94	--	230	231	230	240	200	3.8	0.49	0.018
	12-27-94	--	220	222	230	220	210	<0.10	0.53	0.016
	06-13-96	--	220	--	--	--	--	--	--	--
13N/3E-11NS1	06-30-93	--	230	224	229	200	82	10	<0.010	0.041
14N/3E-31K1	05-25-94	--	69	70	72	130	71	5.7	0.28	0.059
14N/3E-32B1	05-21-93	--	67	--	64	180	71	16	0.26	0.014
	09-22-93	--	59	60	62	180	75	16	0.26	0.018
	07-19-94	--	56	56	61	180	70	16	0.25	0.015
	09-22-94	--	62	58	63	180	71	16	0.26	0.009
	12-20-94	--	110	113	61	170	69	16	0.26	0.010

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
13N/3E-4Q6LYS	04-12-95	--	--	15.8	3.02	18.8	--	--	--	1.30
	01-24-96	57	--	5.56	<0.200	5.56	--	--	--	1.60
	05-15-96	--	--	13.2	<0.080	13.2	--	--	--	<1.20
	05-16-96	--	--	15.1	<0.080	15.1	--	--	--	<1.20
	05-17-96	--	--	14.4	<0.080	14.4	--	--	--	<1.20
	05-21-96	--	--	14.1	<0.080	14.1	--	--	--	<1.20
	05-23-96	--	--	13.6	<0.080	13.6	--	--	--	<1.20
13N/3E-5G1	07-28-93	61	453	--	<0.010	3.60	0.020	<0.20	<0.010	<0.010
13N/3E-8B1	07-20-94	17	465	--	<0.010	2.50	<0.010	<0.20	0.280	0.290
13N/3E-9B1	12-30-92	--	455	--	--	2.50	--	--	--	--
	11-28-94	--	--	--	<0.010	2.90	<0.010	<0.20	<0.010	<0.010
	12-06-94	70	476	--	<0.010	2.70	<0.015	<0.20	<0.010	<0.010
	02-07-95	72	488	--	<0.010	2.70	<0.015	<0.20	<0.010	0.010
	08-03-95	69	470	--	<0.010	2.60	<0.015	<0.20	<0.010	<0.010
13N/3E-10D1	12-30-92	--	1430	--	--	1.80	--	--	--	--
	11-15-94	73	--	4.54	0.060	4.60	<0.010	0.40	<0.010	<0.010
	12-05-94	71	1450	4.54	0.060	4.60	<0.015	0.30	<0.010	0.010
	02-06-95	75	1320	3.72	0.080	3.80	<0.015	0.40	<0.010	0.020
	08-03-95	72	1560	16.7	0.320	17.0	<0.015	0.90	<0.010	<0.010
13N/3E-10E1	09-22-93	58	506	2.38	0.020	2.40	0.010	<0.20	0.090	0.090
	05-25-94	61	494	--	<0.010	2.50	<0.010	<0.20	0.010	0.020
	08-25-94	64	492	--	--	--	--	--	--	--
	12-27-94	68	500	--	<0.010	2.50	<0.015	<0.20	0.030	0.020
13N/3E-10E2	09-23-93	76	523	2.89	0.010	2.90	0.010	<0.20	1.10	0.660
	05-25-94	76	506	--	<0.010	2.90	0.020	<0.20	0.180	0.180
	08-25-94	79	507	--	--	--	--	--	--	--
	12-27-94	77	511	--	<0.010	2.80	<0.015	<0.20	0.070	0.080
	06-13-96	--	--	3.09	0.010	3.10	0.050	<0.20	0.030	0.020
13N/3E-10E3	09-23-93	71	1080	6.36	0.040	6.40	0.050	0.80	3.90	3.00
	05-25-94	78	1060	--	<0.010	6.70	0.020	<0.20	0.170	0.170
	08-25-94	80	1040	--	--	--	--	--	--	--
	12-27-94	80	1060	--	<0.010	7.10	<0.015	<0.20	0.100	0.100
	06-13-96	--	--	--	<0.010	7.60	0.050	<0.20	0.030	0.030
13N/3E-11NS1	06-30-93	56	794	--	<0.010	<0.050	0.030	0.60	0.020	0.010
14N/3E-31K1	05-25-94	34	443	1.48	0.020	1.50	0.020	<0.20	<0.010	<0.010
14N/3E-32B1	05-21-93	70	557	--	<0.010	0.290	<0.010	<0.20	0.320	0.210
	09-22-93	72	540	--	<0.010	0.300	0.010	<0.20	0.420	0.380
	07-19-94	71	556	--	<0.010	0.270	<0.010	<0.20	0.250	0.260
	09-22-94	70	561	--	<0.010	0.280	<0.010	<0.20	0.180	0.210
	12-20-94	78	550	--	<0.010	0.240	<0.015	<0.20	0.090	0.110

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
13N/3E-4Q6LYS	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-5G1	07-28-93	9.0	<1.0	8	37	<1.0	650	<1.0	6.0
13N/3E-8B1	07-20-94	--	--	10	20	--	800	--	--
13N/3E-9B1	12-30-92	--	--	--	--	--	--	--	--
	11-28-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	720	--	--
	02-07-95	--	--	--	--	--	720	--	--
	08-03-95	--	--	--	--	--	720	--	--
13N/3E-10D1	12-30-92	--	--	--	--	--	--	--	--
	11-15-94	--	--	--	--	--	2600	--	--
	12-05-94	--	--	--	--	--	2800	--	--
	02-06-95	--	--	--	--	--	2600	--	--
	08-03-95	--	--	--	--	--	2900	--	--
13N/3E-10E1	09-22-93	--	--	--	--	--	1100	--	--
	05-25-94	--	--	--	--	--	1100	--	--
	08-25-94	--	--	--	--	--	1000	--	--
	12-27-94	--	--	15	22	--	1000	--	--
13N/3E-10E2	09-23-93	--	--	--	--	--	1100	--	--
	05-25-94	--	--	--	--	--	1100	--	--
	08-25-94	--	--	--	--	--	1000	--	--
	12-27-94	--	--	17	21	--	1100	--	--
	06-13-96	--	--	--	--	--	--	--	--
13N/3E-10E3	09-23-93	--	--	--	--	--	1800	--	--
	05-25-94	--	--	--	--	--	1700	--	--
	08-25-94	--	--	--	--	--	1600	--	--
	12-27-94	--	--	14	81	--	1700	--	--
	06-13-96	--	--	--	--	--	--	--	--
13N/3E-11NS1	06-30-93	161	<1.0	21	22	<1.0	1800	<1.0	2.0
14N/3E-31K1	05-25-94	--	--	--	--	--	770	--	--
14N/3E-32B1	05-21-93	--	--	28	12	--	1700	--	--
	09-22-93	33	<1.0	31	13	<1.0	1700	<1.0	<1.0
	07-19-94	--	--	29	12	--	1700	--	--
	09-22-94	--	--	29	12	--	1700	--	--
	12-20-94	--	--	24	13	--	1700	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
13N/3E-4Q6LYS	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	42	--	--	3.0	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-5G1	07-28-93	<1.0	1.0	8.0	<1.0	40	5.0	28	<1.0
13N/3E-8B1	07-20-94	--	--	1100	--	11	27	--	--
13N/3E-9B1	12-30-92	--	--	--	--	--	--	--	--
	11-28-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	<3.0	--	--	<1.0	--	--
	02-07-95	--	--	<3.0	--	--	<1.0	--	--
	08-03-95	--	--	5.0	--	--	<1.0	--	--
13N/3E-10D1	12-30-92	--	--	--	--	--	--	--	--
	11-15-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	<10	--	--	<10	--	--
	02-06-95	--	--	20	--	--	20	--	--
	08-03-95	--	--	<10	--	--	<10	--	--
13N/3E-10E1	09-22-93	--	--	22	--	--	4.0	--	--
	05-25-94	--	--	4.0	--	--	<1.0	--	--
	08-25-94	--	--	<3.0	--	--	<1.0	--	--
	12-27-94	--	--	<3.0	--	19	<1.0	--	--
13N/3E-10E2	09-23-93	--	--	39	--	--	10	--	--
	05-25-94	--	--	16	--	--	<1.0	--	--
	08-25-94	--	--	<3.0	--	--	<1.0	--	--
	12-27-94	--	--	<3.0	--	17	<1.0	--	--
	06-13-96	--	--	--	--	--	--	--	--
13N/3E-10E3	09-23-93	--	--	530	--	--	25	--	--
	05-25-94	--	--	8.0	--	--	<1.0	--	--
	08-25-94	--	--	<3.0	--	--	<1.0	--	--
	12-27-94	--	--	<3.0	--	71	<1.0	--	--
	06-13-96	--	--	--	--	--	--	--	--
13N/3E-11NS1	06-30-93	<1.0	1.0	28	<1.0	41	6.0	90	<1.0
14N/3E-31K1	05-25-94	--	--	340	--	--	100	--	--
14N/3E-32B1	05-21-93	--	--	10	--	12	3.0	--	--
	09-22-93	<1.0	<1.0	12	<1.0	10	1.0	74	<1.0
	07-19-94	--	--	<3.0	--	20	<1.0	--	--
	09-22-94	--	--	<3.0	--	13	<1.0	--	--
	12-20-94	--	--	6.0	--	18	<1.0	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
13N/3E-4Q6LYS	04-12-95	--	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--	--
13N/3E-5G1	07-28-93	1	<1.0	250	<0.50	2.0	7.0	--	--
13N/3E-8B1	07-20-94	--	--	270	--	--	--	--	--
13N/3E-9B1	12-30-92	--	--	--	--	--	--	--	--
	11-28-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--	--
	02-07-95	--	--	--	--	--	--	--	--
	08-03-95	--	--	--	--	--	--	--	--
13N/3E-10D1	12-30-92	--	--	--	--	--	--	--	--
	11-15-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-06-95	--	--	--	--	--	--	--	--
	08-03-95	--	--	--	--	--	--	--	--
13N/3E-10E1	09-22-93	--	--	--	--	--	--	--	--
	05-25-94	--	--	--	--	--	--	--	--
	08-25-94	--	--	--	--	--	--	--	--
	12-27-94	--	--	190	--	--	--	--	--
13N/3E-10E2	09-23-93	--	--	--	--	--	--	--	--
	05-25-94	--	--	--	--	--	--	--	--
	08-25-94	--	--	--	--	--	--	--	--
	12-27-94	--	--	200	--	--	--	--	--
	06-13-96	--	--	--	--	--	--	--	--
13N/3E-10E3	09-23-93	--	--	--	--	--	--	--	--
	05-25-94	--	--	--	--	--	--	--	--
	08-25-94	--	--	--	--	--	--	--	--
	12-27-94	--	--	710	--	--	--	--	--
	06-13-96	--	--	--	--	--	--	--	--
13N/3E-11NS1	06-30-93	--	<1.0	470	--	2.0	4.0	--	--
14N/3E-31K1	05-25-94	--	--	--	--	--	--	--	--
14N/3E-32B1	05-21-93	--	--	60	--	--	--	--	--
	09-22-93	<1	<1.0	70	--	<1.0	<1.0	-0.1	<0.2
	07-19-94	--	--	44	--	--	--	--	--
	09-22-94	--	--	47	--	--	--	--	--
	12-20-94	--	--	47	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL
13N/3E-4Q6LYS	04-12-95	--	--	--	--	--	--	--
	01-24-96	--	--	--	--	--	--	--
	05-15-96	--	--	--	--	--	--	--
	05-16-96	--	--	--	--	--	--	--
	05-17-96	--	--	--	--	--	--	--
	05-21-96	--	--	--	--	--	--	--
	05-23-96	--	--	--	--	--	--	--
13N/3E-5G1	07-28-93	--	--	--	--	--	-90.1	-11.24
13N/3E-8B1	07-20-94	--	--	--	--	--	-91.7	-11.47
13N/3E-9B1	12-30-92	--	--	--	--	--	--	--
	11-28-94	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--
	02-07-95	--	--	--	--	--	--	--
	08-03-95	--	--	--	--	--	--	--
13N/3E-10D1	12-30-92	--	--	--	--	--	--	--
	11-15-94	--	--	--	22.9	--	--	--
	12-05-94	--	--	--	--	--	--	--
	02-06-95	--	--	--	--	--	--	--
	08-03-95	--	--	--	--	--	--	--
13N/3E-10E1	09-22-93	--	--	--	--	--	-94.9	-11.87
	05-25-94	--	--	9.0	--	-8.60	-95.6	-11.74
	08-25-94	--	--	--	--	--	-94.9	-11.75
	12-27-94	--	--	--	--	--	--	--
13N/3E-10E2	09-23-93	--	--	--	--	--	-94.8	-11.70
	05-25-94	--	--	10.4	--	-8.50	-94.4	-11.75
	08-25-94	--	--	--	--	--	-94.5	-11.74
	12-27-94	--	--	--	--	--	--	--
	06-13-96	--	--	--	--	--	--	--
13N/3E-10E3	09-23-93	--	--	--	--	--	-77.2	-8.23
	05-25-94	--	--	92.6	--	-10.20	-76.8	-8.07
	08-25-94	--	--	--	--	--	-77.9	-8.08
	12-27-94	--	--	--	--	--	--	--
	06-13-96	--	--	--	--	--	--	--
13N/3E-11NS1	06-30-93	--	--	--	--	--	-90.5	-11.43
14N/3E-31K1	05-25-94	--	--	--	--	--	-91.7	-11.23
14N/3E-32B1	05-21-93	--	--	--	--	--	-95.2	-11.75
	09-22-93	0.2	0.50	--	--	--	-96.5	-11.80
	07-19-94	--	--	--	--	--	-97.9	-11.57
	09-22-94	--	--	--	7.1	-8.30	-96.3	-11.69
	12-20-94	--	--	--	--	-8.70	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND ARD UNITS
14N/3E-32B1	NH1-630	351616116410701	05-21-96	1245	263.02	630.00	2530	844	835	8.6
14N/3E-32B2	NH1-540	351616116410702	06-02-93	1315	264.35	540.00	2530	898	885	7.7
			09-22-93	1740	264.86	540.00	2530	874	866	7.7
			07-19-94	1700	262.89	540.00	2530	879	842	8.1
			09-22-94	1745	263.70	540.00	2530	858	845	8.3
			05-21-96	1555	262.85	540.00	2530	849	837	8.6
14N/3E-32B3	NH1-300	351616116410703	09-23-93	1715	264.21	300.00	2530	867	872	7.7
			07-20-94	1200	--	300.00	2530	--	1330	--
			09-23-94	0830	263.11	300.00	2530	947	934	7.0
			05-21-96	1800	262.60	300.00	2530	1040	1030	7.3
14N/3E-32F1	I-3A	351553116411001	04-20-93	1315	--	494.00	2500	--	--	--
			06-02-93	1020	--	494.00	2500	797	785	8.1
			11-03-95	0950	--	494.00	2500	825	842	8.1
14N/3E-32F2	BASEBALL-460	351558116412101	02-22-95	1600	--	460.00	2530	925	931	8.6
14N/3E-32F3	BASEBALL-290	351558116412102	02-22-95	1235	--	290.00	2530	795	799	8.0
14N/3E-32H1	I-7	351556116404601	04-20-93	1520	--	490.00	2461	--	--	--
			05-21-93	1130	--	490.00	2461	825	841	8.1
14N/3E-32J1	I-6	351547116405001	04-20-93	1340	--	340.00	2468	--	--	--
			05-18-94	1630	--	340.00	2468	787	802	8.2
14N/3E-32K1	I-5A	351538116410301	04-20-93	1330	--	551.00	2484	--	--	--
			06-02-93	1040	--	551.00	2484	875	868	8.0
			06-02-93	1041	--	551.00	2484	875	783	8.0
			07-19-94	1300	--	551.00	2484	891	881	8.0
			07-20-94	0945	--	551.00	2484	887	878	7.8
14N/3E-32K3	FI1-440	351539116405603	05-04-93	1515	203.79	440.00	2472	882	880	7.6
			09-14-93	1830	204.87	440.00	2472	836	832	7.9
			05-17-94	1100	204.85	440.00	2472	807	820	8.2
			08-23-94	1200	205.89	440.00	2472	812	808	8.0
			12-22-94	1135	207.30	440.00	2472	817	813	8.2
14N/3E-32K4	FI1-355	351539116405604	05-04-93	1815	203.94	355.00	2472	871	868	7.8
			09-15-93	1100	205.50	355.00	2472	836	546	7.8
			05-17-94	1600	204.60	355.00	2472	844	847	7.6
			08-23-94	1330	205.77	355.00	2472	823	814	7.7
			12-22-94	1455	207.09	355.00	2472	848	846	7.6
14N/3E-32K5	FI1-290	351539116405605	05-05-93	1100	205.65	290.00	2472	737	738	7.6
			09-15-93	1415	204.52	290.00	2472	710	547	7.8
			05-18-94	1000	--	290.00	2472	738	753	7.9
			08-23-94	1500	205.74	290.00	2472	772	762	7.9
			12-22-94	1750	206.87	290.00	2472	790	787	7.8
14N/3E-32K6	FI1-230	351539116405606	05-05-93	1300	204.77	230.00	2472	1390	1420	7.7

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	CAR-BONATE WAT.DIS FET FIELD CO3 (MG/L)
14N/3E-32B1	05-21-96	8.5	32.0	28.0	--	8.3	0.06	160	8.6	--
14N/3E-32B2	08-02-93	7.8	--	27.5	--	5.4	1.1	170	5.4	--
	09-22-93	7.8	--	28.5	--	5.1	1.0	170	5.4	--
	07-19-94	8.0	38.0	26.5	--	4.9	.35	170	6.0	--
	09-22-94	8.2	33.0	28.5	--	5.7	.34	160	5.5	--
	05-21-96	8.5	--	27.5	--	6.6	.23	170	6.0	--
14N/3E-32B3	09-23-93	7.7	--	27.5	--	7.6	1.5	170	11	--
	07-20-94	7.1	--	--	--	--	--	--	--	--
	09-23-94	7.2	28.0	26.5	--	4.0	.85	190	11	--
	05-21-96	7.3	26.5	25.5	--	7.2	1.3	210	12	--
14N/3E-32F1	04-20-93	8.1	--	--	--	13	1.2	142	8.9	--
	06-02-93	8.1	--	26.0	--	12	1.9	140	9.3	--
	11-03-95	8.2	22.0	24.0	7.2	13	1.8	150	10	--
14N/3E-32F2	02-22-95	8.4	22.5	25.0	0	7.2	.59	180	4.5	--
14N/3E-32F3	02-22-95	7.9	21.5	22.5	5.6	11	1.7	147	9.4	--
14N/3E-32H1	04-20-93	8.3	--	--	--	15	16	133	8.4	--
	05-21-93	8.2	25.0	27.0	--	14	1.6	160	10	--
14N/3E-32J1	04-20-93	8.3	--	--	--	14	.60	143	8.6	--
	05-18-94	8.0	19.5	25.0	--	13	1.5	144	9.2	--
14N/3E-32K1	04-20-93	8.1	--	--	--	20	3.4	150	9.4	--
	06-02-93	8.2	21.5	26.0	--	15	2.9	150	10	--
	06-02-93	8.2	21.5	26.0	--	--	--	--	--	--
	07-19-94	7.9	--	26.0	--	15	2.9	150	10	--
	07-20-94	7.9	--	26.0	--	16	2.8	150	9.9	--
14N/3E-32K3	05-04-93	7.7	--	26.0	--	9.2	2.0	170	9.0	--
	09-14-93	8.3	--	27.5	--	11	1.3	160	9.0	--
	05-17-94	8.0	21.0	25.0	--	12	1.3	150	9.6	--
	08-23-94	8.1	--	31.0	--	--	--	--	--	--
	12-22-94	8.1	15.0	26.0	1.9	13	1.2	150	9.3	--
14N/3E-32K4	05-04-93	7.7	18.5	24.5	--	6.3	2.4	160	7.6	--
	09-15-93	8.5	--	26.5	--	6.1	1.7	160	7.8	--
	05-17-94	7.6	22.5	24.5	--	12	3.2	170	8.8	--
	08-23-94	7.8	--	27.0	--	--	--	--	--	--
	12-22-94	7.6	16.0	25.0	--	8.3	1.6	160	8.4	--
14N/3E-32K5	05-05-93	7.7	--	25.0	--	5.1	1.8	150	7.3	--
	09-15-93	8.3	--	26.0	--	8.6	1.8	130	8.1	--
	05-18-94	7.9	17.0	23.0	--	11	2.2	140	8.7	--
	08-23-94	8.1	--	28.5	--	--	--	--	--	--
	12-22-94	7.8	14.0	24.0	5.4	13	2.4	150	10	--
14N/3E-32K6	05-05-93	7.8	26.5	25.5	--	24	5.3	250	14	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L-CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
14N/3E-32B1	05-21-96	--	56	--	60	180	69	12	0.26	0.008
14N/3E-32B2	06-02-93	--	70	70	74	180	74	15	.31	.020
	09-22-93	--	71	71	75	170	74	15	.31	.011
	07-19-94	--	74	74	81	170	71	15	.25	.022
	09-22-94	--	72	72	74	170	70	16	.27	.013
	05-21-96	--	69	--	72	170	72	15	.26	.012
14N/3E-32B3	09-23-93	--	130	134	135	150	66	6.5	.29	.014
	07-20-94	--	--	--	318	--	--	--	--	--
	09-23-94	--	170	167	170	150	66	4.4	.26	.023
	05-21-96	--	190	--	235	150	62	4.0	.27	.013
14N/3E-32F1	04-20-93	<1.0	--	--	96	120	65	13	--	--
	06-02-93	--	96	96	98	130	69	11	.29	.016
	11-03-95	--	96	94	103	140	72	10	--	--
14N/3E-32F2	02-22-95	--	88	86	92	180	74	21	.24	.075
14N/3E-32F3	02-22-95	--	84	82	86	140	71	10	.28	.016
14N/3E-32H1	04-20-93	<1.0	--	--	115	150	74	11	--	--
	05-21-93	--	120	120	118	150	68	8.4	.26	.026
14N/3E-32J1	04-20-93	<1.0	--	--	93	140	67	11	--	--
	05-18-94	--	98	100	107	140	63	10	.27	.019
14N/3E-32K1	04-20-93	<1.0	--	--	110	130	85	8.1	--	--
	06-02-93	--	110	107	110	140	85	7.2	.34	.022
	06-02-93	--	110	107	--	--	--	7.4	--	--
	07-19-94	--	98	98	114	140	87	7.8	.35	.023
	07-20-94	--	110	108	113	140	82	8.0	.34	.023
14N/3E-32K3	05-04-93	--	120	--	115	170	66	9.9	.25	.018
	09-14-93	--	210	204	106	160	60	11	.24	.016
	05-17-94	--	100	99	108	150	61	12	.24	.016
	08-23-94	--	110	108	--	--	--	--	.26	.013
	12-22-94	--	100	103	106	150	61	3.6	.24	.012
14N/3E-32K4	05-04-93	--	130	--	127	150	62	7.9	.48	.028
	09-15-93	--	130	127	125	140	60	8.0	.26	.019
	05-17-94	--	140	136	142	140	62	7.6	.68	.010
	08-23-94	--	130	126	--	--	--	--	.25	.012
	12-22-94	--	120	122	150	140	60	.20	.25	.014
14N/3E-32K5	05-05-93	--	--	--	121	120	51	8.5	.22	.012
	09-15-93	--	110	106	115	110	49	8.4	.23	.013
	05-18-94	--	130	127	136	110	56	8.4	.24	.019
	08-23-94	--	130	131	--	--	--	--	.25	.018
	12-22-94	--	140	137	146	110	56	3.6	.24	.018
14N/3E-32K6	05-05-93	--	--	--	282	190	130	5.5	.42	.085

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
14N/3E-32B1	05-21-96	70	550	--	<0.010	0.250	<0.015	<0.20	0.240	0.250
14N/3E-32B2	06-02-93	82	628	0.360	0.010	0.370	0.030	<0.20	9.80	4.10
	09-22-93	81	620	--	<0.010	0.380	<0.010	<0.20	6.20	4.00
	07-19-94	80	574	--	<0.010	0.300	0.020	0.30	2.10	1.60
	09-22-94	79	573	--	<0.010	0.310	<0.010	<0.20	2.00	1.50
	05-21-96	84	562	--	<0.010	0.180	0.020	<0.20	0.330	0.330
14N/3E-32B3	09-23-93	76	610	--	<0.010	2.70	0.020	<0.20	5.40	2.80
	07-20-94	--	--	--	--	--	--	--	--	--
	09-23-94	77	645	--	<0.010	2.60	<0.010	<0.20	9.40	8.70
	05-21-96	42	676	--	<0.010	2.60	0.020	<0.20	13.0	13.0
14N/3E-32F1	04-20-93	--	433	--	--	3.20	--	--	--	--
	06-02-93	63	504	--	<0.010	3.50	0.010	<0.20	0.020	<0.010
	11-03-95	62	542	--	<0.010	3.80	<0.015	<0.20	0.020	<0.010
14N/3E-32F2	02-22-95	72	595	0.230	0.010	0.240	0.030	<0.20	0.010	0.030
14N/3E-32F3	02-22-95	59	516	--	<0.010	2.90	<0.015	<0.20	0.580	0.560
14N/3E-32H1	04-20-93	--	488	--	--	2.50	--	--	--	--
	05-21-93	70	554	--	<0.010	2.10	0.030	<0.20	<0.010	<0.010
14N/3E-32J1	04-20-93	--	449	--	--	2.80	--	--	--	--
	05-18-94	70	532	2.98	0.020	3.00	0.040	<0.20	0.020	0.010
14N/3E-32K1	04-20-93	--	491	--	--	4.70	--	--	--	--
	06-02-93	65	554	--	<0.010	5.00	0.020	<0.20	<0.010	<0.010
	06-02-93	--	--	--	--	--	--	--	--	--
	07-19-94	61	572	--	<0.010	5.30	0.010	<0.20	<0.010	<0.010
	07-20-94	62	575	--	<0.010	5.30	<0.010	<0.20	<0.010	<0.010
14N/3E-32K3	05-04-93	73	627	1.28	0.020	1.30	0.020	<0.20	9.30	6.80
	09-14-93	74	509	--	<0.010	1.20	0.020	<0.20	2.00	1.80
	05-17-94	74	548	1.27	0.030	1.30	0.040	<0.20	0.350	0.390
	08-23-94	--	556	--	<0.010	1.20	0.020	<0.20	0.180	0.170
	12-22-94	74	502	--	<0.010	1.20	<0.015	<0.20	0.080	0.090
14N/3E-32K4	05-04-93	69	616	--	<0.010	2.20	0.030	<0.20	14.0	5.50
	09-15-93	73	576	1.99	0.010	2.00	0.250	<0.20	>2.00	3.50
	05-17-94	66	686	1.83	0.070	1.90	0.130	<0.20	6.30	5.70
	08-23-94	--	552	--	<0.010	1.80	0.020	<0.20	3.30	2.90
	12-22-94	68	499	--	<0.010	1.60	<0.015	<0.20	3.70	3.70
14N/3E-32K5	05-05-93	59	510	--	<0.010	2.90	0.010	<0.20	8.90	5.10
	09-15-93	59	474	--	<0.010	2.90	0.020	<0.20	1.60	1.50
	05-18-94	59	496	2.68	0.020	2.70	0.030	<0.20	0.250	0.280
	08-23-94	--	488	--	<0.010	2.50	0.010	<0.20	0.170	0.160
	12-22-94	60	511	--	<0.010	2.40	<0.015	<0.20	0.150	0.170
14N/3E-32K6	05-05-93	65	916	2.07	0.130	2.20	0.020	<0.20	5.40	3.50

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
14N/3E-32B1	05-21-96	--	--	34	13	--	1600	--	--
14N/3E-32B2	06-02-93	--	--	44	14	--	1700	--	--
	09-22-93	820	<1.0	39	12	<1.0	1700	<1.0	<1.0
	07-19-94	--	--	18	9.0	--	1600	--	--
	09-22-94	--	--	37	11	--	1600	--	--
	05-21-96	--	--	8	18	--	1500	--	--
14N/3E-32B3	09-23-93	--	--	--	--	--	1400	--	--
	07-20-94	--	--	--	--	--	--	--	--
	09-23-94	--	--	54	3.0	--	1400	--	--
	05-21-96	--	--	27	4.0	--	1400	--	--
14N/3E-32F1	04-20-93	--	--	--	--	--	--	--	--
	06-02-93	5.0	<1.0	45	13	<1.0	1400	<1.0	4.0
	11-03-95	--	--	--	--	--	1400	--	--
14N/3E-32F2	02-22-95	--	--	39	13	--	1700	--	--
14N/3E-32F3	02-22-95	--	--	44	10	--	1500	--	--
14N/3E-32H1	04-20-93	--	--	--	--	--	--	--	--
	05-21-93	<10	15	31	25	<0.50	1500	<1.0	--
14N/3E-32J1	04-20-93	--	--	--	--	--	--	--	--
	05-18-94	--	--	41	23	--	1300	--	--
14N/3E-32K1	04-20-93	--	--	--	--	--	--	--	--
	06-02-93	2.0	<1.0	32	22	<1.0	1100	<1.0	6.0
	06-02-93	2.0	<1.0	32	23	<1.0	--	<1.0	6.0
	07-19-94	3.0	<1.0	15	20	<1.0	1100	<1.0	9.0
	07-20-94	3.0	<1.0	35	23	<1.0	1100	<1.0	9.0
14N/3E-32K3	05-04-93	--	--	44	14	--	1400	--	--
	09-14-93	84	<1.0	40	16	<1.0	1500	<1.0	3.0
	05-17-94	--	--	36	22	--	1400	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	44	24	--	1300	--	--
14N/3E-32K4	05-04-93	--	--	36	13	--	1200	--	--
	09-15-93	482	<1.0	44	8.0	<1.0	1400	<1.0	5.0
	05-17-94	--	--	50	52	--	1300	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	41	6.0	--	1200	--	--
14N/3E-32K5	05-05-93	--	--	44	9.0	--	1100	--	--
	09-15-93	164	<1.0	39	7.0	<1.0	1200	<1.0	10
	05-18-94	--	--	35	15	--	1200	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	39	17	--	1200	--	--
14N/3E-32K6	05-05-93	--	--	30	18	--	1100	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
14N/3E-32B1	05-21-96	--	--	<3.0	--	15	<1.0	--	--
14N/3E-32B2	06-02-93	--	--	980	--	14	110	--	--
	09-22-93	<1.0	1.0	1100	1.0	10	57	61	<1.0
	07-19-94	--	--	6.0	--	13	14	--	--
	09-22-94	--	--	13	--	13	11	--	--
	05-21-96	--	--	22	--	10	3.0	--	--
14N/3E-32B3	09-23-93	--	--	500	--	--	56	--	--
	07-20-94	--	--	--	--	--	--	--	--
	09-23-94	--	--	64	--	41	30	--	--
	05-21-96	--	--	11	--	46	18	--	--
14N/3E-32F1	04-20-93	--	--	--	--	--	<30	--	--
	06-02-93	<1.0	<1.0	8.0	<1.0	60	<1.0	61	<1.0
	11-03-95	--	--	39	--	--	<1.0	--	--
14N/3E-32F2	02-22-95	--	--	3.0	--	17	53	--	--
14N/3E-32F3	02-22-95	--	--	5.0	--	58	<1.0	--	--
14N/3E-32H1	04-20-93	--	--	--	--	--	<30	--	--
	05-21-93	<1.0	<1.0	15	<1.0	44	32	55	<1.0
14N/3E-32J1	04-20-93	--	--	--	--	--	<30	--	--
	05-18-94	--	--	<3.0	--	44	2.0	--	--
14N/3E-32K1	04-20-93	--	--	--	--	--	<30	--	--
	06-02-93	<1.0	<1.0	3.0	<1.0	70	<1.0	47	<1.0
	06-02-93	<1.0	<1.0	--	<1.0	62	<1.0	47	<1.0
	07-19-94	<1.0	<1.0	4.0	<1.0	70	<1.0	48	<1.0
	07-20-94	<1.0	<1.0	3.0	<1.0	61	<1.0	49	<1.0
14N/3E-32K3	05-04-93	--	--	940	--	13	81	--	--
	09-14-93	<1.0	<1.0	31	<1.0	10	5.0	68	<1.0
	05-17-94	--	--	9.0	--	9	2.0	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	<3.0	--	13	<1.0	--	--
14N/3E-32K4	05-04-93	--	--	920	--	33	230	--	--
	09-15-93	<1.0	1.0	330	<1.0	40	69	73	<1.0
	05-17-94	--	--	2800	--	39	150	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	3.0	--	32	30	--	--
14N/3E-32K5	05-05-93	--	--	500	--	51	100	--	--
	09-15-93	<1.0	<1.0	120	<1.0	60	4.0	62	<1.0
	05-18-94	--	--	<3.0	--	62	1.0	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	3.0	--	61	<1.0	--	--
14N/3E-32K6	05-05-93	--	--	190	--	80	95	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
14N/3E-32B1	05-21-96	--	--	46	--	--	--	--	--
14N/3E-32B2	06-02-93	--	--	110	--	--	--	--	--
	09-22-93	<1	<1.0	160	--	8.0	2.0	<0.3	<0.2
	07-19-94	--	--	94	--	--	--	--	--
	09-22-94	--	--	100	--	--	--	--	--
	05-21-96	--	--	88	--	--	--	--	--
14N/3E-32B3	09-23-93	--	--	--	--	--	--	<.3	<.2
	07-20-94	--	--	--	--	--	--	--	--
	09-23-94	--	--	82	--	--	--	--	--
	05-21-96	--	--	130	--	--	--	--	--
14N/3E-32F1	04-20-93	--	--	--	--	--	--	--	--
	06-02-93	<1	<1.0	100	--	4.0	3.0	--	--
	11-03-95	--	--	--	--	--	--	--	--
14N/3E-32F2	02-22-95	--	--	47	--	--	--	--	--
14N/3E-32F3	02-22-95	--	--	120	--	--	--	--	--
14N/3E-32H1	04-20-93	--	--	--	--	--	--	--	--
	05-21-93	<1	<1.0	100	--	<3.0	5.0	--	--
14N/3E-32J1	04-20-93	--	--	--	--	--	--	--	--
	05-18-94	--	--	91	--	--	--	--	--
14N/3E-32K1	04-20-93	--	--	--	--	--	--	--	--
	06-02-93	1	<1.0	130	--	<1.0	5.0	--	--
	06-02-93	--	<1.0	120	--	<1.0	5.0	--	--
	07-19-94	<2	<1.0	120	--	3.0	6.0	--	--
	07-20-94	<2	<1.0	120	--	1.0	6.0	--	--
14N/3E-32K3	05-04-93	--	--	140	--	--	--	--	--
	09-14-93	<1	<1.0	140	<0.50	1.0	1.0	<.3	<.2
	05-17-94	--	--	130	--	--	--	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	110	--	--	--	--	--
14N/3E-32K4	05-04-93	--	--	190	--	--	--	--	--
	09-15-93	<1	<1.0	160	<0.50	4.0	4.0	<.3	<.2
	05-17-94	--	--	240	--	--	--	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	180	--	--	--	--	--
14N/3E-32K5	05-05-93	--	--	140	--	--	--	--	--
	09-15-93	<1	<1.0	180	<0.50	1.0	4.0	<.3	<.2
	05-18-94	--	--	160	--	--	--	--	--
	08-23-94	--	--	--	--	--	--	--	--
	12-22-94	--	--	130	--	--	--	--	--
14N/3E-32K6	05-05-93	--	--	290	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL
14N/3E-32B1	05-21-96	--	--	--	--	--	--	--
14N/3E-32B2	06-02-93	--	--	--	--	--	-96.4	-11.73
	09-22-93	0.1	0.40	--	--	-9.40	-96.5	-11.78
	07-19-94	--	--	--	--	--	-97.1	-11.57
	09-22-94	--	--	6.2	7.3	-9.60	-95.8	-11.72
	05-21-96	--	--	--	--	--	--	--
14N/3E-32B3	09-23-93	0.2	0.50	--	--	--	-93.5	-11.68
	07-20-94	--	--	--	--	--	-95.3	-11.48
	09-23-94	--	--	--	7.5	--	-92.8	-11.64
	05-21-96	--	--	--	--	--	--	--
14N/3E-32F1	04-20-93	--	--	--	--	--	--	--
	06-02-93	--	--	--	--	--	-94.3	-11.73
	11-03-95	--	--	--	--	--	-92.7	-11.36
14N/3E-32F2	02-22-95	--	--	--	--	--	-95.4	-11.53
14N/3E-32F3	02-22-95	--	--	--	--	--	-96.2	-11.58
14N/3E-32H1	04-20-93	--	--	--	--	--	--	--
	05-21-93	--	--	--	--	--	-95.2	-11.61
14N/3E-32J1	04-20-93	--	--	--	--	--	--	--
	05-18-94	--	--	--	--	--	-93.4	-11.43
14N/3E-32K1	04-20-93	--	--	--	--	--	--	--
	06-02-93	--	--	--	--	--	-92.4	-11.41
	06-02-93	--	--	--	--	--	--	--
	07-19-94	--	--	--	6.1	--	-91.8	-11.19
	07-20-94	--	--	--	7.1	--	-93.0	-11.17
14N/3E-32K3	05-04-93	--	--	--	--	--	-95.7	-11.85
	09-14-93	0.1	0.30	6.3	--	-9.50	-95.5	-11.97
	05-17-94	--	--	--	--	--	-96.2	-11.83
	08-23-94	--	--	--	--	--	-96.8	-11.78
	12-22-94	--	--	--	--	--	--	--
14N/3E-32K4	05-04-93	--	--	--	--	--	-94.2	-11.91
	09-15-93	0.2	0.60	10.7	--	-9.20	-94.9	-11.83
	05-17-94	--	--	--	--	--	-95.9	-11.77
	08-23-94	--	--	--	--	--	-95.0	-11.74
	12-22-94	--	--	--	--	--	--	--
14N/3E-32K5	05-05-93	--	--	--	--	--	-92.9	-11.72
	09-15-93	0.2	0.60	18.0	--	-9.40	-92.8	-11.72
	05-18-94	--	--	--	--	--	-92.9	-11.51
	08-23-94	--	--	--	--	--	-94.3	-11.44
	12-22-94	--	--	--	--	--	--	--
14N/3E-32K6	05-05-93	--	--	--	--	--	-86.1	-10.51

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)
14N/3E-32K6	FI1-230	351539116405606	09-15-93	1730	204.76	230.00	2472	1450	547	8.6
			05-18-94	1300	--	230.00	2472	1400	1470	7.5
			08-23-94	1015	205.20	230.00	2472	1410	1440	7.5
14N/3E-32M1	I-2A	351543116413401	04-20-93	1500	--	--	2550	--	--	--
			06-02-93	0930	--	--	2550	941	930	8.1
			09-15-93	1430	--	--	2550	948	546	8.0
			11-09-94	1200	--	--	2550	0	75	8.8
14N/3E-32N1S	SOC2-520	351525116413001	11-29-95	1050	250.65	520.00	2530	828	837	8.2
			05-14-96	1315	250.86	520.00	2530	802	805	8.3
14N/3E-32N2	SOC2-410	351525116413002	11-29-95	1240	250.61	410.00	2530	1100	1120	7.6
			05-14-96	1630	250.84	410.00	2530	1140	1140	7.7
14N/3E-32N3	SOC2-270	351525116413003	11-29-95	1440	249.42	270.00	2530	1320	1350	7.7
			05-22-96	1130	249.27	270.00	2530	1350	1330	7.6
14N/3E-32P2	SOC1-904	351527116412501	07-21-94	1200	243.40	904.00	2517	1180	1120	8.5
			09-15-94	1100	239.80	904.00	2517	1140	1130	8.5
14N/3E-32P3	SOC1-730	351527116412502	07-21-94	1800	245.69	730.00	2517	1020	908	8.3
			09-20-94	1830	242.97	730.00	2517	924	906	8.3
14N/3E-32P4	SOC1-580	351527116412503	07-22-94	1130	241.45	580.00	2517	867	810	7.8
			09-15-94	1500	243.24	580.00	2517	818	804	7.9
14N/3E-32P5	SOC1-405	351527116412504	07-20-94	1630	241.36	405.00	2517	871	842	7.5
			09-14-94	1830	241.53	405.00	2517	1030	1020	7.3
			05-01-95	1800	241.10	405.00	2517	919	928	7.4
14N/3E-32P6	SOC1-270	351527116412505	09-20-94	1730	242.75	270.00	2517	1260	1240	7.7
			05-01-95	1930	239.08	270.00	2517	1280	1280	7.9
14N/3E-32Q3	I-8	351525116411301	05-11-95	0040	--	--	2484	1370	1360	7.7
14N/3E-33A1	BC1	351614116394401	07-19-94	0920	145.83	185.00	2420	849	841	8.0
			11-08-94	1130	145.99	185.00	2420	831	--	8.1
			01-31-95	1000	145.88	185.00	2420	824	--	8.0
			05-02-95	1000	146.01	185.00	2420	834	834	8.1
			07-31-95	2000	146.02	185.00	2420	836	827	8.1
14N/3E-33B1	ALF4	351608116395701	11-10-94	0930	--	--	2405	770	834	8.4
14N/3E-33E2	PICNIC-220	351556116402401	05-25-94	1230	149.99	220.00	2425	954	949	7.6
			09-21-94	1600	149.39	220.00	2425	933	1020	7.6
			11-09-95	1030	150.42	220.00	2425	830	835	8.1
14N/3E-33E3	PICNIC-175	351556116402402	09-21-94	1500	149.37	175.00	2425	1030	907	7.6
			11-30-95	0930	150.38	175.00	2425	788	799	8.1
14N/3E-33F1	IX-1	351602116401101	05-25-94	1500	139.44	274.00	2416	781	788	8.0
14N/3E-33G1	ALF1	351551116395601	11-08-94	1200	--	--	2396	800	836	7.9
14N/3E-33G2	ALF2	351559116395701	11-30-94	1600	--	--	2400	776	786	8.3
14N/3E-33G3	ALF3	351602116355101	11-10-94	1230	--	--	2398	730	808	7.9

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STANDARD UNITS)	TEMPERATURE AIR (DEG C)	TEMPERATURE WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	CARBONATE WAT.DIS FET FIELD CO3 (MG/L)
14N/3E-32K6	09-15-93	8.3	--	26.0	--	33	6.8	250	32	--
	05-18-94	7.7	21.0	24.0	--	38	7.6	250	17	--
	08-23-94	7.7	--	26.0	--	39	7.8	260	17	--
14N/3E-32M1	04-20-93	8.0	--	--	--	19	4.3	152	9.0	--
	06-02-93	8.1	--	25.0	--	17	3.4	160	11	--
	09-15-93	8.5	--	26.5	--	18	3.5	170	10	--
	11-09-94	7.7	--	20.0	--	.15	.03	14	.80	--
14N/3E-32N1	11-29-95	8.0	21.5	24.0	0	11	1.2	150	8.0	--
	05-14-96	8.1	--	27.5	.6	11	.97	150	7.6	--
14N/3E-32N2	11-29-95	7.4	22.5	24.0	6.4	31	9.8	170	14	--
	05-14-96	7.6	33.0	26.5	7.0	42	11	170	15	--
14N/3E-32N3	11-29-95	7.6	23.0	23.0	6.2	43	11	210	17	--
	05-22-96	7.6	--	25.0	--	45	11	210	18	--
14N/3E-32P2	07-21-94	8.4	39.0	27.0	--	8.5	.86	210	3.9	--
	09-15-94	8.4	29.5	28.5	--	8.6	.88	220	3.9	--
14N/3E-32P3	07-21-94	8.1	36.0	28.0	--	5.4	1.1	180	2.7	--
	09-20-94	8.0	32.5	27.5	--	5.7	.95	180	2.9	--
14N/3E-32P4	07-22-94	7.7	36.0	27.0	--	6.2	1.4	150	6.3	--
	09-15-94	7.7	33.0	27.5	--	6.3	.97	160	6.3	--
14N/3E-32P5	07-20-94	7.3	32.0	24.0	--	9.0	3.2	160	9.7	--
	09-14-94	7.2	--	25.0	--	12	3.5	190	11	--
	05-01-95	7.3	23.5	25.0	3.6	14	3.6	170	10	--
14N/3E-32P6	09-20-94	7.5	32.5	24.5	--	25	5.6	210	14	--
	05-01-95	7.6	21.0	21.0	0	41	7.9	210	15	--
14N/3E-32Q3	05-11-95	7.5	14.5	23.0	3.4	56	14	190	18	--
14N/3E-33A1	07-19-94	7.9	33.0	26.0	--	15	1.6	150	10	--
	11-08-94	--	21.0	26.0	--	--	--	--	--	--
	01-31-95	--	13.5	24.5	7.0	--	--	--	--	--
	05-02-95	7.9	23.0	25.0	7.0	15	1.5	150	11	--
	07-31-95	7.9	37.5	25.0	6.6	16	1.6	150	9.7	--
14N/3E-33B1	11-10-94	8.5	12.0	25.5	--	15	1.2	150	14	--
14N/3E-33E2	05-25-94	7.5	31.5	26.5	--	12	3.7	190	9.8	--
	09-21-94	7.3	--	26.0	--	6.9	1.6	180	8.4	--
	11-09-95	8.0	25.0	23.0	2.6	11	1.4	150	9.2	--
14N/3E-33E3	09-21-94	7.5	--	29.5	--	12	2.7	190	11	--
	11-30-95	8.0	16.0	21.0	6.0	13	1.1	150	11	--
14N/3E-33F1	05-25-94	7.9	--	26.5	--	17	1.4	140	14	--
14N/3E-33G1	11-08-94	7.8	--	24.0	--	18	2.8	150	12	--
14N/3E-33G2	11-30-94	8.0	--	23.5	--	17	2.9	150	13	--
14N/3E-33G3	11-10-94	7.9	7.0	23.0	--	17	1.9	140	13	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L - CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
14N/3E-32K6	09-15-93	--	350	346	331	180	130	4.2	0.57	<0.001
	05-18-94	--	340	336	361	160	140	5.0	0.53	0.120
	08-23-94	--	370	357	367	160	130	6.9	0.52	0.230
14N/3E-32M1	04-20-93	<1.0	--	--	64	130	110	9.2	--	--
	06-02-93	--	100	101	99	140	110	7.2	0.43	0.027
	09-15-93	--	180	184	99	140	110	7.3	0.44	0.021
	11-09-94	--	16	15	11	1.4	9.5	0.70	--	--
14N/3E-32N1	11-29-95	--	62	60	72	170	73	12	0.24	0.054
	05-14-96	--	59	--	62	170	64	13	0.23	0.035
14N/3E-32N2	11-29-95	--	74	74	82	160	150	4.0	0.61	0.030
	05-14-96	--	78	--	82	170	150	4.5	0.60	0.027
14N/3E-32N3	11-29-95	--	130	132	145	190	180	3.6	0.71	0.038
	05-22-96	--	140	--	146	200	180	3.6	0.72	0.028
14N/3E-32P2	07-21-94	--	80	79	91	260	93	12	0.26	0.085
	09-15-94	--	85	85	96	260	96	12	0.24	0.087
14N/3E-32P3	07-21-94	--	56	54	64	190	73	20	0.25	0.064
	09-20-94	--	70	68	68	200	71	21	0.24	0.062
14N/3E-32P4	07-22-94	--	78	78	83	170	58	14	0.23	0.044
	09-15-94	--	76	76	85	160	59	12	0.22	0.049
14N/3E-32P5	07-20-94	--	92	91	103	130	85	6.7	0.35	0.022
	09-14-94	--	120	113	115	140	110	5.4	--	0.040
	05-01-95	--	95	95	105	120	95	4.8	0.41	0.023
14N/3E-32P6	09-20-94	--	92	96	113	180	130	3.9	0.41	0.041
	05-01-95	--	120	117	129	220	140	4.6	0.52	0.025
14N/3E-32Q3	05-11-95	--	130	132	143	230	160	4.2	0.61	0.053
14N/3E-33A1	07-19-94	--	170	166	174	120	53	5.1	0.22	0.042
	11-08-94	--	170	166	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--	--
	05-02-95	--	170	167	175	110	50	5.5	--	--
	07-31-95	--	170	171	173	120	50	4.7	--	--
14N/3E-33B1	11-10-94	--	140	142	143	130	66	4.4	--	--
14N/3E-33E2	05-25-94	--	--	--	150	160	62	8.7	0.37	0.036
	09-21-94	--	140	140	183	140	61	8.4	0.25	0.042
	11-09-95	--	130	133	147	120	56	8.4	--	--
14N/3E-33E3	09-21-94	--	160	165	153	160	62	4.5	0.26	0.060
	11-30-95	--	120	116	133	120	58	8.3	0.26	0.023
14N/3E-33F1	05-25-94	--	130	133	135	120	55	5.4	0.26	0.034
14N/3E-33G1	11-08-94	--	140	136	146	130	70	6.4	--	--
14N/3E-33G2	11-30-94	--	110	109	109	130	67	5.6	--	--
14N/3E-33G3	11-10-94	--	290	288	143	120	63	5.2	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
14N/3E-32K6	09-15-93	67	908	0.290	0.050	0.340	0.030	<0.20	>2.00	1.80
	05-18-94	74	944	--	0.030	<0.050	0.040	<0.20	0.470	0.490
	08-23-94	66	898	--	--	--	--	--	--	--
14N/3E-32M1	04-20-93	--	513	--	--	8.20	--	--	--	--
	06-02-93	63	589	--	<0.010	7.80	0.020	<0.20	<0.010	<0.010
	09-15-93	62	580	--	<0.010	8.60	0.020	<0.20	<0.010	<0.010
	11-09-94	15	--	--	<0.010	1.90	<0.010	<0.20	0.130	0.140
14N/3E-32N1	11-29-95	82	560	0.330	0.120	0.450	0.040	<0.20	0.060	0.040
	05-14-96	88	555	0.240	0.010	0.250	0.040	<0.20	0.040	0.020
14N/3E-32N2	11-29-95	64	692	--	<0.010	11.0	<0.015	<0.20	0.500	0.470
	05-14-96	63	728	--	<0.010	11.0	<0.015	<0.20	0.270	0.280
14N/3E-32N3	11-29-95	69	834	--	<0.010	9.40	<0.015	<0.20	1.30	1.10
	05-22-96	65	854	9.49	0.010	9.50	0.020	<0.20	0.950	0.870
14N/3E-32P2	07-21-94	27	704	--	0.020	<0.050	0.040	<0.20	0.050	0.050
	09-15-94	27	702	--	0.010	<0.050	0.010	<0.20	0.070	0.070
14N/3E-32P3	07-21-94	28	574	0.090	0.050	0.140	0.040	<0.20	7.10	2.90
	09-20-94	27	545	0.080	0.020	0.100	0.020	<0.20	6.40	3.40
14N/3E-32P4	07-22-94	85	566	0.410	0.010	0.420	0.030	0.30	6.40	1.20
	09-15-94	81	555	--	<0.010	0.400	0.010	<0.20	3.70	1.70
14N/3E-32P5	07-20-94	66	578	5.88	0.020	5.90	0.020	<0.20	10.0	4.90
	09-14-94	70	1020	--	<0.010	8.30	0.020	<0.20	18.0	16.0
	05-01-95	64	606	--	<0.010	7.90	<0.015	<0.20	10.0	10.0
14N/3E-32P6	09-20-94	56	708	--	<0.010	6.50	0.010	0.30	7.80	5.60
	05-01-95	57	818	--	<0.010	6.90	<0.015	<0.20	3.10	2.50
14N/3E-32Q3	05-11-95	66	884	8.28	0.120	8.40	0.050	<0.20	<0.010	<0.010
14N/3E-33A1	07-19-94	44	545	--	<0.010	7.40	<0.010	<0.20	0.030	0.020
	11-08-94	--	--	--	<0.010	7.40	<0.010	<0.20	0.030	0.030
	01-31-95	--	--	--	<0.010	7.50	<0.015	<0.20	0.010	0.020
	05-02-95	44	537	--	<0.010	7.60	<0.015	<0.20	0.040	0.030
	07-31-95	44	504	--	<0.010	7.70	<0.015	<0.20	0.020	0.030
14N/3E-33B1	11-10-94	64	557	4.93	0.170	5.10	0.040	<0.20	0.050	0.060
14N/3E-33E2	05-25-94	60	922	4.81	0.090	4.90	0.170	0.20	18.0	8.30
	09-21-94	69	611	--	<0.010	5.50	0.010	<0.20	22.0	20.0
	11-09-95	66	545	--	<0.010	5.00	<0.015	<0.20	1.30	1.00
14N/3E-33E3	09-21-94	59	676	--	<0.010	4.70	0.030	<0.20	10.0	9.00
	11-30-95	70	530	--	<0.010	5.40	<0.015	<0.20	0.150	0.130
14N/3E-33F1	05-25-94	64	535	--	<0.010	1.20	0.020	<0.20	<0.010	<0.010
14N/3E-33G1	11-08-94	71	553	4.09	0.010	4.10	<0.010	<0.20	0.030	0.030
14N/3E-33G2	11-30-94	73	538	5.46	0.040	5.50	0.010	<0.20	0.050	0.050
14N/3E-33G3	11-10-94	63	536	5.60	0.100	5.70	0.020	<0.20	0.020	0.030

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
14N/3E-32K6	09-15-93	69	<1.0	28	27	<1.0	1300	<1.0	<1.0
	05-18-94	--	--	17	42	--	1300	--	--
	08-23-94	--	--	--	--	--	1200	--	--
14N/3E-32M1	04-20-93	--	--	--	--	--	--	--	--
	06-02-93	3.0	<1.0	32	20	<1.0	1000	<1.0	4.0
	09-15-93	4.0	<1.0	33	19	<1.0	1100	<1.0	4.0
	11-09-94	--	--	--	--	--	850	--	--
14N/3E-32N1	11-29-95	--	--	15	<100	--	1000	--	--
	05-14-96	--	--	17	<100	--	1000	--	--
14N/3E-32N2	11-29-95	--	--	10	<100	--	790	--	--
	05-14-96	--	--	10	<100	--	790	--	--
14N/3E-32N3	11-29-95	--	--	16	<100	--	810	--	--
	05-22-96	--	--	16	79	--	900	--	--
14N/3E-32P2	07-21-94	--	--	10	10	--	1200	--	--
	09-15-94	--	--	10	9.0	--	1200	--	--
14N/3E-32P3	07-21-94	--	--	20	5.0	--	1300	--	--
	09-20-94	--	--	23	4.0	--	1200	--	--
14N/3E-32P4	07-22-94	--	--	24	7.0	--	920	--	--
	09-15-94	--	--	26	6.0	--	920	--	--
14N/3E-32P5	07-20-94	--	--	68	4.0	--	980	--	--
	09-14-94	--	--	--	--	--	960	--	--
	05-01-95	--	--	51	12	--	940	--	--
14N/3E-32P6	09-20-94	--	--	31	25	--	880	--	--
	05-01-95	--	--	20	51	--	1000	--	--
14N/3E-32Q3	05-11-95	--	--	7	55	--	940	--	--
14N/3E-33A1	07-19-94	--	--	17	6.0	--	1500	--	--
	11-08-94	--	--	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	1400	--	--
	07-31-95	--	--	--	--	--	1500	--	--
14N/3E-33B1	11-10-94	--	--	--	--	--	1300	--	--
14N/3E-33E2	05-25-94	--	--	59	30	--	1500	--	--
	08-21-94	--	--	61	2.0	--	1500	--	--
	11-09-95	--	--	--	--	--	1500	--	--
14N/3E-33E3	09-21-94	--	--	81	4.0	--	1400	--	--
	11-30-95	--	--	30	<100	--	1300	--	--
14N/3E-33F1	05-25-94	--	--	--	--	--	1400	--	--
14N/3E-33G1	11-08-94	--	--	--	--	--	1400	--	--
14N/3E-33G2	11-30-94	--	--	--	--	--	1300	--	--
14N/3E-33G3	11-10-94	--	--	--	--	--	1300	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
14N/3E-32K6	09-15-93	<1.0	<1.0	37	<1.0	100	71	35	2.0
	05-18-94	--	--	9.0	--	110	140	--	--
	08-23-94	--	--	6.0	--	--	180	--	--
14N/3E-32M1	04-20-93	--	--	--	--	--	<30	--	--
	06-02-93	<1.0	<1.0	5.0	<1.0	80	<1.0	43	<1.0
	09-15-93	<1.0	<1.0	<3.0	<1.0	80	<1.0	49	<1.0
	11-09-94	--	--	4.0	--	--	<1.0	--	--
14N/3E-32N1	11-29-95	--	--	8.0	--	10	53	--	--
	05-14-96	--	--	7.0	--	4	37	--	--
14N/3E-32N2	11-29-95	--	--	<3.0	--	110	25	--	--
	05-14-96	--	--	<3.0	--	93	5.0	--	--
14N/3E-32N3	11-29-95	--	--	<3.0	--	130	16	--	--
	05-22-96	--	--	<3.0	--	120	7.0	--	--
14N/3E-32P2	07-21-94	--	--	130	--	14	28	--	--
	09-15-94	--	--	5.0	--	<4	29	--	--
14N/3E-32P3	07-21-94	--	--	170	--	18	110	--	--
	09-20-94	--	--	32	--	10	110	--	--
14N/3E-32P4	07-22-94	--	--	400	--	21	130	--	--
	09-15-94	--	--	39	--	14	85	--	--
14N/3E-32P5	07-20-94	--	--	150	--	52	93	--	--
	09-14-94	--	--	56	--	--	100	--	--
	05-01-95	--	--	7.0	--	77	31	--	--
14N/3E-32P6	09-20-94	--	--	7.0	--	89	130	--	--
	05-01-95	--	--	8.0	--	110	23	--	--
14N/3E-32Q3	05-11-95	--	--	30	--	110	19	--	--
14N/3E-33A1	07-19-94	--	--	4.0	--	22	<1.0	--	--
	11-08-94	--	--	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	<3.0	--	--	<1.0	--	--
	07-31-95	--	--	5.0	--	--	3.0	--	--
14N/3E-33B1	11-10-94	--	--	12	--	--	4.0	--	--
14N/3E-33E2	05-25-94	--	--	2000	--	26	160	--	--
	09-21-94	--	--	59	--	22	41	--	--
	11-09-95	--	--	12	--	--	<1.0	--	--
14N/3E-33E3	09-21-94	--	--	99	--	31	68	--	--
	11-30-95	--	--	3.0	--	20	<1.0	--	--
14N/3E-33F1	05-25-94	--	--	97	--	--	8.0	--	--
14N/3E-33G1	11-08-94	--	--	9.0	--	--	140	--	--
14N/3E-33G2	11-30-94	--	--	<3.0	--	--	27	--	--
14N/3E-33G3	11-10-94	--	--	10	--	--	38	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
14N/3E-32K6	09-15-93	<1	<1.0	400	<0.50	2.0	133	2.4	0.74
	05-18-94	--	--	370	--	--	--	--	--
	08-23-94	--	--	--	--	--	--	--	--
14N/3E-32M1	04-20-93	--	--	--	--	--	--	--	--
	06-02-93	1	<1.0	150	--	2.0	5.0	--	--
	09-15-93	<1	<1.0	170	--	3.0	5.0	0.7	0.21
	11-09-94	--	--	--	--	--	--	--	--
14N/3E-32N1	11-29-95	--	--	90	--	--	--	--	--
	05-14-96	--	--	86	--	--	--	--	--
14N/3E-32N2	11-29-95	--	--	320	--	--	--	--	--
	05-14-96	--	--	370	--	--	--	--	--
14N/3E-32N3	11-29-95	--	--	420	--	--	--	--	--
	05-22-96	--	--	420	--	--	--	--	--
14N/3E-32P2	07-21-94	--	--	83	--	--	--	--	--
	09-15-94	--	--	84	--	--	--	--	--
14N/3E-32P3	07-21-94	--	--	98	--	--	--	--	--
	09-20-94	--	--	100	--	--	--	--	--
14N/3E-32P4	07-22-94	--	--	110	--	--	--	--	--
	09-15-94	--	--	100	--	--	--	--	--
14N/3E-32P5	07-20-94	--	--	140	--	--	--	--	--
	09-14-94	--	--	--	--	--	--	--	--
	05-01-95	--	--	230	--	--	--	0.3	<0.2
14N/3E-32P6	09-20-94	--	--	320	--	--	--	--	--
	05-01-95	--	--	560	--	--	--	7.7	2.4
14N/3E-32Q3	05-11-95	--	--	490	--	--	--	--	--
14N/3E-33A1	07-19-94	--	--	240	--	--	--	--	--
	11-08-94	--	--	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	--	--	--
	07-31-95	--	--	--	--	--	--	--	--
14N/3E-33B1	11-10-94	--	--	--	--	--	--	--	--
14N/3E-33E2	05-25-94	--	--	370	--	--	--	--	--
	09-21-94	--	--	150	--	--	--	--	--
	11-09-95	--	--	--	--	--	--	--	--
14N/3E-33E3	09-21-94	--	--	230	--	--	--	--	--
	11-30-95	--	--	180	--	--	--	--	--
14N/3E-33F1	05-25-94	--	--	--	--	--	--	--	--
14N/3E-33G1	11-08-94	--	--	--	--	--	--	--	--
14N/3E-33G2	11-30-94	--	--	--	--	--	--	--	--
14N/3E-33G3	11-10-94	--	--	--	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL
14N/3E-32K6	09-15-93	0.1	0.40	21.9	--	-21.10	-86.7	-10.48
	05-18-94	--	--	--	--	--	-85.4	-10.30
	08-23-94	--	--	--	--	--	-87.4	-10.33
14N/3E-32M1	04-20-93	--	--	--	--	--	--	--
	06-02-93	--	--	--	--	--	-90.2	-11.18
	09-15-93	0.1	0.40	--	7.5	--	-90.6	-11.10
	11-09-94	--	--	--	--	--	--	--
14N/3E-32N1	11-29-95	--	--	--	--	--	-95.8	-11.80
	05-14-96	--	--	--	--	--	--	--
14N/3E-32N2	11-29-95	--	--	--	--	--	-88.6	-10.67
	05-14-96	--	--	--	--	--	--	--
14N/3E-32N3	11-29-95	--	--	--	--	--	-88.0	-10.08
	05-22-96	--	--	--	--	--	--	--
14N/3E-32P2	07-21-94	--	--	--	--	--	-96.4	-11.71
	09-15-94	--	--	5.7	--	-7.40	-96.2	-11.84
14N/3E-32P3	07-21-94	--	--	--	--	--	-96.8	-11.71
	09-20-94	--	--	--	--	--	-96.4	-11.82
14N/3E-32P4	07-22-94	--	--	--	--	--	-98.1	-12.02
	09-15-94	--	--	--	7.8	--	-97.5	-12.12
14N/3E-32P5	07-20-94	--	--	--	--	--	-92.2	-11.45
	09-14-94	--	--	--	8.2	--	-89.7	-11.06
	05-01-95	0.2	0.60	--	--	--	-92.0	-11.21
14N/3E-32P6	09-20-94	--	--	--	--	--	-78.5	-9.13
	05-01-95	0.2	0.60	--	--	--	-81.4	-9.24
14N/3E-32Q3	05-11-95	--	--	--	--	--	-89.1	-10.46
14N/3E-33A1	07-19-94	--	--	--	--	--	-90.6	-11.25
	11-08-94	--	--	--	6.7	--	--	--
	01-31-95	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	--	--
	07-31-95	--	--	--	--	--	--	--
14N/3E-33B1	11-10-94	--	--	--	--	--	--	--
14N/3E-33E2	05-25-94	--	--	--	--	--	-92.9	-11.52
	09-21-94	--	--	--	8.0	--	-93.9	-11.62
	11-09-95	--	--	--	--	--	--	--
14N/3E-33E3	09-21-94	--	--	--	7.8	--	-91.7	-11.37
	11-30-95	--	--	--	--	--	-92.1	-11.36
14N/3E-33F1	05-25-94	--	--	--	--	--	-92.7	-11.46
14N/3E-33G1	11-08-94	--	--	--	--	--	--	--
14N/3E-33G2	11-30-94	--	--	--	--	--	--	--
14N/3E-33G3	11-10-94	--	--	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)
14N/3E-33G4	ALF7	351559116395702	11-09-94	1245	--	--	2400	800	860	7.8
14N/3E-33H1	MW2	351603116393801	11-10-94	1115	123.95	172.10	2412	833	--	8.0
			02-02-95	1030	123.63	172.10	2412	840	--	7.7
			05-04-95	1040	123.53	172.10	2412	841	843	8.0
			08-02-95	0915	123.47	172.10	2412	847	834	7.9
14N/3E-33H2	MW3	351559116393701	11-14-94	1030	116.65	190.43	2404	868	--	8.0
			12-05-94	1200	--	190.43	2404	857	--	8.1
			02-01-95	1400	116.44	190.43	2404	868	--	7.9
			05-03-95	1540	116.21	190.43	2404	865	866	8.1
			08-01-95	2100	116.21	190.43	2404	886	873	8.1
14N/3E-33H3	MW8	351557116393901	11-30-94	1230	--	--	2398	850	853	8.1
14N/3E-33J1	MW5	351549116393801	11-14-94	1630	89.10	116.96	2389	1020	--	8.1
			12-05-94	1600	--	116.96	2389	1040	--	8.0
			02-02-95	1625	88.39	116.96	2389	1030	--	7.9
			05-02-95	1340	87.14	116.96	2389	1060	1050	8.0
			08-02-95	1930	87.73	116.96	2389	1090	1070	8.1
14N/3E-33J2	LFMW7	351542116393702	07-20-94	1130	85.19	116.00	2390	1010	994	7.7
			11-09-94	1130	--	116.00	2390	1020	--	8.0
			02-01-95	1030	84.56	116.00	2390	1030	--	7.7
			05-03-95	1015	84.17	116.00	2390	1050	1050	8.3
			08-01-95	1220	83.93	116.00	2390	1070	1060	8.0
14N/3E-33N1	I-10	351525116402901	07-13-93	0200	150.24	330.00	2425	733	747	8.0
14N/3E-33Q1	TH-4	351527116395201	11-02-95	1700	--	168.00	2385	1570	1600	7.6
14N/3E-33R1	STP-3	351530116394401	12-29-92	1315	--	112.00	2379	1100	--	--
			07-13-93	0641	60.89	112.00	2379	1220	1220	8.1
			11-04-93	0805	--	112.00	2379	1140	1160	8.0
			11-16-94	1130	63.37	112.00	2379	1150	1150	7.9
			12-06-94	1630	--	112.00	2379	1120	1150	8.1
			02-06-95	1530	61.63	112.00	2379	1150	1160	7.9
			08-03-95	0900	61.30	112.00	2379	1220	1190	8.0
14N/3E-34D1	MW1	351604116393101	11-09-94	1630	146.19	201.36	2437	1050	--	8.0
			02-01-95	1620	146.04	201.36	2437	1070	--	7.8
			05-03-95	1800	140.93	201.36	2437	1050	1060	8.0
			08-01-95	1540	145.89	201.36	2437	1060	1050	7.8
14N/3E-34M1	MW4	351550116393101	11-14-94	1330	110.10	176.12	2398	842	--	8.3
			12-05-94	1430	--	176.12	2398	832	--	8.3
			02-02-95	1430	109.78	176.12	2398	845	--	8.1
			05-03-95	1110	111.30	176.12	2398	837	843	8.3
			08-02-95	1230	109.42	176.12	2398	852	843	8.1
14N/3E-34M2	LFMW6	351539116393001	07-20-94	1350	100.14	116.00	2420	851	844	8.0

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	CAR-BONATE WAT.DIS FET FIELD CO3 (MG/L)
14N/3E-33G4	11-09-94	7.9	--	25.0	--	20	2.3	150	15	--
14N/3E-33H1	11-10-94	--	7.0	23.0	--	--	--	--	--	--
	02-02-95	--	20.0	23.0	4.6	--	--	--	--	--
	05-04-95	7.8	22.5	23.5	4.2	16	1.2	150	12	--
	08-02-95	7.9	36.5	25.0	4.2	16	1.2	150	10	--
14N/3E-33H2	11-14-94	--	--	24.0	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--	--
	02-01-95	--	25.0	23.5	4.0	--	--	--	--	--
	05-03-95	8.0	28.5	24.0	5.0	17	1.6	150	11	--
	08-01-95	8.0	37.5	24.5	4.2	18	1.7	160	11	--
14N/3E-33H3	11-30-94	7.8	--	22.5	--	16	1.7	140	13	--
14N/3E-33J1	11-14-94	--	--	22.5	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--	--
	02-02-95	--	24.5	23.5	6.6	--	--	--	--	--
	05-02-95	7.9	24.5	24.0	6.2	27	2.5	170	15	--
	08-02-95	7.9	37.0	24.0	6.0	28	2.6	170	13	--
14N/3E-33J2	07-20-94	7.9	--	25.0	--	23	2.3	150	11	--
	11-09-94	--	19.0	24.5	--	--	--	--	--	--
	02-01-95	--	19.5	23.0	6.6	--	--	--	--	--
	05-03-95	7.9	26.0	25.5	7.0	27	2.7	170	13	--
	08-01-95	7.9	42.5	24.0	6.2	29	2.9	180	13	--
14N/3E-33N1	07-13-93	8.1	32.0	24.0	--	15	2.8	130	10	--
14N/3E-33Q1	11-02-95	7.6	18.0	24.0	4.2	52	5.6	250	18	--
14N/3E-33R1	12-29-92	7.0	--	23.5	--	--	--	195	--	--
	07-13-93	8.1	--	28.5	--	43	5.2	190	14	--
	11-04-93	8.0	22.0	20.0	--	40	4.8	190	14	--
	11-16-94	7.8	--	25.0	--	--	--	--	--	--
	12-06-94	7.7	--	--	--	35	4.1	190	14	--
	02-06-95	8.0	21.5	22.5	7.2	35	4.2	190	14	--
	08-03-95	7.8	28.5	23.0	7.2	37	4.4	190	14	--
14N/3E-34D1	11-09-94	--	18.0	24.5	--	--	--	--	--	--
	02-01-95	--	21.0	23.5	2.6	--	--	--	--	--
	05-03-95	7.9	27.5	24.0	2.6	17	2.4	200	8.9	--
	08-01-95	7.9	44.0	25.0	2.2	18	2.5	190	8.5	--
14N/3E-34M1	11-14-94	--	--	25.5	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--	--
	02-02-95	--	24.0	23.5	5.6	--	--	--	--	--
	05-03-95	8.1	25.0	24.0	5.6	11	1.0	160	11	--
	08-02-95	8.1	41.5	25.0	5.0	11	1.0	170	10	--
14N/3E-34M2	07-20-94	7.9	--	25.0	--	15	1.4	140	10	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	CARBONATE IT-LAB (MG/L - CO3)	ALKALINITY WAT DIS FIX END FIELD CACO3 (MG/L)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKALINITY LAB (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	BROMIDE DISSOLVED (MG/L AS BR)	IODIDE, DISSOLVED (MG/L AS I)
14N/3E-33G4	11-09-94	--	130	135	141	140	72	5.2	--	--
14N/3E-33H1	11-10-94	--	160	162	--	--	--	--	--	--
	02-02-95	--	150	151	--	--	--	--	--	--
	05-04-95	--	150	153	164	120	58	4.5	--	--
	08-02-95	--	160	159	160	120	58	4.3	--	--
14N/3E-33H2	11-14-94	--	160	160	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--	--
	02-01-95	--	170	171	--	--	--	--	--	--
	05-03-95	--	170	165	178	120	57	6.0	--	--
	08-01-95	--	170	173	184	120	61	5.3	--	--
14N/3E-33H3	11-30-94	--	150	152	148	130	76	5.3	--	--
14N/3E-33J1	11-14-94	--	110	112	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--	--
	02-02-95	--	120	116	--	--	--	--	--	--
	05-02-95	--	110	107	118	180	110	6.8	--	--
	08-02-95	--	110	109	114	190	120	6.1	--	--
14N/3E-33J2	07-20-94	--	120	116	123	170	97	7.1	0.36	0.033
	11-09-94	--	120	118	--	--	--	--	--	--
	02-01-95	--	120	117	--	--	--	--	--	--
	05-03-95	--	110	114	119	180	110	6.9	--	--
	08-01-95	--	120	117	117	180	110	6.3	--	--
14N/3E-33N1	07-13-93	--	110	111	111	120	66	7.8	0.26	0.015
14N/3E-33Q1	11-02-95	--	71	70	84	300	220	6.0	--	--
14N/3E-33R1	12-29-92	--	--	--	--	240	120	--	--	--
	07-13-93	--	120	113	112	260	120	6.5	0.40	0.021
	11-04-93	--	98	97	105	220	130	6.3	0.45	0.018
	11-16-94	--	99	98	104	200	150	6.9	--	--
	12-06-94	--	110	104	104	200	150	7.3	--	--
	02-06-95	--	100	104	104	200	150	6.3	--	--
	08-03-95	--	86	86	99	210	160	5.3	--	--
14N/3E-34D1	11-09-94	--	220	216	--	--	--	--	--	--
	02-01-95	--	220	219	--	--	--	--	--	--
	05-03-95	--	220	212	224	160	64	4.5	--	--
	08-01-95	--	210	213	222	170	65	4.0	--	--
14N/3E-34M1	11-14-94	--	160	154	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--	--
	02-02-95	--	150	151	--	--	--	--	--	--
	05-03-95	--	150	154	164	120	56	7.0	--	--
	08-02-95	--	160	162	165	120	56	6.4	--	--
14N/3E-34M2	07-20-94	--	150	149	156	130	61	6.4	0.24	0.054

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
14N/3E-33G4	11-09-94	70	577	5.03	0.070	5.10	0.010	<0.20	<0.010	<0.010
14N/3E-33H1	11-10-94	--	--	--	<0.010	7.30	<0.010	<0.20	<0.010	<0.010
	02-02-95	--	--	--	<0.010	7.40	<0.015	<0.20	0.020	0.020
	05-04-95	50	558	--	<0.010	7.30	<0.015	<0.20	0.020	0.020
	08-02-95	51	550	--	<0.010	7.50	<0.015	<0.20	<0.010	0.010
14N/3E-33H2	11-14-94	--	--	--	<0.010	5.90	<0.010	<0.20	0.030	0.040
	12-05-94	--	--	--	<0.010	<0.050	<0.015	<0.20	0.030	<0.010
	02-01-95	--	--	--	<0.010	6.00	<0.015	<0.20	0.030	0.030
	05-03-95	67	584	--	<0.010	6.20	<0.015	<0.20	0.030	0.020
	08-01-95	69	588	--	<0.010	6.30	<0.015	<0.20	0.010	0.020
14N/3E-33H3	11-30-94	70	565	5.39	0.010	5.40	0.010	<0.20	<0.010	0.010
14N/3E-33J1	11-14-94	--	--	--	<0.010	4.00	<0.010	<0.20	<0.010	<0.010
	12-05-94	--	--	--	<0.010	4.10	<0.015	<0.20	0.020	<0.010
	02-02-95	--	--	--	<0.010	4.10	<0.015	<0.20	<0.010	<0.010
	05-02-95	71	684	--	<0.010	4.30	<0.015	0.50	0.020	0.030
	08-02-95	73	708	--	<0.010	4.40	<0.015	<0.20	<0.010	<0.010
14N/3E-33J2	07-20-94	71	656	--	<0.010	3.90	<0.010	<0.20	0.010	<0.010
	11-09-94	--	--	--	<0.010	3.90	<0.010	<0.20	<0.010	<0.010
	02-01-95	--	--	--	<0.010	4.00	<0.015	<0.20	0.020	<0.010
	05-03-95	69	698	--	<0.010	4.20	<0.015	<0.20	<0.010	<0.010
	08-01-95	72	700	--	<0.010	4.20	<0.015	<0.20	<0.010	<0.010
14N/3E-33N1	07-13-93	68	496	--	<0.010	3.00	0.020	<0.20	0.030	0.030
14N/3E-33Q1	11-02-95	65	1000	8.49	0.010	8.50	<0.015	<0.20	<0.010	<0.010
14N/3E-33R1	12-29-92	--	750	--	--	3.70	--	--	--	--
	07-13-93	68	822	--	<0.010	4.80	0.020	<0.20	0.030	0.020
	11-04-93	82	762	--	<0.010	4.10	0.020	<0.20	<0.010	<0.010
	11-16-94	77	--	--	<0.010	3.20	<0.010	<0.20	<0.010	<0.010
	12-06-94	77	758	--	<0.010	3.20	<0.015	<0.20	<0.010	<0.010
	02-06-95	77	754	--	<0.010	3.10	<0.015	<0.20	<0.010	<0.010
	08-03-95	76	788	--	<0.010	2.90	<0.015	<0.20	<0.010	<0.010
14N/3E-34D1	11-09-94	--	--	--	<0.010	6.40	<0.010	<0.20	0.030	0.040
	02-01-95	--	--	--	<0.010	6.50	<0.015	<0.20	0.030	0.030
	05-03-95	30	670	--	<0.010	6.70	<0.015	<0.20	0.040	0.040
	08-01-95	31	666	--	<0.010	6.90	<0.015	<0.20	0.020	0.030
14N/3E-34M1	11-14-94	--	--	--	<0.010	6.60	<0.010	<0.20	<0.010	0.010
	12-05-94	--	--	--	<0.010	<0.050	<0.015	<0.20	0.010	<0.010
	02-02-95	--	--	--	<0.010	6.70	<0.015	<0.20	<0.010	0.020
	05-03-95	70	568	--	<0.010	6.70	<0.015	<0.20	<0.010	0.010
	08-02-95	73	574	--	<0.010	6.70	0.020	<0.20	0.010	0.020
14N/3E-34M2	07-20-94	57	557	--	<0.010	4.60	0.020	<0.20	0.020	<0.010

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ANTIMONY, DISSOLVED (UG/L AS SB)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	BORON, DISSOLVED (UG/L AS B)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)
14N/3E-33G4	11-09-94	--	--	--	--	--	1300	--	--
14N/3E-33H1	11-10-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-04-95	--	--	--	--	--	1500	--	--
	08-02-95	--	--	--	--	--	1400	--	--
14N/3E-33H2	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	1400	--	--
	08-01-95	--	--	--	--	--	1400	--	--
14N/3E-33H3	11-30-94	--	--	--	--	--	1300	--	--
14N/3E-33J1	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	1200	--	--
	08-02-95	--	--	--	--	--	1300	--	--
14N/3E-33J2	07-20-94	--	--	32	22	--	1300	--	--
	11-09-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	1300	--	--
	08-01-95	--	--	--	--	--	1300	--	--
14N/3E-33N1	07-13-93	--	--	34	--	--	1300	--	--
14N/3E-33Q1	11-02-95	--	--	--	--	--	1500	--	--
14N/3E-33R1	12-29-92	--	--	--	--	--	--	--	--
	07-13-93	--	--	27	--	--	1400	--	--
	11-04-93	9.0	<1.0	28	47	<1.0	1200	<1.0	5.0
	11-16-94	--	--	--	--	--	1100	--	--
	12-06-94	--	--	--	--	--	1200	--	--
	02-06-95	--	--	--	--	--	1200	--	--
	08-03-95	--	--	--	--	--	1200	--	--
14N/3E-34D1	11-09-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	2200	--	--
	08-01-95	--	--	--	--	--	2100	--	--
14N/3E-34M1	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	1400	--	--
	08-02-95	--	--	--	28	--	1400	--	--
14N/3E-34M2	07-20-94	--	--	29	42	--	1500	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
14N/3E-33G4	11-09-94	--	--	6.0	--	--	4.0	--	--
14N/3E-33H1	11-10-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-04-95	--	--	<3.0	--	--	<1.0	--	--
	08-02-95	--	--	3.0	--	--	<1.0	--	--
14N/3E-33H2	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	3.0	--	--	<1.0	--	--
	08-01-95	--	--	7.0	--	--	4.0	--	--
14N/3E-33H3	11-30-94	--	--	4.0	--	--	<1.0	--	--
14N/3E-33J1	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	<3.0	--	--	<1.0	--	--
	08-02-95	--	--	<3.0	--	--	<1.0	--	--
14N/3E-33J2	07-20-94	--	--	5.0	--	39	10	--	--
	11-09-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	4.0	--	--	<1.0	--	--
	08-01-95	--	--	8.0	--	--	4.0	--	--
14N/3E-33N1	07-13-93	--	--	15	--	50	<1.0	--	--
14N/3E-33Q1	11-02-95	--	--	60	--	--	67	--	--
14N/3E-33R1	12-29-92	--	--	--	--	--	--	--	--
	07-13-93	--	--	25	--	80	3.0	--	--
	11-04-93	<1.0	<1.0	29	2.0	80	<1.0	45	1.0
	11-16-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	<3.0	--	--	<1.0	--	--
	02-06-95	--	--	<3.0	--	--	<1.0	--	--
	08-03-95	--	--	<3.0	--	--	<1.0	--	--
14N/3E-34D1	11-09-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	9.0	--	--	<1.0	--	--
	08-01-95	--	--	<3.0	--	--	3.0	--	--
14N/3E-34M1	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	<3.0	--	--	<1.0	--	--
	08-02-95	--	--	4.0	--	--	<1.0	--	--
14N/3E-34M2	07-20-94	--	--	59	--	28	230	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
14N/3E-33G4	11-08-94	--	--	--	--	--	--	--	--
14N/3E-33H1	11-10-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-04-95	--	--	--	--	--	--	--	--
	08-02-95	--	--	--	--	--	--	--	--
14N/3E-33H2	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--	--
14N/3E-33H3	11-30-94	--	--	--	--	--	--	--	--
14N/3E-33J1	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	--	--	--
	08-02-95	--	--	--	--	--	--	--	--
14N/3E-33J2	07-20-94	--	--	240	--	--	--	--	--
	11-09-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--	--
14N/3E-33N1	07-13-93	<1	--	130	<0.50	--	--	--	--
14N/3E-33Q1	11-02-95	--	--	--	--	--	--	--	--
14N/3E-33R1	12-29-92	--	--	--	--	--	--	--	--
	07-13-93	1	--	420	<0.50	--	--	--	--
	11-04-93	<1	<1.0	320	--	2.0	6.0	--	--
	11-16-94	--	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--	--
	02-06-95	--	--	--	--	--	--	--	--
	08-03-95	--	--	--	--	--	--	--	--
14N/3E-34D1	11-09-94	--	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--	--
14N/3E-34M1	11-14-94	--	--	--	--	--	--	--	--
	12-05-94	--	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--	--
	08-02-95	--	--	--	--	--	--	--	--
14N/3E-34M2	07-20-94	--	--	190	--	--	--	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	TRITIUM WATER MOLE-CULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL
14N/3E-33G4	11-09-94	--	--	--	--	--	--	--
14N/3E-33H1	11-10-94	--	--	--	6.6	--	--	--
	02-02-95	--	--	--	--	--	--	--
	05-04-95	--	--	--	--	--	--	--
	08-02-95	--	--	--	--	--	--	--
14N/3E-33H2	11-14-94	--	--	--	7.2	--	--	--
	12-05-94	--	--	--	--	--	--	--
	02-01-95	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--
14N/3E-33H3	11-30-94	--	--	--	--	--	--	--
14N/3E-33J1	11-14-94	--	--	--	9.0	--	--	--
	12-05-94	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	--	--
	08-02-95	--	--	--	--	--	--	--
14N/3E-33J2	07-20-94	--	--	--	--	--	-93.9	-11.45
	11-09-94	--	--	--	9.1	--	--	--
	02-01-95	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--
14N/3E-33N1	07-13-93	--	--	--	6.9	--	-91.1	-11.28
14N/3E-33Q1	11-02-95	--	--	--	--	--	-89.3	-10.79
14N/3E-33R1	12-29-92	--	--	--	--	--	--	--
	07-13-93	--	--	--	8.7	--	-91.8	-10.99
	11-04-93	--	--	--	--	--	-92.0	-11.13
	11-16-94	--	--	--	--	--	--	--
	12-06-94	--	--	--	--	--	--	--
	02-06-95	--	--	--	--	--	--	--
	08-03-95	--	--	--	--	--	--	--
14N/3E-34D1	11-09-94	--	--	--	7.4	--	--	--
	02-01-95	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--
14N/3E-34M1	11-14-94	--	--	--	6.6	--	--	--
	12-05-94	--	--	--	--	--	--	--
	02-02-95	--	--	--	--	--	--	--
	05-03-95	--	--	--	--	--	--	--
	08-02-95	--	--	--	--	--	--	--
14N/3E-34M2	07-20-94	--	--	--	--	--	-94.9	-11.49

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	LOCAL NAME	STATION NUMBER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FT)	DEPTH OF WELL, TOTAL (FT)	ALT. OF LAND SURFACE DATUM (FT. ABOVE NGVD)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND ARD UNITS
14N/3E-34M2	LFMW6	351539116393001	11-08-94	1500	98.75	116.00	2420	844	--	8.1
			01-31-95	1500	98.32	116.00	2420	847	--	8.1
			05-02-95	1750	97.95	116.00	2420	842	854	8.1
			08-01-95	0920	92.71	116.00	2420	872	855	8.1

STATE WELL NUMBER	DATE	CAR-BONATE IT-LAB (MG/L - CO3)	ALKA-LINITY WAT DIS FIX END FIELD CAC03 (MG/L)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	BROMIDE DIS-SOLVED (MG/L AS BR)	IODIDE, DIS-SOLVED (MG/L AS I)
14N/3E-34M2	11-08-94	--	140	143	--	--	--	--	--	--
	01-31-95	--	140	142	--	--	--	--	--	--
	05-02-95	--	150	149	152	130	64	6.8	--	--
	08-01-95	--	140	141	150	130	64	5.9	--	--

STATE WELL NUMBER	DATE	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	CAR-BONATE WAT.DIS FET FIELD CO3 (MG/L)
14N/3E-34M2	11-08-94	--	--	23.5	--	--	--	--	--	--
	01-31-95	--	21.0	23.0	7.4	--	--	--	--	--
	05-02-95	7.9	24.5	24.5	7.4	16	1.3	150	10	--
	08-01-95	8.0	27.5	24.0	7.4	17	1.4	160	9.3	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE --180 DEG. C DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N)	PHOS-PHORUS DIS-SOLVED (MG/L AS P)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P)
14N/3E-34M2	11-08-94	--	--	--	<0.010	4.80	<0.010	<0.20	<0.010	<0.010
	01-31-95	--	--	4.59	0.010	4.60	0.015	0.20	0.010	0.010
	05-02-95	58	558	--	<0.010	4.60	<0.015	<0.20	0.030	0.020
	08-01-95	60	565	--	<0.010	4.50	<0.015	<0.20	<0.010	<0.010

STATE WELL NUMBER	DATE	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ANTI-MONY, DIS-SOLVED (UG/L AS SB)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	BORON, DIS-SOLVED (UG/L AS B)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)
14N/3E-34M2	11-08-94	--	--	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	1300	--	--
	08-01-95	--	--	--	--	--	1400	--	--

STATE WELL NUMBER	DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)
14N/3E-34M2	11-08-94	--	--	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	19	--	--	45	--	--
	08-01-95	--	--	10	--	--	26	--	--

Appendix C. Water-quality data for selected wells, lysimeters, and a spring in Irwin Basin at Fort Irwin National Training Center, California, 1992–96—Continued

STATE WELL NUMBER	DATE	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	THALLIUM, DISSOLVED (UG/L AS TL)	ZINC, DISSOLVED (UG/L AS ZN)	URANIUM NATURAL DISSOLVED (UG/L AS U)	TRITIUM TOTAL (PCI/L)	TRITIUM IN WATER MOLECULES (TU)
14N/3E-34M2	11-08-94	--	--	--	--	--	--	--	--
	01-31-95	--	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--	--

STATE WELL NUMBER	DATE	TRITIUM WATER MOLECULES COUNT ERROR (TU)	TRITIUM 2 SIGMA WATER, WHOLE, TOTAL (PCI/L)	CARBON 14 PERCENT MODERN	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL
14N/3E-34M2	11-08-94	--	--	--	6.9	--	--	--
	01-31-95	--	--	--	--	--	--	--
	05-02-95	--	--	--	--	--	--	--
	08-01-95	--	--	--	--	--	--	--

TABLES

Table 1. State well number, local name, and well-construction data for wells in Irwin Basin at Fort Irwin National Training Center, California

[ft, foot; in., inch; —, no data; Obs., observation; Prod., production]

State well number	Local name	Altitude of land surface (ft above sea level)	Depth drilled (ft)	Date of completion	Depth of well (ft)	Perforated interval (ft)	Diameter of well (in.)	Water use at site
13N/3E-4B1	SP1-240	2,390	260	02–24–94	240	220–240	2	Obs.
13N/3E-4B2	SP1-180	2,390	260	02–24–94	180	160–180	2	Obs.
13N/3E-4B3	SP1-130	2,390	260	02–24–94	130	110–130	2	Obs.
13N/3E-4B4	NIT3	2,380	99	11–10–94	97	92–97	2	Obs.
13N/3E-4B5LYS	NIT3 (Red)	2,380	99	11–10–94	—	[1]68	—	Obs.
13N/3E-4B6LYS	NIT3 (Yellow)	2,380	99	11–10–94	—	[1]46	—	Obs.
13N/3E-4B7LYS	NIT3 (Green)	2,380	99	11–10–94	—	[1]35	—	Obs.
13N/3E-4B8LYS	NIT3 (Blue)	2,380	99	11–10–94	—	[1]15	—	Obs.
13N/3E-4C1	WC1-320	2,399.74	340	07–02–93	320	300–320	2	Obs.
13N/3E-4C2	WC1-220	2,399.74	340	07–02–93	220	200–220	2	Obs.
13N/3E-4C3	WC1-150	2,399.74	340	07–02–93	150	130–150	2	Obs.
13N/3E-4D1	WC2-320	2,419.85	320	08–13–93	320	300–320	2	Obs.
13N/3E-4D2	WC2-250	2,419.85	320	08–13–93	250	230–250	2	Obs.
13N/3E-4D3	WC2-170	2,419.85	320	08–13–93	170	150–170	2	Obs.
13N/3E-4G1	STP-1	2,385.63	140	12–27–89	140	90–140	5	Obs.
13N/3E-4K1	STP-4	2,375.28	85	12–18–89	85	65–85	5	Obs.
13N/3E-4K2	NIT2-238	2,385	238	11–05–94	238	228–238	2	Obs.
13N/3E-4K3	NIT2-190	2,385	238	11–05–94	190	170–190	2	Obs.
13N/3E-4K4	NIT2-135	2,385	238	11–05–94	135	115–135	2	Obs.
13N/3E-4M1	IT-1	2,410	384	11–26–80	351	141–341	14	Prod.[2]
13N/3E-4Q1	IX-3	2,385	300	10–14–80	300	90–290	4	Obs.
13N/3E-4Q2	NIT1	2,385	97	11–03–94	90	85–90	2	Obs.
13N/3E-4Q3LYS	NIT1 (Red)	2,385	97	11–03–94	—	[1]75	—	Obs.
13N/3E-4Q4LYS	NIT1 (Yellow)	2,385	97	11–03–94	—	[1]53.5	—	Obs.
13N/3E-4Q5LYS	NIT1 (Green)	2,385	97	11–03–94	—	[1]35	—	Obs.
13N/3E-4Q6LYS	NIT1 (Blue)	2,385	97	11–03–94	—	[1]15	—	Obs.
13N/3E-5D1	I-1	2,521.27	524	03– –41	524	235–500	14	Prod.[2]
13N/3E-5G1	TH-5	2,460	481	12–15–87	450	210–350 380–440	4	Obs.
13N/3E-5G2	I-9	2,460	457	01–29–88	450	210–440	14	Prod.[3]
13N/3E-6P1	TH-1	2,700	370	01–17–88	365	—	4	Obs.
13N/3E-8B1	AD1-255	2,500	277	03–06–94	255	235–255	2	Obs.
13N/3E-9B1	STP-5	2,378.27	120	01–09–90	120	70–120	5	Obs.
13N/3E-10D1	STP-6	2,344.85	65	01–10–90	65	15–65	5	Obs.
13N/3E-10E1	WC3-243	2,342.65	260	08–15–93	243	223–243	2	Obs.
13N/3E-10E2	WC3-170	2,342.65	260	08–15–93	170	150–170	2	Obs.
13N/3E-10E3	WC3-60	2,342.65	260	08–15–93	60	40–60	2	Obs.

See footnotes at end of table.

Table 1. State well number, local name, and well-construction data for wells in Irwin Basin at Fort Irwin National Training Center, California—Continued

State well number	Local name	Altitude of land surface (ft above sea level)	Depth drilled (ft)	Date of completion	Depth of well (ft)	Perforated interval (ft)	Diameter of well (in.)	Water use at site
14N/3E-31K1	TH-3	2,610	416	01–13–88	410	260–405	4	Obs.
14N/3E-32B1	NH1-630	2,530	660	03–07–93	630	610–630	2	Obs.
14N/3E-32B2	NH1-540	2,530	660	03–07–93	540	520–540	2	Obs.
14N/3E-32B3	NH1-300	2,530	660	03–07–93	300	280–300	2	Obs.
14N/3E-32F1	I-3A	2,500	500	10– –81	494	300–494	14	Prod.
14N/3E-32F2	BASEBALL-460	2,530	500	11–08–94	460	440–460	2	Obs.
14N/3E-32F3	BASEBALL-290	2,530	500	11–08–94	290	270–290	2	Obs.
14N/3E-32H1	I-7	2,461.33	510	09– –62	490	220–475	14	Prod.
14N/3E-32J1	I-6	2,468.41	340	11– –43	340	200–310	14	Prod.
			550	11– –51	550	340–536		
14N/3E-32K1	I-5A	2,483.76	551	11– –81	551	320–340	14	Prod.
						375–535		
14N/3E-32K3	FI1-440	2,472.43	493	02–23–93	440	420–440	2	Obs.
14N/3E-32K4	FI1-355	2,472.43	493	02–23–93	355	335–355	2	Obs.
14N/3E-32K5	FI1-290	2,472.43	493	02–23–93	290	270–290	2	Obs.
14N/3E-32K6	FI1-230	2,472.43	493	02–23–93	230	210–230	2	Obs.
14N/3E-32L1	I-3	2,496.89	--	11– –42	—	234–460	14	Prod.[4]
14N/3E-32M1	I-2A	2,550	--	02–07–84	—	290–560	14	Prod.
14N/3E-32N1	SOC2-520	2,523	540	05–10–95	520	500–520	2	Obs.
14N/3E-32N2	SOC2-410	2,523	540	05–10–95	410	390–410	2	Obs.
14N/3E-32N3	SOC2-270	2,523	540	05–10–95	270	250–270	2	Obs.
14N/3E-32P1	I-2	2,507.24	521	05– –41	521	215–413	14	Prod.[4]
14N/3E-32P2	SOC1-904	2,517	905	06–08–94	904	850–870	2	Obs.
						894–904		
14N/3E-32P3	SOC1-730	2,517	905	06–08–94	730	710–730	2	Obs.
14N/3E-32P4	SOC1-580	2,517	905	06–08–94	580	560–580	2	Obs.
14N/3E-32P5	SOC1-405	2,517	905	06–08–94	405	385–405	2	Obs.
14N/3E-32P6	SOC1-270	2,517	905	06–08–94	270	250–270	2	Obs.
14N/3E-32Q1	I-4	2,471.30	430	12– –42	430	185–392	14	Prod.[3]
14N/3E-32Q2	I-5	2,483.63	551	12– –42	551	220–312	14	Prod.[4]
						350–537		
14N/3E-32Q3	I-8	2,495	750	08– –62	726[5]	[5]210–726	14	Prod.[3]
14N/3E-33A1	BC1	2,420	185	02–22–94	185	145–185	2	Obs.
14N/3E-33B1	ALF4	2,405	—	—	—	—	—	Obs.
14N/3E-33E2	PICNIC-220	2,425	260	03–09–94	220	200–220	2	Obs.
14N/3E-33E3	PICNIC-175	2,425	260	03–09–94	175	155–175	2	Obs.
14N/3E-33F1	IX-1	2,416.28	275	09–25–80	274	179–259	4	Obs.

See footnotes at end of table.

Table 1. State well number, local name, and well-construction data for wells in Irwin Basin at Fort Irwin National Training Center, California—Continued

State well number	Local name	Altitude of land surface (ft above sea level)	Depth drilled (ft)	Date of completion	Depth of well (ft)	Perforated interval (ft)	Diameter of well (in.)	Water use at site
14N/3E-33G1	ALF1	2,395.90	—	—	—	—	—	Obs.
14N/3E-33G2	ALF2	2,399.70	—	—	—	—	—	Obs.
14N/3E-33G3	ALF3	2,398.00	—	—	—	—	—	Obs.
14N/3E-33G4	ALF7	2,399.60	—	—	—	—	—	Obs.
14N/3E-33H1	MW2	2,411.59	—	—	172.10	—	4	Obs.
14N/3E-33H2	MW3	2,404.34	—	—	190.43	138–188	4	Obs.
14N/3E-33H3	MW8	2,398.00	—	—	—	—	—	Obs.
14N/3E-33J1	MW5	2,389.21	—	—	116.96	—	4	Obs.
14N/3E-33J2	LFMW7	2,390	116.5	04–20–94	116	76–116	5	Obs.
14N/3E-33N1	I-10	2,424.69	336	02–27–88	330	160–320	14	Prod.[3]
14N/3E-33Q1	TH-4	2,385.03	185	12–21–87	168	98–158	4	Obs.
14N/3E-33R1	STP-3	2,379.13	112	12–28–89	112	72–112	5	Obs.
14N/3E-34D1	MW1	2,437.15	—	—	201.36	—	4	Obs.
14N/3E-34M1	MW4	2,398.39	—	—	176.12	—	4	Obs.
14N/3E-34M2	LFMW6	2,420	116	04–04–94	116	96–116	5	Obs.
([6])	STP7	2,356	70	02–08–96	70	30–70	4	Obs.
([6])	STP8	2,358	70	02–06–96	70	30–70	4	Obs.
([6])	STP9	2,370	80	02–08–96	80	40–80	4	Obs.
([6])	STP11	2,394	90	02–09–96	90	50–90	4	Obs.

[1]Lysimeter, depth of installation.
[2]Destroyed in 1996.
[3]Unused in 1996.
[4]Capped.
[5]Caliper log run on well to determine perforated interval.
[6]State well numbers have not been established for these wells.

Table 2. Annual ground-water pumpage for Irwin, Bicycle, and Langford Basins near Fort Irwin National Training Center, California, 1941–93

[—, no data]

Year	Irwin Basin[1]	Bicycle Basin[2]	Langford Basin[3]	Total[4]
	Pumpage in acre-feet			
1941	33	—	—	33
1942	130	—	—	130
1943	350	—	—	350
1944	480	—	—	480
1945	182	—	—	182
1946	57	—	—	57
1947	55	—	—	55
1948	55	—	—	55
1949	55	—	—	55
1950	55	—	—	55
1951	293	—	—	293
1952	336	—	—	336
1953	671	—	—	671
1954	668	—	—	668
1955	598	—	—	598
1956	602	—	—	602
1957	704	—	—	704
1958	686	—	—	686
1959	655	—	—	655
1960	746	—	—	746
1961	881	—	—	881
1962	1,119	—	—	1,119
1963	1,147	—	—	1,147
1964	1,202	—	—	1,202
1965	1,305	—	—	1,305
1966	1,509	—	—	1,509
1967	827	822	—	1,649
1968	764	820	—	1,584
1969	727	954	—	1,681
1970	549	896	—	1,445
1971	364	608	—	972
1972	399	480	—	879
1973	321	157	—	478
1974	200	170	—	370
1975	236	210	—	446
1976	236	393	—	629
1977	64	123	—	187
1978	283	493	—	776
1979	502	462	—	964
1980	721	866	—	1,587
1981	660	793	—	1,453
1982	630	758	—	1,388
1983	720	866	—	1,586
1984	1,675	689	—	2,364
1985	1,133	1,243	—	2,376
1986	1,315	1,329	—	2,644
1987	1,927	822	—	2,749
1988	1,700	1,033	—	2,733
1989	1,696	829	—	2,525
1990	1,868	1,312	—	3,180
1991	1,051	1,380	—	2,431
1992	1,012	1,134	619	2,765
1993	997	757	1,114	2,868

[1] Pumpage in Irwin Basin: 1941-71, 1973-77, 1980—James M. Montgomery and Associates, 1981. 1972, 1978-89, 1981—Estimated by U.S. Geological Survey. 1982-83—Wilson F. So and Associates, 1989. 1984-93—U.S. Army, Fort Irwin Directorate of Public Works.

[2] Pumpage in Bicycle Basin: 1967-71, 1973-79—James M. Montgomery and Associates, 1981. 1972, 1980—Estimated by U.S. Geological Survey. 1981-83—Wilson F. So and Associates, 1989. 1984-93—U.S. Army, Fort Irwin Directorate of Public Works.

[3] Pumpage in Langford Basin: 1992-93—U.S. Army, Fort Irwin Directorate of Public Works.

[4] Total is sum of information from various sources.

Table 3. Estimate of wastewater recharge in Irwin Basin on the basis of wastewater inflow, evaporation, and evapotranspiration at Fort Irwin National Training Center, California, 1941–93

[All values are reported in acre-feet per year; —, not irrigated during indicated year; ft/yr, foot per year]

Year	Wastewater inflow estimated from base pumpage[1,2]		Potential evaporation from ponds[3]	Potential evapotranspiration from fields[4]	Range of estimated recharge[5,6]	
	Minimum	Maximum			Minimum	Maximum
1941	19	23	53	—	0	0
1942	75	91	53	—	22	38
1943	203	245	53	—	150	192
1944	278	336	53	—	225	283
1945	106	127	53	—	53	74
1946	33	40	53	—	0	0
1947	32	39	53	—	0	0
1948	32	39	53	—	0	0
1949	32	39	53	—	0	0
1950	32	39	53	—	0	0
1951	170	205	53	—	117	152
1952	195	235	53	—	142	182
1953	389	470	53	—	336	417
1954	387	468	53	—	334	415
1955	347	419	112	365	294	366
1956	349	421	112	365	0	0
1957	408	493	112	365	0	13
1958	398	480	112	365	0	0
1959	380	459	112	365	0	0
1960	433	522	112	365	0	42
1961	511	617	112	365	31	137
1962	649	783	112	365	169	303
1963	665	803	112	365	185	323
1964	697	841	112	365	217	361
1965	757	914	112	365	277	434
1966	875	1,056	112	365	395	576
1967	956	1,154	112	365	476	674
1968	919	1,109	112	365	439	629
1969	975	1,177	112	365	495	697
1970	838	1,012	112	365	358	532
1971	564	680	112	365	84	200
1972	510	615	112	—	398	503
1973	277	335	112	—	165	223
1974	215	259	112	—	103	147
1975	259	312	112	—	147	200
1976	365	440	112	—	253	328
1977	108	131	112	—	0	19

See footnotes at end of table.

Table 3. Estimate of wastewater recharge in Irwin Basin on the basis of wastewater inflow, evaporation, and evapotranspiration at Fort Irwin National Training Center, California, 1941–93—Continued

Year	Wastewater inflow estimated from base pumpage[1,2]		Potential evaporation from ponds[3]	Potential evapotranspiration from fields[4]	Range of estimated recharge[5,6]	
	Minimum	Maximum			Minimum	Maximum
1978	450	543	112	—	338	431
1979	559	675	112	—	447	563
1980	920	1,111	112	—	808	999
1981	843	1,017	112	365	363	537
1982	805	972	112	365	325	492
1983	920	1,110	112	365	440	630
1984	1,371	1,655	112	365	891	1,175
1985	1,378	1,663	112	365	898	1,183
1986	1,534	1,851	310	430	794	1,111
1987	1,594	1,924	310	430	854	1,184
1988	1,585	1,913	310	430	845	1,173
1989	1,465	1,768	310	430	725	1,028
1990	1,844	2,226	310	430	1,104	1,486
1991	1,410	1,702	310	430	670	962
1992	1,604	1,936	310	430	864	1,196
1993	1,663	2,008	310	430	923	1,268
Average	649	783	126	216	324	450

[1]Minimum inflow estimated as 58 percent of total pumpage listed in table 2.

[2]Maximum inflow estimated as 70 percent of total pumpage listed in table 2.

[3]Potential evaporation is estimated by multiplying the area of the sewage ponds by the potential evaporation rate of 6.6 ft/yr (David Inouye, California Department of Water Resources, written commun., 1996). The area of the ponds was 8 acres from 1941 to 1954, 17 acres from 1955 to 1985, and 47 acres from 1986 to 1993.

[4]Potential evapotranspiration is estimated by multiplying the area of the grass areas irrigated with wastewater (driving range, golf course, and sprinkler-system pivot) by the consumptive-use of 6.3 ft/yr (Sandra Owen-Joyce, U.S. Geological Survey, oral commun., 1996). The grass area included 0 acres from 1941 to 1954, 58 acres from 1955 to 1985, and 68 acres from 1986 to 1993.

[5]Minimum recharge is estimated by subtracting the sum of the estimated potential evaporation and evapotranspiration from the minimum estimated amount of wastewater inflow.

[6]Maximum recharge is estimated by subtracting the sum of the estimated potential evaporation and evapotranspiration from the maximum estimated amount of wastewater inflow.

Table 4. Ground-water budget for Irwin Basin at Fort Irwin National Training Center, California, 1993

[acre-ft/yr, acre foot per year; in/yr, inches per year; ft/yr, foot per year]

Source of water	Estimated value, (acre-ft/yr)
Recharge	
Natural	
Precipitation	[1]150
Artifical	
Seepage of wastewater	[2]1,100
Irrigation-return flow	[3]210
Total	1,460
Discharge	
Natural	
Underflow..	[4]85
Evapotranspiration	0
Artificial	
Ground-water pumpage	1,000
Total	1,085
Change in storage (recharge-discharge)	375

[1]Assuming that precipitation recharge is uniform over the entire basin area, value calculated by multiplying basin area and precipitation recharge which was estimated as a percentage of average annual precipitation [1.74 percent × 5.3 in/yr (0.45 ft/yr)] by C.F. Hostrup and Associates, 1955.

[2]Value is average of minimum and maximum estimated recharge from wastewater seepage for 1993. Values listed in table 3.

[3]Value calculated by multiplying 1993 lawn area (33 acres) by the consumptive use for grass (6.3 ft/yr; Sandra Owen-Joyce, U.S. Geological Survey, oral commun., 1996) and assuming that the irrigation efficiency is 50 percent (twice as much water is applied than is used).

[4]Value calculated in text using Darcy's law and 1994 water-level data.

Table 5. Minimum, maximum, and average of dissolved-solids and nitrate concentrations in samples collected for selected ground-water sites at Fort Irwin National Training Center, California, 1993–96

[mg/L, milligram per liter; <, actual value is less than value shown]

State well number	Number of samples	Dissolved-solids concentration (mg/L)			Number of samples	Nitrate as nitrogen (mg/L)		
		Minimum	Maximum	Average		Minimum	Maximum	Average
13N/3E-4B1	3	1,010	1,080	1,047	2	10	11	11
13N/3E-4B2	3	852	872	863	2	7.5	7.5	7.5
13N/3E-4B3	3	1,520	1,530	1,523	2	7.7	9.2	8.5
13N/3E-4B4	2	1,210	1,270	1,240	3	17	22	19
13N/3E-4B6LYS	1	720	720	720	5	2.4	4.7	3.5
13N/3E-4C1	7	526	668	557	6	2.3	3.5	2.6
13N/3E-4C2	7	491	520	503	5	2.8	3.1	2.9
13N/3E-4C3	6	744	968	869	6	1.4	12	8.9
13N/3E-4D1	4	536	630	565	3	1.2	1.9	1.5
13N/3E-4D2	4	480	532	503	4	2.3	2.5	2.4
13N/3E-4D3	2	610	688	649	4	.77	3.3	2.5
13N/3E-4G1	6	862	944	916	7	7.6	17	13
13N/3E-4K1	4	1,900	2,290	2,093	5	18	22	20
13N/3E-4K2	1	547	547	547	2	2.5	2.8	2.6
13N/3E-4K3	1	524	524	524	2	2.7	2.9	2.8
13N/3E-4K4	3	528	552	542	3	2.6	3.1	2.9
13N/3E-4M1	1	482	482	482	1	2.7	2.7	2.7
13N/3E-4Q2	3	2,250	3,030	2,533	4	22	30	25
13N/3E-4Q3LYS	1	6,380	6,380	6,380	11	1.8	34	11
13N/3E-4Q4LYS	1	4,930	4,930	4,930	12	3.5	15	10
13N/3E-4Q5LYS	1	2,460	2,460	2,460	12	11	32	24
13N/3E-4Q6LYS	1	2,140	2,140	2,140	12	5.6	33	20
13N/3E-5G1	1	453	453	453	1	3.6	3.6	3.6
13N/3E-8B1	1	465	465	465	1	2.5	2.5	2.5
13N/3E-9B1	4	455	488	472	5	2.5	2.9	2.7
13N/3E-10D1	4	1,320	1,560	1,440	5	1.8	17	6.4
13N/3E-10E1	4	492	506	498	3	2.4	2.5	2.5
13N/3E-10E2	4	506	523	512	4	2.8	3.1	2.9
13N/3E-10E3	4	1,040	1,080	1,060	4	6.4	7.6	7.0
13N/3E-11NS1	1	794	794	794	1	<.05	<.05	<.05
14N/3E-31K1	1	443	443	443	1	1.5	1.5	1.5
14N/3E-32B1	6	540	561	552	6	.2	.30	.27
14N/3E-32B2	5	562	628	591	5	.18	.38	.31
14N/3E-32B3	3	610	676	644	3	2.6	2.7	2.6
14N/3E-32F1	3	433	542	493	3	3.2	3.8	3.5
14N/3E-32F2	1	595	595	595	1	.24	.24	.24
14N/3E-32F3	1	516	516	516	1	2.9	2.9	2.9

Table 5. Minimum, maximum, and average of dissolved-solids and nitrate concentrations in samples collected for selected ground-water sites at Fort Irwin National Training Center, California, 1993–96—Continued

State well number	Number of samples	Dissolved-solids concentration (mg/L)			Number of samples	Nitrate as nitrogen (mg/L)		
		Minimum	Maximum	Average		Minimum	Maximum	Average
14N/3E-32H1	2	488	554	521	2	2.1	2.5	2.3
14N/3E-32J1	2	449	532	490	2	2.8	3.0	2.9
14N/3E-32K1	4	491	575	548	4	4.7	5.3	5.1
14N/3E-32K3	5	502	627	548	5	1.2	1.3	1.2
14N/3E-32K4	5	499	686	586	5	1.6	2.2	1.9
14N/3E-32K5	5	474	511	496	5	2.4	2.9	2.7
14N/3E-32K6	4	898	944	916	3	<.05	2.2	.85
14N/3E-32M1	3	513	589	561	4	1.9	8.6	6.6
14N/3E-32N1	2	555	560	558	2	.25	.45	.35
14N/3E-32N2	2	692	728	710	2	11	11	11
14N/3E-32N3	2	834	854	844	2	9.4	9.5	9.4
14N/3E-32P2	2	702	704	703	2	<.05	<.05	<.05
14N/3E-32P3	2	545	574	560	2	.10	.14	.12
14N/3E-32P4	2	555	566	561	2	.40	.42	.41
14N/3E-32P5	3	578	1,020	735	3	5.9	8.3	7.4
14N/3E-32P6	2	708	818	763	2	6.5	6.9	6.7
14N/3E-32Q3	1	884	884	884	1	8.4	8.4	8.4
14N/3E-33A1	3	504	545	529	5	7.4	7.7	7.5
14N/3E-33B1	1	557	557	557	1	5.1	5.1	5.1
14N/3E-33E2	3	545	922	693	3	4.9	5.5	5.1
14N/3E-33E3	2	530	676	603	2	4.7	5.4	5.0
14N/3E-33F1	1	535	535	535	1	1.2	1.2	1.2
14N/3E-33G1	1	553	553	553	1	4.1	4.1	4.1
14N/3E-33G2	1	538	538	538	1	5.5	5.5	5.5
14N/3E-33G3	1	536	536	536	1	5.7	5.7	5.7
14N/3E-33G4	1	577	577	577	1	5.1	5.1	5.1
14N/3E-33H1	2	550	558	554	4	7.3	7.5	7.4
14N/3E-33H2	2	584	588	586	5	<.05	6.3	4.9
14N/3E-33H3	1	565	565	565	1	5.4	5.4	5.4
14N/3E-33J1	2	684	708	696	5	4.0	4.4	4.2
14N/3E-33J2	3	656	700	685	5	3.9	4.2	4.0
14N/3E-33N1	1	496	496	496	1	3.0	3.0	3.0
14N/3E-33Q1	1	1,000	1,000	1,000	1	8.5	8.5	8.5
14N/3E-33R1	6	750	822	772	7	2.9	4.8	3.6
14N/3E-34D1	2	666	670	668	4	6.4	6.9	6.6
14N/3E-34M1	2	568	574	571	5	<.05	6.7	5.4
14N/3E-34M2	3	557	565	560	5	4.5	4.8	4.6

Table 6. Water-quality data of wastewater effluent at the wastewater-treatment facility at Fort Irwin National Training Center, California

[All data were analyzed at U.S. Geological Survey laboratories. Locations of sites are shown in figure 2. Numbering systems for sites are explained in text. Altitude of land surface in feet above sea level. ft, foot; µS/cm, microsiemen per centimeter; °C, degrees Celsius; mg/L, milligram per liter; µg/L, microgram per liter. —, no data]

Local identifier	Station number	Date	Time	Altitude of land surface	Specific conductance (µS/cm)	Specific conductance lab (µS/cm)	pH water whole field (standard units)	pH water whole laboratory (standard units)
Inflow to wastewater-treatment facility (before oxidation ponds)	351508116394901	07-14-93	0900	2,380	1,270	1,280	7.3	6.9
Outflow from wastewater-treatment facility (after oxidation ponds	351503116394901	07-14-93	0910	2,380	1,350	1,420	9.2	8.4

Local identifier	Date	Temperature, water (°C)	Calcium total recoverable (mg/L)	Magnesium, total recoverable (mg/L)	Sodium, total recoverable (mg/L)	Potassium, total recoverable (mg/L)	Carbonate water wh fet field (mg/L as CO_3)	Carbonate water wh lt lab (mg/L as CO_3)	Alkalinity wat wh tot fet field (mg/L as $CaCO_3$)
Inflow to wastewater-treatment facility (before oxidation ponds)	07-14-93	28.0	29	6.1	180	<0.1	—	—	291
Outflow from wastewater-treatment facility (after oxidation ponds)	07-14-93	28.0	27	5.6	230	< .1	62	59	259

Local identifier	Date	Alkalinity lab (mg/L as $CaCO_3$)	Alkalinity wat wh tot lt field (mg/L as $CaCO_3$)	Sulfate disolved (mg/L)	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, residue at 180 °C, dissolved (mg/L)
Inflow to wastewater-treatment facility (before oxidation ponds)	07-14-93	440	291	120	110	5.3	59	624
Outflow from wastewater-treatment facility (after oxidation ponds)	07-14-93	272	259	170	140	6.5	66	826

Local identifier	Date	Nitrogen, nitrate total (mg/L)	Nitrogen nitrite total (mg/L)	Nitrogen, $NO_2 + NO_3$ (mg/L as N)	Nitrogen, ammonia total (mg/L)	Nitrogen, organic total (mg/L)	Nitrogen, ammonia + organic total (mg/L)	Phosphorus total (mg/L)
Inflow to wastewater-treatment facility (before oxidation ponds)	07-14-93	0.00	0.060	0.060	26.0	18	44	7.60
Outflow from wastewater-treatment facility (after oxidation ponds)	07-14-93	.00	.110	.110	11.0	17	28	5.50

Local identifier	Date	Phorphorus ortho total (mg/L)	Boron, dissolved (µg/L)	Iron, total recoverable (µg/L)	Manganese, total recoverable (µg/L)	Methylene blue active substance (mg/L)	$^2H/^1H$ stable isotope ratio per mil	$^{18}O/^{16}O$ stable isotope ratio per mil
Inflow to wastewater-treatment facility (before oxidation ponds)	07-14-93	5.00	1,300	2,200	70	4.9	-93.3	-11.64
Outflow from wastewater-treatment facility (after oxidation ponds)	07-14-93	4.40	1,800	140	30	.33	-80.4	-8.64

Table 7. Water-quality data for core samples from Irwin Basin at Fort Irwin National Training Center, California

[ft, foot; µS/cm, microsiemens per centimeter. Well locations are shown on figure 4]

Site name	Depth of sample (ft)	Specific conductance (µS/cm)
GB1	10	403
STP3R	20	385
STP7	40	170
STP8	25	417
STP8	40	1,485
STP9	15	1,968
STP11	15	1,530
STP11	25	1,643

Table 8. Tritium, carbon-14, carbon-13, deuterium, and oxygen-18 in ground-water samples in Irwin Basin at Fort Irwin National Training Center, California

[All data were analyzed at U.S. Geological Survey laboratories. Location of sites shown in figure 2. Numbering systems for sites are explained in text. ft, foot; TU, tritium units; —, no data; <, actual value is less than value shown]

State well number	Date	Depth (ft)	Tritium (TU)	Carbon-14, percent modern	Carbon-13 (per mil)	Deuterium (per mil)	Oxygen-18 (per mil)
13N/3E-4B1	05-26-94	240	—	—	—	–89.8	–10.77
	08-24-94		—	—	—	–90.8	–10.66
13N/3E-4B2	05-26-94	180	—	—	—	–91.2	–11.14
	08-24-94		—	—	—	–92.4	–11.16
13N/3E-4B3	05-26-94	130	—	—	—	–87.1	–10.34
	08-24-94		—	—	—	–86.6	–9.92
13N/3E-4B4	02-14-95	97	—	—	—	–73.9	–7.35
	11-02-95		—	—	—	–75.7	–7.52
13N/3E-4C1	07-28-93	320	—	—	—	–94.3	–11.76
	09-16-93		<0.2	13.5	–10.1	–94.6	–11.82
	11-05-93		—	—	—	–95.8	–11.77
	05-24-94		—	—	—	–94.3	–11.69
	08-25-94		—	—	—	–96.1	–11.64
13N/3E-4C2	07-28-93	220	—	—	—	–92.3	–11.66
	09-16-93		<.2	13.2	–9.0	–92.4	–11.69
	11-05-93		—	—	—	–93.9	–11.70
	05-24-94		—	—	—	–94.3	–11.57
	08-25-94		—	—	—	–93.4	–11.54
13N/3E-4C3	07-28-93	150	—	—	—	–89.3	–10.79
	09-16-93		.2	—	–9.5	–89.8	–10.97
	11-05-93		—	—	—	–89.3	–10.76
	05-26-94		—	—	—	–90.0	–11.04
	09-22-94		—	—	—	–88.7	–11.18
13N/3E-4D1	08-25-93	320	—	—	—	–95.0	–11.78
	05-24-94		—	11.9	–6.6	–95.8	–11.64
	08-24-94		—	—	—	–95.3	–11.69
13N/3E-4D2	08-26-93	250	—	—	—	–94.1	–11.68
	05-24-94		—	13.3	–8.3	–95.2	–11.65
	08-24-94		—	—	—	–94.4	–11.61
13N/3E-4D3	08-25-93	170	—	—	—	–90.0	–11.26
	09-24-93		—	—	—	–92.3	–11.26
	05-24-94		—	—	—	–89.6	–11.09
	09-22-94		—	—	—	–90.5	–11.23
13N/3E-4G1	09-23-93	—	.6	—	—	–90.6	–11.13
	11-04-93	—	—	—	—	–92.4	–11.44
	11-15-94	—	—	—	—	—	—

Table 8. Tritium, carbon-14, carbon-13, deuterium, and oxygen-18 in ground-water samples in Irwin Basin at Fort Irwin National Training Center, California—Continued

State well number	Date	Depth (ft)	Tritium (TU)	Carbon-14, percent modern	Carbon-13 (per mil)	Deuterium (per mil)	Oxygen-18 (per mil)
13N/3E-4K1	11-04-93	—	—	—	—	-83.8	-9.27
13N/3E-4K2	02-23-95	238	—	—	—	-93.7	-11.52
13N/3E-4K3	02-23-95	190	—	—	—	-93.3	-11.38
13N/3E-4K4	02-23-95	135	—	—	—	-93.7	-11.32
13N/3E-4M1	05-20-93	351	—	—	—	-91.6	-11.61
13N/3E-4Q2	02-24-95	90	—	—	—	-83.9	-9.39
	11-28-95		—	—	—	-75.0	-7.58
13N/3E-5G1	07-28-93	450	—	—	—	-90.1	-11.24
13N/3E-8B1	07-20-94	255	—	—	—	-91.7	-11.47
13N/3E-10D1	11-15-94	—	—	—	—	—	—
13N/3E-10E1	09-22-93	243	—	—	—	-94.9	-11.87
	05-25-94		—	9.0	-8.6	-95.6	-11.74
	08-25-94		—	—	—	-94.9	-11.75
13N/3E-10E2	09-23-93	170	—	—	—	-94.8	-11.70
	05-25-94		—	10.4	-8.5	-94.4	-11.75
	08-25-94		—	—	—	-94.5	-11.74
13N/3E-10E3	09-23-93	60	—	—	—	-77.2	-8.23
	05-25-94		—	92.6	-10.2	-76.8	-8.07
	08-25-94		—	—	—	-77.9	-8.08
13N/3E-11NS1	06-30-93	—	—	—	—	-90.5	-11.43
14N/3E-31K1	05-25-94	410	—	—	—	-91.7	-11.23
14N/3E-32B1	05-21-93	630	—	—	—	-95.2	-11.75
	09-22-93		<0.2	—	—	-96.5	-11.8
	07-19-94		—	—	—	-97.9	-11.57
	09-22-94		—	—	-8.3	-96.3	-11.69
	12-20-94		—	—	-8.7	—	—
14N/3E-32B2	06-02-93	540	—	—	—	-96.4	-11.73
	09-22-93		<.2	—	-9.4	-96.5	-11.78
	07-19-94		—	—	—	-97.1	-11.57
	09-22-94		—	6.2	-9.6	-95.8	-11.72
14N/3E-32B3	09-23-93	300	<.2	—	—	-93.5	-11.68
	07-20-94	—	—	—	-95.3	-11.48	
	09-23-94	—	—	—	-92.8	-11.64	
14N/3E-32F1	06-02-93	494	—	—	—	-94.3	-11.73
	11-03-95	—	—	—	-92.7	-11.36	
14N/3E-32F2	02-22-95	460	—	—	—	-95.4	-11.53
14N/3E-32F3	02-22-95	290	—	—	—	-96.2	-11.58
14N/3E-32H1	05-21-93	490	—	—	—	-95.2	-11.61
14N/3E-32J1	05-18-94	340	—	—	—	-93.4	-11.43

Table 8. Tritium, carbon-14, carbon-13, deuterium, and oxygen-18 in ground-water samples in Irwin Basin at Fort Irwin National Training Center, California—Continued

State well number	Date	Depth (ft)	Tritium (TU)	Carbon-14, percent modern	Carbon-13 (per mil)	Deuterium (per mil)	Oxygen-18 (per mil)
14N/3E-32K1	06-02-93	551	—	—	—	-92.4	-11.41
	07-19-94		—	—	—	-91.8	-11.19
	07-20-94		—	—	—	-93.0	-11.17
14N/3E-32K3	05-04-93	440	—	—	—	-95.7	-11.85
	09-14-93		<0.2	6.3	-9.5	-95.5	-11.97
	05-17-94		—	—	—	-96.2	-11.83
	08-23-94		—	—	—	-96.8	-11.78
14N/3E-32K4	05-04-93	355	—	—	—	-94.2	-11.91
	09-15-93		<.2	10.7	-9.2	-94.9	-11.83
	05-17-94		—	—	—	-95.9	-11.77
	08-23-94		—	—	—	-95.0	-11.74
14N/3E-32K5	05-05-93	290	—	—	—	-92.9	-11.72
	09-15-93		<.2	18.0	-9.4	-92.8	-11.72
	05-18-94		—	—	—	-92.9	-11.51
	08-23-94		—	—	—	-94.3	-11.44
14N/3E-32K6	05-05-93	230	—	—	—	-86.1	-10.51
	09-15-93		.7	21.9	-21.1	-86.7	-10.48
	05-18-94		—	—	—	-85.4	-10.30
	08-23-94		—	—	—	-87.4	-10.33
14N/3E-32M1	06-02-93	—	—	—	—	-90.2	-11.18
	09-15-93	—	.2	—	—	-90.6	-11.10
14N/3E-32N1	11-29-95	520	—	—	—	-95.8	-11.80
14N/3E-32N2	11-29-95	410	—	—	—	-88.6	-10.67
14N/3E-32N3	11-29-95	270	—	—	—	-88.0	-10.08
14N/3E-32P2	07-21-94	904	—	—	—	-96.4	-11.71
	09-15-94		—	5.7	-7.4	-96.2	-11.84
14N/3E-32P3	07-21-94	730	—	—	—	-96.8	-11.71
	09-20-94		—	—	—	-96.4	-11.82
14N/3E-32P4	07-22-94	580	—	—	—	-98.1	-12.02
	09-15-94		—	—	—	-97.5	-12.12
14N/3E-32P5	07-20-94	405	—	—	—	-92.2	-11.45
	09-14-94		—	—	—	-89.7	-11.06
	05-01-95		<.2	—	—	-92.0	-11.21
14N/3E-32P6	09-20-94	270	—	—	—	-78.5	-9.13
	05-01-95		2.4	—	—	-81.4	-9.24
14N/3E-32Q3	05-11-95	—	—	—	—	-89.1	-10.46
14N/3E-33A1	07-19-94	185	—	—	—	-90.6	-11.25
	11-08-94		—	—	—	—	—

Table 8. Tritium, carbon-14, carbon-13, deuterium, and oxygen-18 in ground-water samples in Irwin Basin at Fort Irwin National Training Center, California—Continued

State well number	Date	Depth (ft)	Tritium (TU)	Carbon-14, percent modern	Carbon-13 (per mil)	Deuterium (per mil)	Oxygen-18 (per mil)
14N/3E-33E2	05-25-94	220	—	—	—	–92.9	–11.52
	09-21-94		—	—	—	–93.9	–11.62
14N/3E-33E3	09-21-94	175	—	—	—	–91.7	–11.37
	11-30-95		—	—	—	–92.1	–11.36
14N/3E-33F1	05-25-94	274	—	—	—	–92.7	–11.46
14N/3E-33H1	11-10-94	172.10	—	—	—	—	—
14N/3E-33H2	11-14-94	190.43	—	—	—	—	—
14N/3E-33J1	11-14-94	116.96	—	—	—	—	—
14N/3E-33J2	07-20-94	116	—	—	—	–93.9	–11.45
	11-09-94	--	—	—	—	—	
14N/3E-33N1	07-13-93	330	—	—	—	–91.1	–11.28
14N/3E-33Q1	11-02-95	168	—	—	—	–89.3	–10.79
14N/3E-33R1	07-13-93	--	—	—	—	–91.8	–10.99
	11-04-93	--	—	—	—	–92.0	–11.13
14N/3E-34D1	11-09-94	201.36	—	—	—	—	—
14N/3E-34M1	11-14-94	176.12	—	—	—	—	—
14N/3E-34M2	07-20-94	116	—	—	—	–94.9	–11.49

Table 9. Lithologic log for borehole of monitoring site SP1 (13N/3E-4B1, -4B2, -4B3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,390 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, February 23–24, 1994. Total depth drilled 260 ft. Perforated intervals 220–240, 160–180, and 110–130 ft]

Depth (ft)		Description
From	To	
Site SP1 (13N/3E-4B1, -4B2, -4B3)		
Cuttings		
0	20	Sand, fine to coarse, with occasional granules; poorly sorted; subangular to subrounded; light brown (5YR 5/6) to moderate brown (5YR 4/4).
20	40	Sand, very fine to coarse, with granules and pebbles; very poorly sorted; subangular to subrounded; some mafic minerals and mica; moderate brown (5YR 4/4).
40	60	Sand, fine to coarse, with occasional granules and pebbles; poorly sorted; subangular to subrounded; moderate brown (5YR 4/4).
60	80	Sand, fine to very coarse, with some granules and pebbles; poorly sorted; angular to subrounded; occasional rock fragments; moderate brown (5YR 4/4).
80	90	Sand, fine to coarse, with some granules and pebbles, some clay; poorly sorted; subangular to subrounded; moderate brown (5YR 4/4).
90	120	Sand, fine to coarse, with clay and some granules; poorly sorted; subangular to subrounded; moderate brown (5YR 4/4).
120	140	Sand, fine to coarse, with clay and some granules; poorly sorted; subangular to subrounded; moderate brown (5YR 4/4).
140	160	Sand, fine to medium; moderately sorted; subangular to subrounded; some mafic minerals and mica; moderate brown (5YR 4/4).
160	190	Sand, fine to medium, with clay, occasionally coarse grains; moderately sorted; subangular to subrounded; mafic minerals and mica; moderate yellowish brown (10YR 5/4).
190	200	Sand, fine to coarse, with some clay, occasional granules and pebbles; poorly sorted; angular to subangular; moderate yellowish brown (10YR 5/4).
200	215	Weathered granitic rock, with some sand; moderate yellowish brown (10YR 5/4) to pale yellowish brown (10YR 5/4).
215	260	Weathered granitic rock with some sand; moderate yellowish brown (10YR 5/4).

Table 10. Lithologic log for borehole of monitoring site NIT3 (13N/3E-4B4, -4B5LYS, -4B6LYS, -4B7LYS, -4B8LYS) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,380 ft above sea level. Drilled by U.S. Geological Survey using air rotary, November 10, 1994. Total depth drilled 99 ft. Water table well perforated interval 92–97 ft. Lysimeter depths 68, 46, 35, and 15 ft]

Depth (ft)		Description
From	To	
Site NIT3 (13N/3E-4B4, -4B5LYS, -4B6LYS, -4B7LYS, -4B8LYS)		
Cuttings		
0	6	Sandy, silty gravel, medium to coarse; subrounded; pale yellowish brown (10YR 6/2).
6	8	Core: Silty, sandy gravel, medium to coarse; poorly sorted; subangular to subrounded; moderate yellow brown (10YR 5/4).
8	16	Silty sand, medium to very coarse, some gravel; poorly sorted; subrounded; moderate yellow brown (10YR 5/4).
16	18	Core: Sandy, silty gravel, fine to coarse; poorly sorted; subangular; moderate yellow brown (10YR 5/4).
18	26	Sandy gravel, coarse to very coarse; poorly sorted; rounded; moderate yellow brown (10YR 5/4).
26	28	Core: Silty sand, medium to coarse, some gravel; poorly sorted; subangular; pale yellow brown (10YR 6/2) to moderate yellow brown (10YR 5/4).
28	36	Silty sand, medium to very coarse, some gravel; very poorly sorted; subrounded to rounded; moderate yellow brown (10YR 5/4).
36	38	Core: Silty sand, medium to coarse, trace gravel; poorly sorted; subangular; pale yellow brown (10YR 6/2).
38	57	Silty gravel, medium to very coarse, trace sand; very poorly sorted; subangular; moderate yellow brown (10YR 5/4).
57	59	Core: Silty sand, medium to coarse, some gravel; poorly sorted; subangular; moderate yellow brown (10YR 5/4).
59	77	Sandy gravel, medium to coarse, some silt; poorly sorted; subrounded; moderate yellow brown (10YR 5/4).
77	79	Core: Silt, fine; well sorted; subrounded; moderate yellow brown (10YR 5/4); dark angular lithic fragments within silt sediments.
79	97	Sandy gravel, coarse to very coarse; poorly sorted; subrounded; dark yellow brown (10YR 4/2).
97	99	Core: Sandy gravel, coarse to very coarse; poorly sorted; subrounded; dark yellow brown (10YR 4/2).

Table 11. Lithologic log for borehole of monitoring site WC1 (13N/3E-4C1, -4C2, -4C3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface 2,399.74 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, June 29–July 2, 1993. Total depth drilled 340 ft. Perforated intervals 300–320, 200–220, and 130–150 ft]

Depth (ft)		Description
From	To	
Site WC1 (13N/3E-4C1, -4C2, -4C3)		
Cuttings		
0	20	Sand, fine to very coarse, and gravel, with small amount of silt; poorly sorted; subrounded; light brown (5YR 5/6) to moderate yellowish brown (10YR 5/4).
20	40	Sand, fine to very coarse, and gravel, with small amount of silt; poorly sorted; subrounded; light brown (5YR 5/6) to moderate yellowish brown (10YR 5/4).
40	60	Sand, coarse to very coarse, and some gravel-sized rock fragments; moderately well sorted; subangular; moderate yellowish brown (10YR 5/4).
60	80	Sand, coarse to very coarse, and gravel; moderately well sorted; subangular; moderate yellowish brown (10YR 5/4).
80	100	Sand, fine to very coarse, and gravel, with occasional pebbles, some silt, rock fragments; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
100	120	Sand, fine to very coarse, some gravel and rock fragments; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
120	140	Sand, fine to very coarse, with gravel, some clay; poorly sorted; subrounded; light brown (5YR 5/6) to moderate yellowish brown (10YR 5/4).
140	160	Sand, fine to very coarse, with gravel, some silt; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
160	180	Sand, fine to very coarse, with some gravel, some clay; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
180	200	Clay, with some fine to coarse sand; moderate yellowish brown (10YR 5/4).
200	220	Clay, with some fine to coarse sand; moderate yellowish brown (10YR 5/4).
220	240	Fractured rock consisting of quartz, mafic minerals, fragments of granitic rock; dark yellowish orange (10Y 6/6).
240	260	Fractured rock consisting of pieces of granitic rock, quartz, mafic minerals; dark yellowish orange (10YR 6/6) to grayish orange (10YR 7/4).
260	280	Fractured granitic rock consisting of quartz, mafic minerals, mica; grayish orange (10YR 7/4) to olive gray (5Y 4/1).
280	300	Fractured rock consisting of granitic fragments, quartz; grayish orange (10YR 7/4) and dark yellowish orange (10YR 6/6).
300	320	Fractured rock consisting of granitic fragments, quartz; grayish orange (10YR 7/4) and dark yellowish orange (10YR 6/6).
320	340	Clay, with some coarse grains and subangular sand.

Table 12. Lithologic log for borehole of monitoring site WC2 (13N/3E-4D1, -4D2, -4D3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface 2,419.85 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, August 11–13, 1993. Total depth drilled 320 ft. Perforated intervals 300–320, 230–250, and 150 ft]

Depth (ft) From	Depth (ft) To	Description
Site WC2 (13N/3E-4D1, -4D2, -4D3)		
Cuttings		
0	20	Sand, fine to very coarse, with rock fragments; poorly sorted; subrounded to subangular; moderate brown (5YR 4/4) to moderate yellowish brown (10YR 5/4)
20	40	Sand, fine to very coarse, with rock fragments; poorly sorted; subrounded to subangular; moderate brown (5YR 4/4) to moderate yellowish brown (10YR 5/4).
40	50	Sand, fine to coarse, with some gravel-sized rock fragments; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4).
50	80	Sand, fine to very coarse, with some gravel, occasional rock fragments; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4).
80	100	Sand, fine to very coarse, with some gravel, occasional rock fragments; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4).
100	120	Sand, fine to very coarse, with occasional rock fragments; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
120	140	Sand, fine to very coarse, with occasional granules; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
140	160	Sand, fine to very coarse, with occasional granules and rock fragments; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
160	180	Sand, fine to very coarse, with occasional granules; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
180	200	Sand, fine to coarse, and silt; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
200	220	Silt, and some sand, fine to coarse, with occasional granules; moderate yellowish brown (10YR 5/4).
220	240	Sand, fine to very coarse, with some silt, occasional granules, and rock fragments; poorly sorted; subangular to subrounded; dark yellowish brown (10YR 4/2).
240	260	Sand, very coarse to fine, with some silt, occasional gravel; moderately sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
260	265	Sand, very coarse to fine, with some silt, some rock fragments; moderately sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
265	300	Sand, coarse to very coarse, with occasional granules, rock fragments; moderately well sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
300	320	Sand, coarse to very coarse, with some granules, rock fragments; moderately well sorted; subrounded to angular; dark yellowish brown (10YR 4/2).

Table 13. Lithologic log for borehole of monitoring site NIT2 (13N/3E-4K2, -4K3, -4K4) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,385 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, November 2–5, 1994. Total depth drilled 238 ft. Perforated intervals 228–238, 170–190, and 115–135 ft]

Depth (ft)		Description
From	To	
NIT2 (13N/3E-4K2, -4K3, -4K4)		
Cuttings		
0	20	Gravelly sand, medium to coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4); quartz.
20	40	Sandy gravel, coarse to very coarse; very poorly sorted; subangular to angular; moderate yellowish brown (10YR 5/4).
40	60	Slightly silty sand, medium to coarse, some gravel; well to poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
60	70	Slightly silty, gravelly sand, fine to medium; very poorly sorted; subangular; dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4).
70	80	No sample collected. Clay layer.
80	100	Sand, medium, trace gravel; well sorted; subangular to angular; moderate yellowish brown (10YR 5/4).
100	120	Silty sandy gravel, fine to very coarse; poorly sorted; subrounded; grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6).
120	140	Sand, medium to coarse, trace gravel; well sorted; angular to subangular; moderate yellowish brown (10YR 5/4).
140	160	Sandy silt, fine to medium; well sorted; subrounded; pale yellowish brown (10YR 6/2).
160	180	Sandy silt; fine to medium; well sorted; subrounded; moderate yellowish brown (10YR 5/4).
180	205	Silty sandy gravel, medium to very coarse; poorly sorted; angular to subangular; dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4).
205	220	No sample collected. Ground-up bedrock, possibly biotite schist.
220	238	No sample collected. Ground-up granitic bedrock and biotite schist.

Table 14. Lithologic log for borehole of monitoring site NIT1 (13N/3E-4Q2, -4Q3LYS, -4Q4LYS, -4Q5LYS, -4Q6LYS) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,385 ft above sea level. Drilled by U.S. Geological Survey using air odex, November 3, 1994. Total depth drilled 97 ft. Water table well perforated interval 85–90 ft. Lysimeter depths 75, 53.5, 35, and 15 ft]

Depth (ft)	Description
NIT1 (13N/3E-4Q2, -4Q3LYS, -4Q4LYS, -4Q5LYS, -4Q6LYS)	
Cores	
7	Sandy, silty gravel, medium to very coarse; poorly sorted; subrounded; moderate brown (5YR 4/4).
17	Silty gravel, medium to very coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
20	Silty sand, fine to medium; poorly sorted; subrounded to rounded; moderate yellowish brown (10YR 5/4).
24	Silty sand, some gravel; fine to coarse; very poorly sorted; some subangular, most subrounded; moderate yellowish brown (10YR 5/4).
28	Sandy silty gravel, medium to very coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
30	Silty sandy gravel, medium to very coarse; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
38	Sandy silty gravel, medium to very coarse; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
48	Silty sand, some gravel; medium to coarse; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
58	Silty sand, some gravel; medium to very coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4) to dark yellowish orange (10YR 6/6).
66	Sandy silty gravel, fine to very coarse; poorly sorted; subangular; grayish orange (10YR 7/4).
79	Sandy silty gravel, fine to very coarse; poorly sorted; subangular; grayish orange (10YR 7/4).

Table 15. Lithologic log for borehole of monitoring site AD1 (13N/3E-8B1) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,500 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, March 4–6, 1994. Total depth drilled 277 ft. Perforated interval 235–255 ft]

Depth (ft)		Description
From	To	
AD1 (13N/3E-8B1)		
Cuttings		
0	20	Sand, fine to coarse with some granules and pebbles; poorly sorted; angular to subrounded; moderate yellowish brown (10YR 5/4).
20	40	Sand, fine to coarse, with some granules and pebbles; poorly sorted; angular to subrounded; moderate yellowish brown (10YR 5/4).
40	60	Sand, fine to coarse, with some clay, occasional granules and pebbles; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
60	85	Sand, fine to medium, with clay; moderately sorted; occasional pebbles, subangular to subrounded; moderate yellowish brown (10YR 5/4).
85	100	Sand, fine to coarse, with some granules and pebbles; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
100	120	Sand, fine to coarse, with some granules and pebbles; poorly sorted; subangular to subrounded; some mica and mafic minerals; moderate yellowish brown (10YR 5/4).
120	140	Sand, fine to medium, with occasional granules and pebbles, some clay; moderately sorted; subangular to subrounded; some mafic minerals and mica; dark yellowish brown (10YR 4/2).
140	160	Sand, fine to medium, with occasional granules and pebbles; moderately sorted; subangular to subrounded; mafic minerals and mica; dark yellowish brown (10YR 4/2).
160	175	Sand, fine to medium, with some granules and pebbles; moderately sorted; subangular to subrounded; mafic minerals and mica; dark yellowish brown (10YR 4/2).
175	200	Clay, with sand, fine to coarse, occasional pebbles; subangular to subrounded; light olive gray (5Y 5/2).
200	220	Clay, with sand and ground-up granitic rock; grayish olive (10Y 4/2).
220	240	Clay, with ground-up granitic rock; grayish olive (10Y 4/2).
240	255	Clay, with sand, fine to medium, and some ground-up granitic rock; subangular to subrounded; moderate olive brown (5Y 4/4).
255	277	Ground-up granitic rock; dark greenish gray (5GY 4/1).

Table 16. Lithologic log for borehole of monitoring site WC3 (13N/3E-10E1, -10E2, -10E3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface 2,342.65 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, August 13–15, 1993. Total depth drilled 260 ft. Perforated intervals 223–243, 150–170, and 40–60 ft]

Depth (ft)		Description
From	To	
WC3 (13N/3E-10E1, -10E2, -10E3)		
Cuttings		
0	20	Sand, fine to very coarse, with occasional granules and pebbles, some silt; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
20	40	Sand, fine to very coarse, with some granules and pebbles, some rock fragments; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
40	65	Sand, fine to very coarse, granules, pebbles, silt; poorly sorted; subrounded; light olive brown (5Y 5/6).
65	80	Clay, with some fine sand, granules, silt; subangular gravel; light olive brown (5Y 5/6) to yellowish gray (5Y 7/2).
80	100	Clay, with some fine sand, granules, silt; subangular gravel; light olive brown (5Y 5/6) to yellowish gray (5Y 7/2).
100	125	Sand, very fine to coarse, some granules, clay; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
125	140	Clay, with some fine to coarse sand; moderate yellowish brown (10YR 5/4).
140	160	Clay, with some fine to coarse sand, occasional granules; sand is subrounded; dark yellowish brown (10YR 4/2).
160	170	Sand, fine to very coarse, and gravel, granules to pebbles; poorly sorted; multicolored angular rock fragments; sand is subrounded; dark yellowish brown (10YR 4/2).
170	200	Clay, with some very fine to coarse sand, occasional granules; dark yellowish brown (10YR 4/2).
200	220	Sand, very fine to very coarse, with granules and pebbles, some silt; very poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
220	250	Sand, fine to very coarse, with granules and pebbles; very poorly sorted; subrounded to subangular; abundance of mafic minerals; dark yellowish brown (10YR 4/2).
250	260	Fractured bedrock; sample consists of sand, fine to very coarse, granules, rock fragments; poorly sorted; subrounded to subangular; abundance of mafic minerals; dark yellowish brown (10YR 4/2).

Table 17. Lithologic log for borehole of monitoring site NH1 (14N/3E-32B1, -32B2, -32B3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,530 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, March 3–7, 1993. Total depth drilled 660 ft. Perforated intervals 610–630, 520–540, and 280–300 ft]

Depth (ft)		Description
From	To	
NH1 (14N/3E-32B1, -32B2, -32B3)		
Cuttings		
0	20	Gravel, granules to large pebbles, with sand, medium to coarse; poorly sorted; sand, subrounded to subangular; gravel, subangular to angular; quartz, biotite, volcanic and granitic rock fragments (rhyolite?); grayish brown (5YR 3/2).
20	40	Gravel, granules to large pebbles, with sand, medium to coarse; poorly sorted; sand, subrounded; gravel, subrounded to angular; grayish brown (5YR 3/2).
40	60	Gravel, granules to pebbles, and sand, fine to coarse; poorly sorted; subrounded to angular; grayish brown (5YR 3/2).
60	80	Sand, medium to coarse, with some fine sand and gravel, granule- to pebble-sized; poorly sorted; rounded to subangular; quartz, mica, mafic fragments, volcanic fragments; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4).
80	100	Sand, fine to medium, with some coarse and very coarse grains, possible silt; moderately poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
100	120	Sand, very coarse to fine, with some granules and pebbles; subrounded to angular; poorly sorted; gravel rock fragments (volcanic, granitic), mafic minerals; dark yellowish brown (10YR 4/2).
120	140	Sand, coarse to fine, with some gravel, granules; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
140	160	Sand, very coarse to fine, with some gravel, granules; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
160	180	Sand, fine to coarse, with some granules; poorly sorted; subrounded to angular; quartz, biotite, volcanic rock fragments; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
180	200	Sand, medium to fine, with some coarse grains, occasional granules, possible silt; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
200	220	Sand, fine to medium, with occasional granules, some silt; moderately sorted; subrounded to subangular; dark yellowish brown (10YR 4/2) to moderate yellowish brown (10YR 5/4).
220	240	Sand, fine to coarse, with occasional granules, some silt; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
240	260	Sand, fine to coarse, with some gravel, granules; poorly sorted; subrounded to angular; abundance of mafic minerals and rock fragments; dark yellowish brown (10YR 4/2).
260	280	Sand, coarse to fine, with gravel, granules to pebbles; poorly sorted; subrounded to angular; gravel looks like volcanic rock fragments; dark yellowish brown (10YR 4/2).
280	300	Sand, medium to very coarse, with gravel, granules to pebbles; poorly sorted; subrounded to angular; gravel mostly volcanic rock fragments, some granitic; dark yellowish brown (10YR 4/2).
300	320	Sand, fine to medium, with some coarse, occasional granules; moderately sorted; mostly rounded to subangular; dark yellowish brown (10YR 4/2).
320	340	Sand, fine to coarse, with gravel, granules to pebbles, some silt; poorly sorted; subrounded to angular; dark yellowish brown (10YR 4/2).
340	360	Gravel, granules to pebbles, and sand, medium to coarse; gravel consists of volcanic and granitic rock fragments; poorly sorted; subangular to angular; dark yellowish brown (10YR 4/2).
360	380	Gravel, granules to pebbles, with some sand, medium to coarse; poorly sorted; angular to subrounded; dark yellowish brown (10YR 4/2); rock fragments (volcanic, granitic).
380	400	Gravel, granules to pebbles, with some sand, fine to coarse; poorly sorted; subrounded to angular; dark yellowish brown (10YR 4/2); volcanic, granitic rock fragments.
400	420	Gravel, granules to pebbles, with some sand, fine to coarse; poorly sorted; subrounded to angular; dark yellowish brown (10YR 4/2); volcanic, granitic rock fragments.

Table 17. Lithologic log for borehole of monitoring site NH1 (14N/3E-32B1, -32B2, -32B3) at Fort Irwin National Training Center, California—Continued

Depth (ft) From	Depth (ft) To	Description
NH1 (14N/3E-32B1, -32B2, -32B3)—Continued		
Cuttings		
420	440	Gravel, granules to pebbles, and sand, medium to coarse; poorly sorted; angular to subrounded; dark yellowish brown (10YR 4/2); volcanic and granitic rock fragments.
440	460	Gravel, granules to pebbles, and sand, medium to very coarse; poorly sorted; angular; some subrounded; dark yellowish brown (10YR 4/2); rock fragments are mostly volcanic, some granitic.
460	480	Gravel, granules to pebbles, with some sand, medium and coarse; poorly sorted; angular; dark yellowish brown (10YR 4/2); fragments of volcanic and granitic rocks.
480	500	Gravel, granules to pebbles, and sand, medium to coarse; poorly sorted; subangular to angular; dark yellowish brown (10YR 4/2); mostly volcanic rock fragments.
500	520	Gravel, granules to pebbles, and sand, medium to coarse; poorly sorted; angular; grayish brown (5YR 3/2); mostly volcanic rock fragments, some granitic.
520	540	Gravel, granules to pebbles, and sand, medium to coarse; poorly sorted; angular; grayish brown (5YR 3/2); mostly volcanic rock fragments, some granitic.
540	560	Gravel, granules to pebbles, and sand, medium to coarse; poorly sorted; angular; grayish brown (5YR 3/2); mostly red, brown, black volcanic rock fragments.
560	580	Gravel, granules to pebbles, and sand, medium to coarse; poorly sorted; angular; grayish brown (5YR 3/2); mostly red, brown, black volcanic rock fragments.
580	600	Ground-up fragments of volcanic rocks, granules to pebbles, and medium to coarse sand-sized; poorly sorted; angular; dark yellowish brown (10YR 4/2) to grayish brown (5YR 3/2).
600	620	Ground-up fragments of volcanic rocks, some granules and pebbles, mostly medium to coarse sand-sized; poorly sorted; angular; some granitic rock fragments; grayish brown (5YR 3/2).
620	640	Ground-up rock fragments, mostly volcanic, some granitic, medium to coarse sand-sized, occasionally granules and pebbles; poorly sorted; angular; grayish brown (5YR 3/2).
640	660	Volcanic, ground-up rock fragments, some granitic (pink, yellow, orange; jasper); medium to very coarse, some granules; poorly sorted; angular; blackish red (5YR 2/2).

Table 18. Lithologic log for borehole of monitoring site BASEBALL (14N/3E-32F2, -32F3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,530 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, November 6–8, 1994. Total depth drilled 500 ft. Perforated intervals 440–460 and 270–290 ft]

Depth (ft)		Description
From	To	
BASEBALL (14N/3E-32F2, -32F3)		
Cuttings		
0	20	Silty gravelly sand, medium to coarse; poorly sorted; subrounded to rounded; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
20	40	Silty gravelly sand, coarse; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
40	60	Silty gravelly sand, coarse to very coarse; poorly sorted; subangular to angular; moderate yellowish brown (10YR 5/4).
60	80	Sandy gravel, medium to coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
80	100	Sandy gravel, coarse to very coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
100	120	Gravelly sand, coarse; poor to moderately sorted; subrounded to rounded; moderate yellowish brown (10YR 5/4).
120	140	Gravelly sand, coarse; moderately sorted; subangular; pale yellowish brown (10YR 6/2).
140	160	Silty gravelly sand, medium to coarse; moderately to poorly sorted; subangular; pale yellowish brown (10YR 6/2).
160	180	Silty sand, medium to coarse; moderately sorted; pale yellowish brown (10YR 6/2).
180	200	Gravelly silty sand, medium to coarse; poorly sorted; subangular to subrounded; pale yellowish brown (10YR 6/2).
200	220	Silty sand, medium to very coarse; some gravel; poorly sorted; subangular to angular; pale yellowish brown (10YR 6/2).
220	240	Sandy gravel, coarse to very coarse; poorly sorted; angular; pale yellowish brown (10YR 6/2).
240	260	Sandy gravel, coarse; poorly sorted; subangular to angular; pale yellowish brown (10YR 6/2).
260	280	Silty sand, medium to coarse; poorly sorted; subrounded to rounded; pale yellowish brown (10YR 6/2).
280	300	Silty sand, medium to coarse; poorly sorted; subangular to subrounded; pale yellowish brown (10YR 6/2).
300	320	Silty sand, medium to coarse; poorly sorted; subangular to subrounded; pale yellowish brown (10YR 6/2).
320	340	Silty sand, medium to coarse; poorly sorted; angular to subangular; pale yellowish brown (10YR 6/2).
340	360	Sand, coarse, with traces of silt; moderately poorly sorted; angular; dark yellowish brown (10YR 4/2).
360	380	Sandy gravel, medium to coarse; poorly sorted; subangular to angular; dark yellowish brown (10YR 4/2).
380	400	Sandy gravel, medium to coarse; poorly sorted; subangular to subrounded; dark yellowish brown (10YR 4/2).
400	420	Gravelly sand, medium, few coarse; moderately sorted; angular; dark yellowish brown (10YR 4/2).
420	440	Sandy gravel, medium to coarse; moderately sorted; angular; dark yellowish brown (10YR 4/2).
440	460	Sand, medium to coarse, some gravel; poorly sorted; angular; pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2).
460	480	Sand, medium; well sorted; angular; dark yellowish brown (10YR 4/2).
480	500	Sand, medium to coarse; some gravel; poorly sorted; subangular to angular; dark yellowish brown (10YR 4/2).

Table 19. Lithologic log for borehole of monitoring site FI1(14N/3E-32K3, -32K4, -32K5, -32K6) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface 2,472.43 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, February 16–23, 1993. Total depth drilled 493 ft. Perforated intervals 420–440, 335–355, 270–290, and 210–230 ft]

Depth (ft) From	Depth (ft) To	Description
FI1(14N/3E-32K3, -32K4, -32K5, -32K6)		
Cuttings		
0	20	No sample collected
20	40	Sand, fine to very coarse, with some granules and pebbles; poorly sorted; subrounded, occasional angular; some mica and mafic minerals; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
40	60	Sand, fine to very coarse, with some granules and pebbles; poorly sorted; subrounded; occasional rock frament (volcanic?), some mafic minerals, possibly clay; moderate yellowish brown (10YR 5/4).
60	80	Sand, fine to very coarse, with some granules and pebbles; poorly sorted; subrounded; occasional volcanic rock fragments, some clay; moderate yellowish brown (10YR 5/4).
80	100	Sand, fine to very coarse, with granules to small pebbles; poorly sorted; subrounded, some subangular rock fragments; abundant mica; moderate yellowish brown (10YR 5/4).
100	120	Sand, fine to very coarse, with granules and pebbles, some clay; poorly sorted; rounded to subrounded, occasional subangular rock fragments; abundant mica; moderate yellowish brown (10YR 5/4).
120	140	Sand, fine to very coarse, with granules and pebbles; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
140	160	Sand, fine to very coarse, with granules to small pebbles, some clay; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
160	180	Sand, fine to very coarse, and granules to small pebbles; poorly sorted; subrounded, occasional angular rock fragments; moderate yellowish brown(10YR 5/4).
180	200	Sand, fine to very coarse, and granules to small pebbles; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
200	220	Gravelly silty sand, very fine sand to small pebbles, with silt; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
220	240	Slightly gravelly sand, fine sand to small pebbles, some silt; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
240	260	Slightly gravelly sand, fine sand to small pebbles, with some silt; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
260	280	Slightly gravelly sand, fine sand to small pebbles, with some silt; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
280	300	Sand, fine to very coarse; moderately poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
300	320	Sand, very fine to medium, with coarse grains; moderately sorted; subrounded to subangular; dark yellowish brown (10YR 4/2); some mafic minerals.
320	340	Sand, fine to coarse; moderately sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
340	360	Sand, fine to coarse; moderately sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
360	380	Sand, fine to coarse; moderately sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
380	400	Sand, fine to coarse, with some very coarse grains; poorly sorted; subrounded to subangular; dark yellowish brown (10YR 4/2).
400	420	Sand, fine to very coarse, with some angular rock fragments; poorly sorted; subrounded to angular; dark yellowish brown (10YR 4/2).
420	440	Sand, fine to very coarse, many angular rock fragments; poorly sorted; subangular to angular; dark yellowish brown (10YR 4/2) to grayish brown (5YR 3/2).
440	460	Ground-up granitic rock, quartz, mafic minerals, mica, medium-sized grains; well sorted; subangular; olive gray (5Y 3/2).
460	490	Ground-up granitic rock, quartz, mafic minerals, mica, fine and medium-sized grains; well sorted; subangular; olive gray (5Y 3/2).
490	493	Core: Granitic bedrock.

Table 20. Lithologic log for borehole of monitoring site SOC2 (14N/3E-32N1, -32N2, -32N3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,530 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, May 9–10, 1995. Total depth drilled 540 ft. Perforated intervals 500–520, 390–410, and 250–270 ft]

Depth (ft)		Description
From	To	
SOC2 (14N/3E-32N1, -32N2, -32N3)		
Cuttings		
0	18	Sand, some gravel, medium to very coarse; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
18	38	Sand, some gravel, medium to very coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
38	58	Sand, some gravel, medium to very coarse; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 4/2) to dark yellowish brown (10YR 4/2).
58	78	Sand, trace gravel, medium to coarse; moderately sorted; subrounded; dark yellowish brown (10YR 4/2).
78	98	Sand, medium to coarse; moderately to well sorted; subrounded; dark yellowish brown (10YR 4/2).
98	118	Sand, medium to coarse; moderately sorted; subangular; dark yellowish brown (10YR 4/2).
118	138	Sand, medium grained; well sorted; subangular to angular; moderate yellowish brown (10YR 5/4).
138	158	Sand, medium grained; moderately sorted; subrounded; moderate yellowish brown (10YR 5/4).
158	178	Sand, medium to coarse grained; moderate to poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
178	198	Sand, medium to very coarse; moderately to poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
198	218	Sand, some gravel; fine to coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
218	238	Sand, some gravel; medium, some coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
238	258	Sand, medium to coarse; moderately to poorly sorted; subangular to angular; moderate yellowish brown (10YR 5/4).
258	278	Sand, medium grained; moderately sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
278	298	Sand, medium grained; moderately sorted; subrounded; moderate yellowish brown (10YR 5/4).
298	318	Sand, medium to coarse; moderately sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
318	338	Sand, medium to coarse; moderately sorted; subangular; moderate yellowish brown (10YR 5/4).
338	358	Sand, fine to coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
358	378	Sand, medium to very coarse; poorly sorted; subrounded; moderate yellowish brown (10YR 5/4).
378	418	Sand, coarse to very coarse; moderately sorted; rounded to subrounded; moderate yellowish brown (10YR 5/4).
418	438	Sand, some gravel; medium to very coarse; poorly sorted; subangular; moderate yellowish brown (10YR 5/4).
438	458	Sand, trace gravel; medium to coarse; moderately sorted; subangular; dark yellowish brown (10YR 4/2).
458	478	Sand with gravel, medium to very coarse; poorly sorted; subangular; dark yellowish brown (10YR 4/2).
478	498	Sand some gravel; medium to coarse; moderately sorted; subangular; moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2).
498	518	Sand, fine to medium; moderately sorted; subrounded; dark yellowish brown (10YR 4/2).

Table 21. Lithologic log for borehole of monitoring site SOC1 (14N/3E-32P2, -32P3, -32P4, -32P5, -32P6) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,517 ft above sea level. Drilled by the U.S. Geological Survey using mud rotary, June 2–8, 1994. Total depth drilled 905 ft. Perforated intervals 850–870 and 894–904, 710–730, 560–580, 385–405, and 250–270 ft]

Depth (ft)		Description
From	To	
SOC1 (14N/3E-32P2, -32P3, -32P4, -32P5, -32P6)		
Cuttings		
0	40	Sand, fine to coarse; granules and pebbles;poorly sorted; angular to subrounded; mafic minerals; moderate yellowish brown (10YR 5/4).
40	60	Sand, fine to coarse, with granules, pebbles, and clay; poorly sorted; subangular to subrounded; mafic minerals; moderate yellowish brown (10YR 5/4).
60	80	Sand, fine to coarse, with some granules, pebbles and clay; poorly sorted; subangular to subrounded; mafic minerals; moderate yellowish brown (10YR 5/4).
80	120	Sand, fine to coarse, with occasional granules and some clay; poorly sorted, subangular to subrounded; moderate yellowish brown (10YR 5/4).
120	140	Sand, fine to coarse, with granules, pebbles, and some clay; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
140	160	Sand, fine to coarse, with granules, pebbles, and some clay; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
160	240	Sand, fine to coarse, with clay and some granules; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
240	280	Sand, fine to coarse, with clay and some granules; poorly sorted; subrounded to subangular; moderate yellowish brown (10YR 5/4).
280	360	Sand, fine to medium, with clay and some granules; moderately sorted; subangular to subrounded; mafic minerals; moderate yellowish brown (10YR 5/4).
360	390	Sand, fine to coarse, with some clay and some granules; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
390	440	Sand, fine to medium, with some clay; moderately sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
440	460	Sand, fine to coarse, with granules and some clay; poorly sorted; angular to subrounded; mafic minerals, mica; dark yellowish brown (10YR 4/2).
460	520	Sand, fine to coarse, with some clay and occasional granules; poorly sorted; angular to subrounded; mafic minerals and mica; dark yellowish brown (10YR 4/2).
520	560	Sand, fine to medium, with clay; moderately sorted; subangular to subrounded, mafic minerals and mica; dark yellowish brown (10YR 4/2).
560	590	Sand, fine, some medium, with clay; moderately sorted; subrounded; mafic minerals and mica; dark yellowish brown (10YR 4/2).
590	640	Sand, fine to medium, with clay; moderately sorted; subrounded; mica; olive gray (5Y 3/2).
640	660	Clay, with fine sand; olive gray (5Y 3/2).
660	720	Sand, fine to medium, with clay; moderately sorted; subangular to subrounded; olive gray (5Y 3/2).
720	770	Sand, fine to medium, with clay; occasional granules; moderately sorted; subangular to subrounded; mica; olive gray; (5Y 3/2).
770	780	Sand, medium to fine, with clay; moderately sorted; subrounded; mica, mafic minerals; olive gray (5Y 3/2).
780	820	Sand, medium to fine, with clay; occasional granules; moderately sorted; subangular to subrounded; abundant mica and mafic minerals; olive gray (5Y 3/2).
820	840	Clay and sand, fine to coarse; poorly sorted; subangular to subrounded; olive gray (5Y 3/2); mica.
840	905	Clay with fine sand, some medium; grayish olive (10YR 4/2); abundant mafic minerals and mica; possible siltstone.

Table 22. Lithologic log for borehole of monitoring site BC1 (14N/3E-33A1) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,420 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, February 20–22, 1994. Total depth drilled 185 ft. Perforated interval 145–185 ft]

Depth (ft)		Description
From	To	
BC1 (14N/3E-33A1)		
Cuttings		
0	20	Sand, fine to coarse, some granules; poorly sorted; subangular to subrounded; mica and mafic minerals present; moderate brown (5YR 4/4).
20	48	Ground-up metamorphic rock, possibly mica schist; mostly mica, mafic minerals, and quartz; sample consists of medium to very coarse sand-sized particles; subangular; olive black (5Y 2/1).
48	61	Clay, with ground-up metamorphic rock; mica, mafic minerals, quartz, occasional rock fragments; some sand, fine to medium-sized grains; poorly sorted; angular; olive gray (5Y 4/1).
61	68	No sample collected. Clay layer.
68	80	Ground-up metamorphic rock; mostly mica, mafic minerals, quartz; some sand, very fine to fine-size grains; olive black (5Y 4/4).
80	95	Ground-up granitic rock, very fine- to fine-sized fragments, with clay; moderately sorted; abundant mica, mafic minerals, and quartz, occasional larger rock fragments; dark yellowish brown (10YR 4/2).
95	120	Ground-up granitic rock, fine- to coarse-sized fragments, with some very coarse occasional granules and pebbles; poorly sorted; subangular; occasional rock fragments; dark yellowish brown (10YR 4/2).
120	140	Ground-up granitic rock, fine- to very coarse-sized fragments, gravelly granules to pebbles; poorly sorted; sand is subangular to subrounded; dark yellowish brown (10YR 4/2) to olive gray (5Y 3/2).
140	160	Ground-up granitic rock, fine- to very coarse-sized fragments, some granules; occasional rock fragments; poorly sorted; angular to subrounded; dark yellowish brown (10YR 4/2) to olive gray (5Y 3/2).
160	180	Ground-up granitic rock, fine- to very coarse-sized fragments, with clay, occasional rock fragments; poorly sorted; subangular to subrounded; abundant mica at approximately 180 ft; dark yellowish brown (10YR 4/2) to olive gray (5Y 3/2).
180	185	Ground-up granitic rock, medium- to very coarse-sized fragments, with clay, some granule- and pebble-sized gravel; poorly sorted; angular to subangular; dark yellowish brown (10YR 4/2) to olive gray (5Y 3/2).

Table 23. Lithologic log for borehole of monitoring site PICNIC (14N/3E-33E2, -33E3) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,425 ft above sea level. Drilled by U.S. Geological Survey using mud rotary, March 7–9, 1994. Total depth drilled 260 ft. Perforated interval 200–220 and 155–175 ft]

Depth (ft)		Description
From	To	
PICNIC (14N/3E-33E2, -33E3)		
Cuttings		
0	20	Gravel, granules to pebbles, and sand, fine to coarse; poorly sorted; angular to subrounded; moderate brown (5YR 4/4).
20	40	Sand, fine to coarse, with granules and pebbles; poorly sorted; subangular to subrounded; some mica; moderate brown (5YR 4/4).
40	120	Sand, fine to coarse, with granules and pebbles, some clay; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
120	140	Sand, fine to coarse, with some granules and some clay; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
140	160	Sand, fine to coarse, with some granules and clay; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
160	180	Sand, fine to medium, some coarse, with occasional granules, some clay; moderately sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
180	200	Sand, fine to coarse, with some granules; poorly sorted; subangular to subrounded; abundant mafic minerals and some mica; dark yellowish brown (10YR 4/2).
200	225	Sand, fine to coarse, with occasional granules; poorly sorted; subangular to subrounded; mafic minerals and mica; dark yellowish brown (10YR 4/2).
225	260	Weathered granitic rock, (mostly quartz, mafic minerals, and mica); olive gray (5Y 4/1).

Table 24. Lithologic log for borehole of monitoring site LFMW7 (14N/3E-33J2) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,390 ft above sea level. Drilled by U.S. Geological Survey using air odex, April 19–20, 1994. Total depth drilled 116.5 ft. Perforated intervals 76–116 ft]

Depth (ft)		Description
From	To	
LFMW7 (14N/3E-33J2)		
Cuttings		
0	10	Sand, very fine to medium, with some silt, occasional granules; moderately sorted; subrounded; moderate brown (5YR 4/4).
10	20	Clay, some very fine sand, with occasional granules, some mica, some rock fragments; moderate yellowish brown (10YR 5/4).
20	30	Sand, very fine to medium, with some granules, occasional pebbles, some clay; moderately sorted; subrounded; some rock fragments; moderate brown (5YR4/4).
30	40	Sand, very fine to medium, with gravel, granule to pebble; poorly sorted; sand is subangular to subrounded, gravel is angular to subangular; abundant mica and mafic minerals; moderate yellowish brown (10YR 5/4).
40	50	Sand, very fine to medium, with some silt; moderately sorted; subangular to subrounded; some mica and mafic minerals; moderate yellowish brown (10YR5/4).
50	60	Ground-up metamorphic rock, abundant mica, mafic minerals, and quartz.
60	70	Ground-up metamorphic rock, mica, mafic minerals, quartz, olive black (5YR2/1).
70	116	No sample collected. Ground-up metamorphic rock, possibly mica schist.

Table 25. Lithologic log for borehole of monitoring site LFMW6 (14N/3E-34M2) at Fort Irwin National Training Center, California

[ft, foot. Altitude of land surface approximately 2,420 ft above sea level. Drilled by U.S. Geological Survey using air odex, March 29–April 4, 1994. Total depth drilled 116 ft. Perforated interval 96–116 ft]

Depth (ft)		Description
From	To	
LFMW6 (14N/3E-34M2)		
Cuttings		
0	10	Sand, fine to coarse, with some granules and pebbles, silt; poorly sorted; subangular to subrounded; moderate yellowish brown (10YR 5/4).
10	20	Sand, fine to coarse, with gravel, granules to pebbles; poorly sorted; sand is subangular to subrounded, gravel is angular to subangular; moderate yellowish brown (10YR 5/4).
20	25	Sand, fine to coarse, with gravel, granules to pebbles; poorly sorted; sand is subangular to subrounded, gravel is angular to subangular; moderate yellowish brown (10YR 5/4).
25	35	Sand, fine to coarse, with gravel, granules to pebbles and some silt; poorly sorted; sand is subangular to subrounded, gravel is angular to subrounded; moderate brown (5YR 4/4).
35	45	Sand, fine to coarse, with gravel, granules to pebbles, some silt; poorly sorted; sand is subangular to subrounded, gravel is angular to subrounded; moderate brown (5YR 4/4).
45	55	Sand, fine to coarse, with gravel, granules to pebbles; poorly sorted; sand is subangular to subrounded, gravel is angular to subangular; dark yellowish brown (10YR 4/2).
55	60	Gravel, granules to pebbles, with sand, fine to coarse; poorly sorted; subangular to subrounded; dark yellowish brown (10YR 4/2).
60	65	Gravel, granules to pebbles, with sand, fine to coarse, some silt; poorly sorted; gravel is subangular to subrounded, sand is subangular to subrounded; moderate yellowish brown (10YR 5/4).
65	75	Sand, very fine to coarse, with some silt and gravel, granules to pebbles; poorly sorted; sand is subangular to subrounded, gravel is angular to subrounded; dark yellowish brown (10YR 4/2).
75	85	Sand, very fine to coarse, with gravel, granules to pebbles, silt; poorly sorted; sand is subangular to subrounded, gravel is angular to subrounded; dark yellowish brown (10YR 4/2).
85	90	Sand, very fine to medium, with silt and some gravel, granule size; poorly sorted; abundant mica at approximately 90 ft.
90	95	Ground-up metamorphic rock, possibly mica schist; sand is subangular to subrounded; dusky yellowish brown (10YR 2/2).
95	98	Sand, very fine to coarse, with silt and gravel, granule to pebble; poorly sorted; subangular to subrounded; abundant mica (possibly ground-up mica schist); dusky yellowish brown (10YR 2/2).
98	116	Sand, fine to coarse, with gravel, granule to pebble; poorly sorted; ground-up granitic rock; sand is subangular to subrounded; dusky yellowish brown (10YR 2/2).

☆ U.S. GOVERNMENT PRINTING OFFICE: 1997-585-583/79158