



PHILIPS

Philips Semiconductors

May 27, 1996

Ms. Stephanie Kruse
Hazardous & Radioactive Materials Bureau
NMED
2044A Galisteo Street
Santa Fe, NM 87505

Certified Mail: Z 729 721 025

SUBJECT: Groundwater Monitoring Results

Dear Ms. Kruse:

According to Philips Semiconductors' HSWA permit (NMD000709782-1), modified March 18, 1996, to include the Coronado Municipal Landfill, we are required to perform quarterly groundwater sampling beginning no later than April 17, 1996. Enclosed are the results from the second quarter groundwater monitoring performed on April 15 and 16. All samples were tested for the constituents listed in 40 CFR 264 Appendix IX as requested. The only constituents found in the samples were arsenic, barium, chromium, zinc, and tetrachloroethene. All concentrations were well below the NMWQCC standards for groundwater.

Our next groundwater monitoring is scheduled for July in accordance with our permit. Due to the fact that the RCRA Facility Investigation Workplan will probably not be approved by that time, we are requesting that our monitoring requirements be reduced to testing for volatile compounds only as of the July monitoring. As you are well aware, testing for all Appendix IX constituents is very costly and is excessive in this situation. Please let us know by June 14 if this change is possible.

If you have any questions regarding this submission, please call me at (505) 822-7634.

Sincerely,

Melanie McKinley
Environmental Engineer

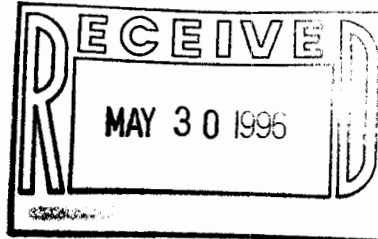
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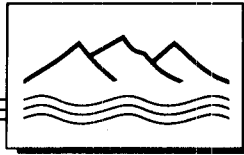
Enclosure

cc: Jim Cochran, EHS Manager
James Casey, Legal Counsel

Philips Semiconductors
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DANIEL B. STEPHENS & ASSOCIATES, INC.

ENVIRONMENTAL SCIENTISTS AND ENGINEERS

**North American Philips Company
Quarterly Ground-Water Monitoring Report**

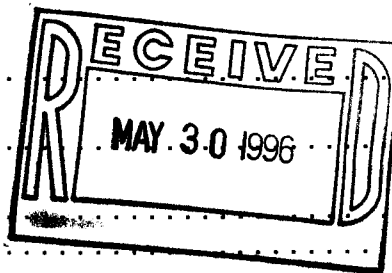
**Prepared for
North American Philips Company
Albuquerque, New Mexico**

May 24, 1996



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North American Philips Company Quarterly Ground-Water Monitoring Report

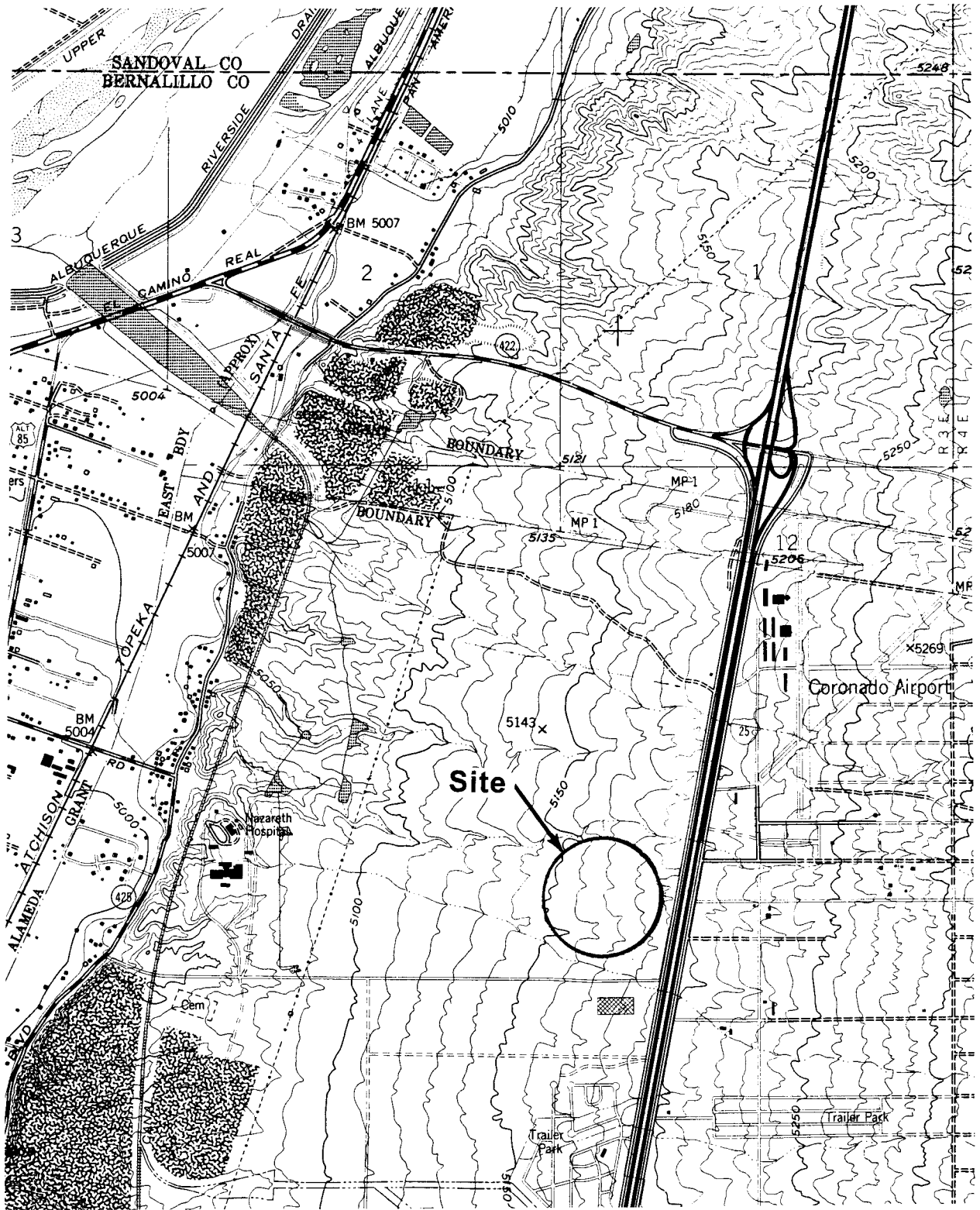
1. Introduction

In accordance with *Modifications to Module IV-Corrective Action of RCRA Permit No. NMD000709782-1 Section C (Special Conditions), Subsection C.1 (Quarterly Sampling of Existing Ground Water Monitoring Wells)*, ground-water monitoring was conducted by Daniel B. Stephens & Associates, Inc. (DBS&A), at North American Philips Company's (Philips) facility in Albuquerque, New Mexico, on April 15 and 16, 1996. Sampling and analysis procedures followed New Mexico Environment Department (NMED) ground-water sampling guidelines and U.S. Environmental Protection Agency (EPA's) *RCRA Ground-Water Monitoring: Draft Technical Guidance*, dated November 1992.

This report summarizes the results of the April 1996 sampling event at the Philips facility, formerly known as Signetics Corporation, Inc. Sections 2 through 4 describe the background and history of the Philips site, the hydrogeologic setting, and monitoring methods and results, respectively. Conclusions are provided in Section 5.

2. Background

The Philips facility is located at the north edge of the City of Albuquerque, near the intersection of Interstate 25 and Alameda Boulevard, as shown in Figures 1 and 2. The facility is located on approximately 60-acres obtained from the City of Albuquerque. Construction of the 470,000 square foot plant began in 1978, operations began in 1982, and full operational status was reached in 1983. A portion of the site was formerly occupied by the City of Albuquerque Coronado Municipal Landfill, which operated from 1963 to 1965 and received mainly household and commercial trash. Historical evidence suggests that it was a relatively small landfill composed of two sections that occupied an area of approximately 7.5 acres (PRC, 1992). The site is bordered to the north by vacant land, to the south by private businesses, to the east by the Pan American Freeway (Interstate 25), and to the west by Honeywell, Inc., a manufacturing facility.



Source: Adapted from Alameda, NM,
7.5 minute USGS quadrangle map.



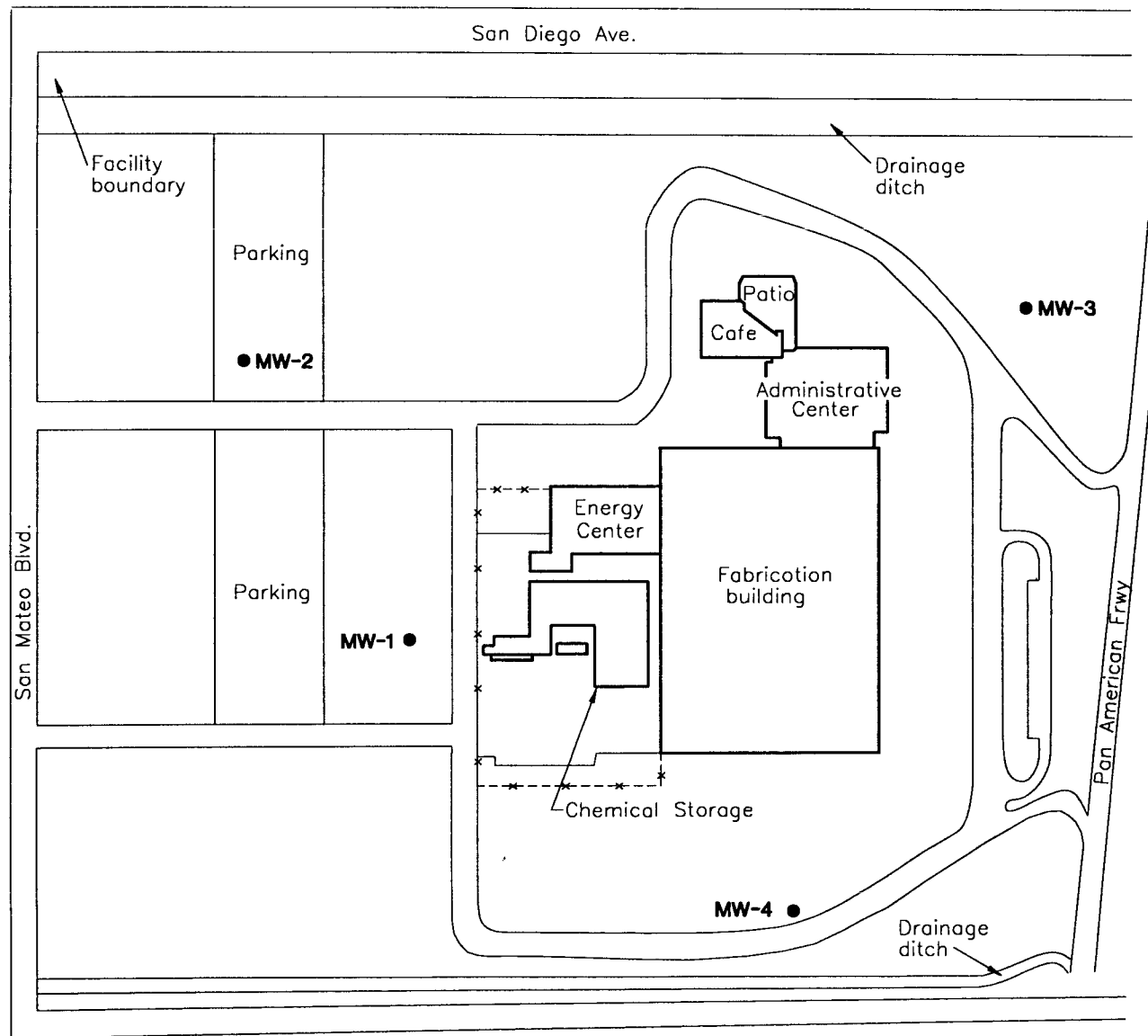
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5-9-96 JN 6023

PHILIPS SEMICONDUCTORS, INC.
General Site Vicinity

Figure 1



Not to scale

Explanation

● Monitor well

-x-x- Fence



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PHILIPS SEMICONDUCTORS, INC.
Site Plan



Four ground-water monitoring wells (MW-1 through MW-4) were installed on the property in May and June 1987. The monitoring wells were sampled for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and general water quality parameters in June and August 1987. Ground-water samples were subsequently collected from the monitor wells in September 1988, in May, September, and December 1989, and approximately quarterly from 1990 through 1993. The wells were sampled twice in 1994 and once in 1995. Previous ground-water samples consistently contained low concentrations of tetrachloroethene (PCE). Early (three rounds in 1988 and 1989) monitoring results also showed low concentrations of 1,1,2,2-tetrachlorethane.

3. Hydrogeologic Setting

The Philips site is located in the easternmost portion of the Basin and Range Province of the United States. The geologic setting is generally characterized by thick alluvial sediments deposited in a north-south trending fault basin, the Rio Grande Rift. Sediments deposited by the Rio Grande are poorly consolidated, and are generally quite permeable. Ground water in the shallow unconfined aquifer is recharged via the Rio Grande and local precipitation within the basin boundaries (Kaehler, 1990; Wilkins, 1986).

3.1 Geology

The Philips facility is located about 2 miles east of the Rio Grande at an elevation of about 5,200 feet above mean sea level. The facility is located on the lower portion of the Sandia piedmont plain, which consists of coalescing alluvial fans from the Sandia Mountains dissected by westward trending arroyos. Two small, lined arroyos lie north and south of the facility and are reportedly part of the La Cueva Arroyo drainage area. La Cueva Arroyo drains an area of approximately 6.4 miles upgradient of the Philips facility (PRC, 1992).

Sediments underlying the site include the Santa Fe Group, alluvial fans, and valley alluvium. The tertiary Santa Fe Group underlies the Quaternary surficial deposits of the modern Rio Grande and crops out on the east and west mesas. Materials of the Santa Fe Group were derived from erosion of the highlands east and west of the Rio Grande Rift, and volcanic activity and erosion



of the highlands farther north. The Santa Fe Group consists of unconsolidated to poorly consolidated sediments and interbedded volcanic rocks. The deposits range from boulders to clay and from well sorted stream channel deposits to poorly sorted slopewash deposits. Extrusive volcanic rocks of Tertiary and Quaternary ages, mainly basaltic rocks, are interbedded with sediments (PRC, 1992). Details of the regional geology are available in numerous reports (Anderholm, 1988; Bjorklund and Maxwell, 1961; Hawley and Haase, 1992; Kernodle and Scott, 1986).

3.2 Ground Water

The sediments that fill the Rio Grande Rift include the Santa Fe Group, and the overlying alluvium deposited by the modern Rio Grande (valley fill). Both units are hydraulically interconnected, and water moves from one formation into the other based on the local hydraulic gradient (Bjorklund, 1961). Ground water in the valley fill is generally under water table conditions, but locally, artesian conditions may exist as a result of a confinement of saturated gravel or sand beds between beds of silt or clay. The water table generally slopes southwestward from the Sandia and Manzano Mountains at a rate of approximately 5 to 20 feet per mile (Bjorklund, 1961). Variations in the direction of the water table slope are caused by differences in permeability and saturated thicknesses, or especially by ground-water withdrawals for water supply systems. Recharge to the aquifer is from precipitation, underflow of ground water derived from further north along the Rio Grande Rift, and recharge from streams, drains, canals, surface reservoirs, and irrigation water within the Albuquerque basin.

4. Monitoring Methods and Results

This section describes the methods used to collect ground-water samples from monitor wells at the Philips facility, and a discussion of the April 1996 results.

4.1 Ground-Water Sampling Methods

DBS&A sampled the four on-site ground-water monitor wells at the Philips facility on April 15 and 16, 1996. All samples were collected in accordance with (1) DBS&A's standard operating



procedures for ground-water sampling, (2) the methods in *RCRA Ground-Water Monitoring: Draft Technical Guidance* (EPA, 1992), and (3) accepted regulatory and industry standards. A representative of the NMED, Mr. Dale Conover, was present on April 15, 1996, to observe the sampling activities.

Prior to sampling each monitor well, the depth to water was measured with an electric sounder. The well was then purged of approximately three well-bore volumes of water using the dedicated bladder pump at each well. A summary of the April 1996 ground-water elevation measurements and calculated purge volumes is presented in Table 1. During purging, pH, temperature, and electrical conductance were monitored to ensure that water quality had stabilized prior to sampling. Table 2 summarizes the ground-water quality data obtained during sample purging of each well.

**Table 1. Summary of Water Table Measurements and Calculated Purge Volumes
April 12, 1996**

Monitor Well	Surface Elevation (ft)	Measuring Point Elevation ^a (ft)	Approximate Total Depth (ft)	Depth to Water ^b (ft)	Water Table Elevation (ft)	Water Column Thickness (ft)	Purge Volume ^c (gal)
MW-1	5168.17	5168.70	247	207.28	4961.42	39.72	19.45
MW-2	5158.15	5159.36	245	196.14	4963.22	48.86	23.92
MW-3	5185.48	5186.43	260	231.59	4954.84	28.41	13.91
MW-4	5182.46	5182.94	260	224.24	4958.70	35.76	17.51

^a Top of casing

^b Measured from the top of casing

^c Calculated by as $V = 3\pi r^2 h \times 7.48 \text{ gal/ft}^3$, where h = water column thickness (feet) and r = well bore radius (feet)

In accordance with Philips' RCRA Permit Section C, Subsection C.1, ground-water samples were analyzed for all chemical parameters on the RCRA Appendix IX Ground-Water Monitoring List. Additionally, several quality control/quality assurance (QC/QA) samples were collected. A matrix spike sample (MW-3MS) and a matrix spike duplicate sample (MW-3MSD) were obtained from



Table 2. Summary of Ground-Water Parameters Obtained During Sample Purging, April 15 and 16, 1996

Monitor Well	Purge Volume ^a (gal)	Volume Purged (gal)	Time	pH	Electrical Conductivity (μS/cm)	Temperature (°C)
MW-1	19.45	3.00	1340	7.78	383	19.6
		6.00	1355	9.29	391	16.9
		9.00	1410	7.98	556	17.0
		12.00	1425	8.07	609	17.1
		15.00	1440	7.97	631	17.2
		18.00	1455	7.88	640	17.1
		20.00	1505	7.89	647	17.2
MW-2	23.92	4.00	1525	6.82	634	16.2
		8.00	1548	6.83	768	16.2
		12.00	1610	6.84	762	16.1
		16.00	1630	6.84	760	16.1
		20.00	1645	6.85	689	16.1
		24.00	1700	6.85	748	16.3
		26.00	1710	6.86	754	16.2
MW-3	13.91	2.50	1125	4.21	330	16.0
		5.00	1145	4.31	350	16.3
		7.50	1200	6.13	396	16.7
		10.00	1215	7.30	330	16.1
		12.50	1230	7.34	330	16.1
		15.00	1245	7.39	268	17.2
		15.20	1250	7.39	296	17.1
MW-4	17.51	3.00	957	6.92	922	16.7
		6.00	1020	7.01	921	16.6
		9.00	1050	7.04	922	17.1
		12.00	1120	7.03	923	17.1
		15.00	1150	7.04	918	16.9
		18.00	1200	7.05	921	16.7
		19.00	1205	7.04	920	16.7

Notes: Measurements obtained using a YSI flowthrough meter

^a Calculated by $V = 3\pi r^2 h \times 7.48 \text{ gal/ft}^3 \times 3$, where h = water column thickness (feet), r = well bore radius (feet)



MW-3, and a blind duplicate sample (Duplicate) was obtained from MW-2 and analyzed for Appendix IX constituents. The laboratory methods employed included the following:

- VOCs by EPA method 8260
- SVOCs by EPA method 8270
- Pesticides/polychlorinated biphenyls (PCBs) by EPA 8080
- Herbicides by EPA method 8150
- Polycyclic aromatic hydrocarbons (PAHs) by EPA method 8310
- Polychlorinated dioxins and furans by EPA method 8280
- Metals by EPA 6000 Series/7000 Series
- Cyanide by EPA method 335.3
- Sulfide by EPA method SM427C

As recommended by NMED, each well sample was also analyzed for ethylene dibromide (EDB) by EPA method 502. The full list of compounds and elements analyzed is included with the laboratory reports in Appendix A.

Water samples were collected in appropriate bottles with appropriate preservatives for selected samples. As a QA/QC measure, a trip blank for detection of possible VOC contaminants was included with the sample bottles. All sample bottles were pre-cooled with ice prior to sampling, and following collection, were kept in coolers with Blue Ice until delivered to the analytical laboratory. Chemical analysis for VOCs, SVOCs, pesticides/PCBs, herbicides, cyanide, sulfide, and metals were performed by ACZ Laboratories, Inc., of Steamboat Springs, Colorado. Chemical analyses for EDB and polycyclic hydrocarbons were performed by Hall Environmental Analysis Laboratory, Inc. (HEAL), of Albuquerque, New Mexico, and analysis for dioxins and furans was subcontracted by HEAL to Ionics International, Inc., of Houston, Texas.

4.2 Ground-Water Elevation Results

Ground water is encountered in the Philips' monitor wells at depths of approximately 200 feet below ground surface (bgs). Based on our April 1996 data, the ground-water flow direction is to the east-northeast. This is consistent with ground-water elevation data measured during previous



site investigations. The depths to ground water and ground-water table elevations as measured on April 12, 1996, are summarized in Table 1 and shown graphically on Figure 3.

4.3 Ground-Water Monitoring Results and Analyses

Laboratory results for ground-water samples collected during April 1996 are presented in Table 3. The data table includes only analytes detected above the laboratory detection limits. Full laboratory reports are provided in Appendix A. Concentrations of PCE in ground-water samples from MW-1, MW-2, and MW-4 were slightly greater than laboratory detection levels, but less than the NMWQCC ground-water standard of 20 µg/L. Concentrations of arsenic, barium, chromium, and zinc were also detected, but were well below NMWQCC ground-water standards.

Handwritten note: PCE 100 µg/L (7/9)

4.4 Ground-Water Quality Discussion

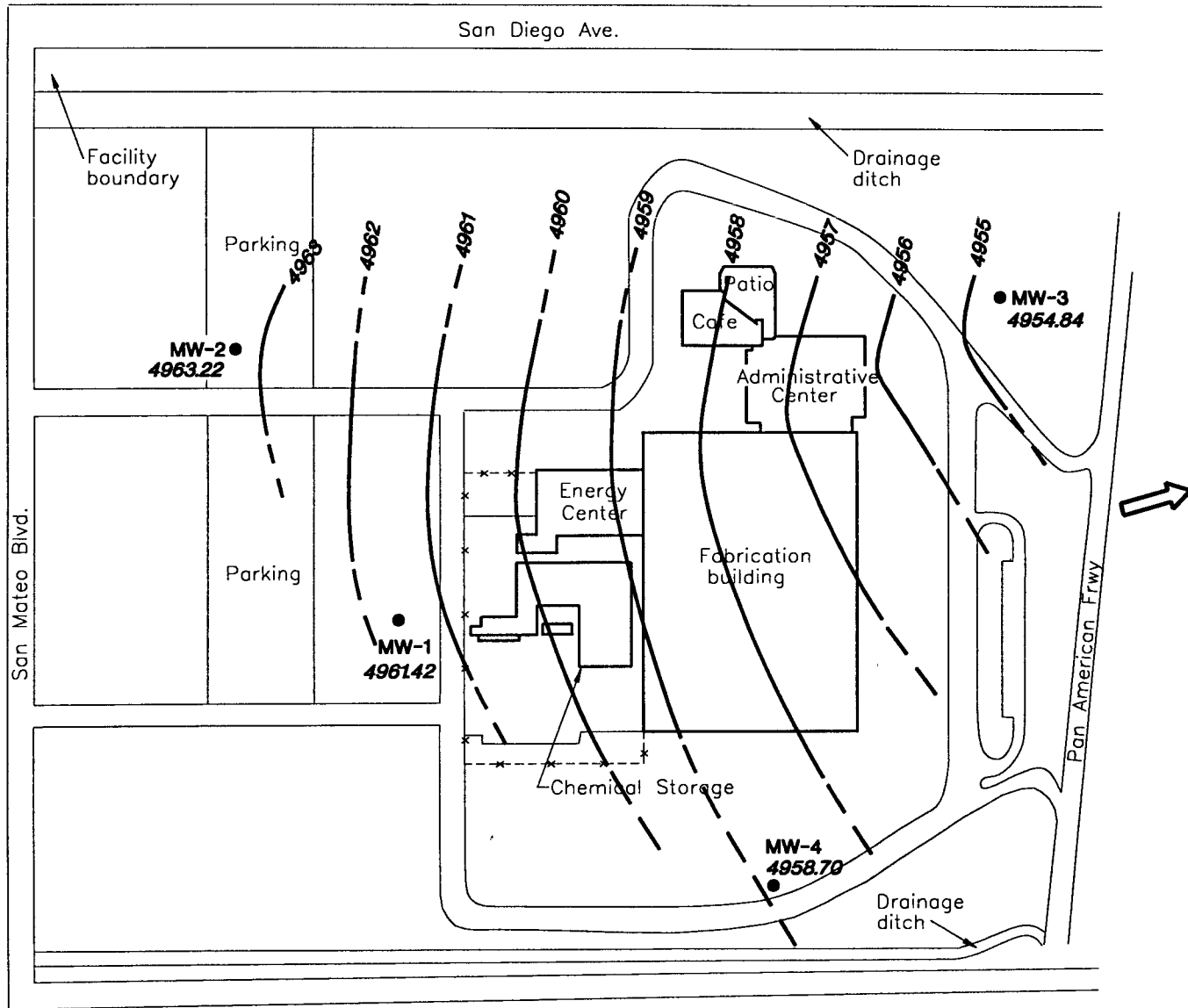
The April 1996 monitoring results indicate that ground-water quality in the area of the Philips facility is generally good, and water quality degradation is minimal. The monitoring results indicate that all chemical parameters are below NMWQCC ground-water standards. These results are similar to past monitoring results that have periodically indicated minor ground-water contamination with VOCs. No chemical parameters in the historical monitoring record have consistently exceeded standards, and none exhibit a trend of increasing concentrations.

Handwritten notes: EOB, MCL, 0.05 µg/L, 0.01 µg/L

5. Conclusions

Environmental monitoring activities were conducted at the Philips facility during April 1996 in accordance with the *Modification to Module IV-Corrective Action of RCRA Permit No. NMD000709782-1, Section C (Special Conditions), subsection C.1 (Quarterly Sampling of Existing Ground Water Monitoring Wells)*. As specified in the Permit, ground-water samples were collected and analyzed for all analytes listed in the Appendix IX-Ground-Water Monitoring List for RCRA TSD facilities. The concentrations of PCE detected in ground-water samples obtained from MW-1, MW-2, and MW-4 were slightly greater than laboratory detection limits, but less than the NMWQCC ground-water standard. The priority pollutant metals arsenic, barium, chromium,

Handwritten notes: As, Cr, Ba, 100 µg/L, 100 µg/L



Not to scale

Explanation

● Monitor well

-x-x- Fence

➔ General ground-water flow direction



DANIEL B. STEPHENS & ASSOCIATES, INC.
4-30-96 JN 6023

PHILIPS SEMICONDUCTORS, INC.
Ground-Water Table Elevation Data
April 12, 1996

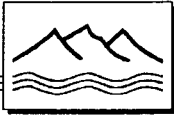


Table 3. Summary of Chemical Analytical Data, April 15 and 16, 1996

Monitor Well	EDB ^a (µg/L)	EPA Method 8310 ^b (µg/L)	EPA Method 8280 ^c (µg/L)	EPA Methods 6000 Series/7000 Series ^d		Cyanide ^e (µg/L)	Sulfide ^f (µg/L)	EPA Method 8150 ^g (µg/L)	EPA Method 8080 ^h (µg/L)	EPA Method 8270 ⁱ (µg/L)	EPA Method 8260 ^j	
				Detected Analyte	Concentration (µg/L)						Detected Analyte	Concentration (µg/L)
MW-1	<0.01	ND	ND	Barium Chromium Zinc	198 20 20	ND	ND	ND	ND	ND	PCE	7.4
MW-2	<0.01	ND	ND	Arsenic Barium Zinc	2 109 30	ND	ND	ND	ND	ND	PCE	6.6
MW-3	<0.01	ND	ND	Arsenic Barium Zinc	2 45 20	ND	ND	ND	ND	ND	ND	---
MW-4	<0.01	ND	ND	Arsenic Barium Zinc	2 141 20	ND	ND	ND	ND	ND	ND	---
MW-2 Duplicate	<0.01	ND	ND	Arsenic Barium Zinc	1 107 30	ND	ND	ND	ND	ND	PCE	6.9
Trip Blank	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	---
NMWQCC standards for ground water	0.1	---	---	Arsenic Barium Chromium Zinc	100 1,000 50 10,000	200	---	---	---	---	PCE	20

^a EDB = Ethylene dibromide, analyzed by EPA Method 504.

^b EPA method 8310 for polycyclic aromatic hydrocarbons (PAHs).

^c EPA method 8280 for polychlorinated dioxins and furans.

^d EPA methods 6000 Series/7000 Series for priority pollutant metals by 29 CFR Appendix IX. Only analytes detected above laboratory detection limits are included in this table.

Detection limits are shown on laboratory reports included in Appendix A.

^e Total cyanide analyzed by EPA method 335.3, colorimetric with distillation.

^f Sulfide analyzed by EPA method SM427C, modified methylene blue.

^g EPA method 8150 for herbicides.

^h EPA method 8270 for semi-volatile organic compounds.

ⁱ EPA method 8080 for pesticides and polychlorinated biphenols.

^j EPA method 8260 for volatile organic compounds. Only analytes detected greater than laboratory detection limits are included in this table. Detection limits are shown on laboratory reports, included in Appendix A.

µg/L = Micrograms per liter (ppb)

ND = Analytes not detected at method detection limits. Detection limits for each analyte are shown on laboratory reports included in Appendix A.

NA = Not analyzed

PCE = Tetrachloroethene



and zinc were detected at concentrations greater than laboratory detection limits, but far less than NMWQCC ground-water standards.

The ground-water monitoring results do not indicate any adverse ground-water quality impacts. Previous sampling in 1987 for SVOCs and metals also showed no adverse impacts. In view of these findings and the results of prior ground-water monitoring, we suggest that future ground-water monitoring be performed on a semiannual schedule for VOCs only.

References

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