Final Close-Out Report
Sola Optical USA, Inc.
Superfund Site
Sonoma County, California

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ACRONYMS

1,1,1-TCA	1,1,1-trichloroethane
1,1,2-TCA	1,1,2-trichloroethane
1,1-DCE	1,1-dichloroethene
1,1-DCA	1,1-dichloroethane
1,2-DCA	1,2-dichloroethane
5YR	Five-Year Review
bgs	below ground surface
CSPRMD	County of Sonoma Permit and Resource Management Department
EPA	United States Environmental Protection Agency
GWTS	groundwater extraction and treatment system
IC	institutional control
MCL	Maximum Contaminant Limit
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
msl	mean sea level
O&M	operation and maintenance
PCE	tetrachloroethene
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RAO	Remedial Action Objective
ROD	Record of Decision
TCE	trichloroethene
UST	underground storage tank
VOAs	volatile organic analysis
VOC	volatile organic compound

I. Introduction

EPA's remedial action objective for the Sola Optical USA, Inc. (Sola) Superfund Site (Site) – namely, to restore the groundwater to drinking water standards – has been achieved. All response actions have been successfully completed.

II. Summary of Site Conditions

Background

The Site is located in the City of Petaluma in Sonoma County, California, just east of Lakeville Highway's intersection with Interstate Highway 101, as shown on Figure 1. The Site's main property contains a manufacturing building and adjoining administration office building. Six underground storage tanks (USTs) were formerly located behind the north corner of the manufacturing part of the facility. The Site building is currently occupied by three companies, which utilize the main facility building and the loading docks. There is a fence located along the eastern Site boundary. Since 2005, an asphalt parking lot and four building pads with the associated below grade infrastructure (i.e., electrical and plumbing) have been constructed on the auxiliary 11 acre lot, adjacent to the main property.

The topography of the area is essentially flat, gently sloping 50 feet per mile from low hills in the east towards the Petaluma River, located approximately one mile southwest of the Sola building. Adobe Creek, located 0.3 miles west of the Sola building, runs north-south and flows intermittently into the Petaluma River one mile south from the Site.

Geologic investigations indicate that the depositional sediments at the Site consist of a complex sequence of alluvial deposits consisting of interbedded clays, silts, and sands, with lesser amounts of gravel. At depths of approximately 80 to 100 feet below ground surface (bgs), thicker clay intervals are present, which appear to be relatively continuous over distances of hundreds of feet. Interbedded within the clay are silt, sand, and gravel layers of various thicknesses. These deeper sediments probably represent complex alluvial and estuarine depositional environments (LFR, 1989).

Since 2005, groundwater in the shallow sediments was generally encountered from 6 to 18.5 feet above mean sea level (msl). The aquifer is unconfined and the groundwater flows south/southwesterly towards the Petaluma River, most likely the point of discharge. Natural recharge occurs at the base of the foothills to the north/northeast. The shallow aquifer extends to approximately 30 feet below msl and has been classified by the United States Environmental Protection Agency (EPA) as a Class IIa drinking water source aquifer. Below the shallow aquifer, the intermediate aquifer is approximately 30 to 60 feet below msl. The deep aquifer is from approximately 60 to 100 feet below msl, the deeper aquifer from approximately 100 to 200 feet below msl, and the deepest aquifer is greater than 200 feet below msl (LFR, 1990).

The 35-acre Sola property is zoned for industrial use. Land-use in the surrounding area is industrial, commercial, residential, and undeveloped land. The adjacent property to the west of

the Site was previously owned by Stero Company, a manufacturer of dishwashers. There are residential subdivisions to the north and northwest of the Site, approximately 200 feet away. Property east of the Site is used for office space and the Harvest Christian School.

The approximately 11-acre (889,060 square feet) previously undeveloped auxiliary lot in the southwest portion of the Site was purchased by RNM Cader, L.L.C. (RNM) for development in approximately 2001. An asphalt parking lot and four building pads with the associated below grade infrastructure (i.e., electrical and plumbing) were constructed on this lot between 2005 and 2010. The approximately 24-acre main lot of the Sola property, including the buildings, was sold to Kland, L.L.C. in 2002. The buildings include the original manufacturing building, the adjoining administration office building, and a parking lot surrounding the buildings. Three commercial tenants currently occupy the Site building: Petaluma Poultry, Reynolds Packaging, and Scott Laboratories. Petaluma Poultry conducts sales and distribution of poultry; Reynolds Packaging conducts storage and distribution of food packaging materials; and Scott Laboratories conducts manufacturing and finishing of cork for the wine industry.

The City of Petaluma uses the unconfined aquifer in the area as a drinking water source. In the vicinity of the Site, one City of Petaluma municipal water supply well (Station #5, screened from 180 to 512 feet bgs) and two private wells (Stero industrial well and Crandell residential well) were previously used. In addition, one City of Petaluma well (screened from 60 to 280 feet bgs) was installed at the Site but never used. All of these wells were shut down and/or abandoned in accordance with State of California well decommissioning requirements.

Sola manufactured ophthalmic lenses at the facility from 1978 through 2001. The facility consisted of the one manufacturing building and adjoining administration office building. The manufacturing process involved the injection of a catalyzed, thermosetting resin into a cavity between polished glass molds. The mold assembly was then placed in an air oven to cure the resin. The assembly was removed from the oven and subsequently put through a cleaning process before the production was repeated. The six USTs located behind the rear north corner of the manufacturing part of the facility were used to store solvents such as 1,1,1-trichloroethane (1,1,1-TCA), acetone, and methanol.

Early Investigations and Removal Actions

In May 1982, Sola found low concentrations of volatile organic compound (VOC) contamination in the groundwater beneath the Site, near the six USTs. In 1983, the San Francisco Regional Water Quality Control Board (Regional Board) directed Sola to investigate the contamination, and 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), methylene chloride, and 1,1,1-TCA were identified in the groundwater. In July 1985, Sola excavated and removed the six USTs. When the tanks were removed, there were no signs of leakage from the tanks; however, observations of the tank fill pipes and surrounding backfill showed staining on the pipes and in the adjacent backfill (LFR, 1990). It was concluded that the groundwater contamination might be a result of accidental spillage adjacent to, or leakage from, the fill pipes.

The tank removal included excavation of gravel backfill materials and three to five feet of native soil from the sides and bottom of the excavation pit. Confirmation sampling identified the presence of three contaminants: acetone, 1,1-DCE, and trans-1,2-dichloroethene. Based on these

findings, an additional two feet of soil was excavated from the eastern wall of the former tank area. Further confirmation sampling demonstrated the presence of VOCs, including acetone. No additional excavation was performed (LFR, 1990).

In July 1986, soil gas samples were collected from 40 locations, ranging from three to five feet bgs, to determine if VOCs were migrating from shallow groundwater and to aid in selection of locations for groundwater monitoring and extraction wells. Chemicals detected in the soil gas included: chloroform, carbon tetrachloride, 1,1-DCA, 1,1-DCE, tetrachloroethene (PCE), and 1,1,1-TCA. Maximum concentrations were found approximately 70 feet downgradient from the location of the former USTs (CH2M Hill, 1991).

In 1987, the Regional Board ordered Sola to construct and operate a groundwater extraction and treatment system (GWTS). Sola conducted the activities, with the treated groundwater being discharged into Adobe Creek, just northwest of the Site, under a permit from the Regional Board. The extraction and treatment system began operating in 1988. Sola also arranged to have the City of Petaluma shut down the nearby municipal water supply well, to avoid interference with the groundwater clean-up efforts and prevent potential use of Site-impacted groundwater.

In 1989, EPA became the lead regulatory agency for remedial activities at the Site. On February 21, 1990, EPA added the Site to the National Priorities List of Superfund sites. Soon thereafter, EPA issued an administrative order directing Sola to conduct further environmental sampling and to prepare a remedial investigation report and a feasibility study of clean-up options, both of which Sola completed in 1991.

Final Investigations and Remedies Selected

EPA issued a Record of Decision for the Site in 1991 (1991 ROD). Twelve chemicals of potential concern were identified in the 1991 ROD: acetone, butanone, 1,1-DCA, 1,2-dichloroethane (1,2-DCA), 1,1-DCE, Freon 113, 4-methyl-2-pentanone, PCE, toluene, 1,1,1-TCA, 1,1,2-trichloroethane (1,1,2-TCA), and trichloroethene (TCE). Contamination was found in the soil (acetone ranging up to 54 milligrams per kilogram (mg/kg) and 1,1-DCE at 0.051 mg/kg), and in the groundwater (primarily 1,1-DCA, 1,1-DCE, 1,1,1-TCA, and Freon-113). The highest contaminant concentration in groundwater was 1,1-DCE (3,300 micrograms per liter [µg/L]), detected in shallow well W-14 located downgradient of the former UST area. The wells on the downgradient edge of the Site indicated that the lateral extent of the VOC contamination within the Sola property was at or below the clean-up standards (EPA, 1991).

The risk assessment presented in the 1991 ROD indicated an excess lifetime cancer risk based on use of on-site contaminated groundwater for drinking water of $1x10^{-4}$ (1 person out of 10,000 people), primarily from 1,1 DCE. The non-carcinogenic risk estimate for contaminated groundwater indicated that no adverse noncarcinogenic health effects were expected.

The ecological assessment identified Adobe Creek as the closest surface water body to the Site and as a site of a local project to reintroduce anadromous steelhead trout to the creek. However, water quality samples from groundwater monitoring wells installed between the Sola property and Adobe Creek did not detect any contaminants, indicating that discharge of contaminants to surface water had not occurred. In addition, contaminants detected in groundwater at the Site

were below their corresponding federal surface water quality criteria for the protection of aquatic life.

Based on the remedial investigation report, feasibility study, and risk assessment, EPA issued the original ROD on September 27, 1991 (EPA, 1991). The Remedial Action Objective (RAO) was to restore groundwater to its beneficial use, which is drinking water (Table 1). The 1991 ROD determined that an expanded GWTS was the most appropriate method for remediating contamination at the Site. The selected site cleanup remedy consisted of the following elements:

- Groundwater monitoring to assure capture of contaminated groundwater and to demonstrate restoration of groundwater to cleanup standards throughout the aquifer
- Operation of existing extraction wells (8)
- Construction and operation of two additional shallow extraction wells
- Conversion of monitoring wells LF-13 and LF-17 to deep extraction wells
- Construction and operation of additional piping for the new and converted wells
- On-site treatment and discharge off-site or discharge to the City of Petaluma sewage treatment system

A ROD Amendment was signed on March 30, 2007, modifying the previously selected remedy for the Site, but leaving intact the 1991 ROD's remedial action objective of restoring groundwater to its beneficial use as drinking water (EPA, 2007). The evaluations leading to the ROD Amendment are described in the following section. The 2007 ROD Amendment addressed the two issues that prompted the remedy change: (1) groundwater clean-up, and (2) Institutional Controls (ICs). The new remedy selected in the 2007 ROD Amendment includes the following elements(EPA, 2007):

- Monitored Natural Attenuation (MNA) to achieve groundwater clean-up standards
- ICs to protect against inappropriate use of the contaminated groundwater until the clean-up standards are achieved
- Monitoring of both of the remedy components until clean-up standards are achieved and sustained

Remedial Actions

Sola expanded the system in 1992, pursuant to the 1991 ROD and a Unilateral Administrative Order issued by EPA (EPA, 1992a), and continued its operations. EPA signed an "Interim Close-out Report" to document completion of the construction and operability of the system (EPA, 1992b). This report served as the Preliminary Close-out Report and as the Remedial Action Report.

The system was expected to restore the shallow groundwater to clean-up standards within 15-20 years. Initially, concentrations of the VOC contamination at the Site decreased significantly. By 1997, however, the rate of contaminant reduction had decreased. Groundwater monitoring data at four wells showed that concentrations of two contaminants, 1,1-DCE and 1,1,-DCA, appeared to have stabilized and reached an asymptote at levels above the clean-up standards. Continued monitoring reflected no further reductions in contaminant concentrations. Some areas of the contaminated aquifer had achieved the clean-up standard of 5 parts per billion for 1,1-DCA but not the entire plume. The extraction and treatment system was no longer effectively removing these lower concentrations of contaminants from the groundwater.

In 1997, Sola requested approval from EPA to shut off the extraction and treatment system and issue a technical impracticability waiver, arguing that the clean-up goals for these two contaminants could not be achieved using extraction and treatment. EPA requested instead that Sola examine MNA as a potential remedy for the Site. Sola ceased operating the GWTS and monitored the aquifer's response under EPA's oversight.

The concentrations of the two remaining contaminants slowly declined. In 2001, Sola analyzed the data gathered since system shut-down in 1997 and presented its evaluation of MNA, following EPA guidance (LFR, 2001). Sola's evaluation concluded that extraction and treatment alone would not be capable of achieving the clean-up standard for the remaining aquifer contaminant, but MNA would likely be an effective remedy for attaining the clean-up standard. EPA indicated it would proceed with amending the 1991 ROD to establish MNA as the new remedy. The extraction and treatment system was decommissioned in 2002, and Sola prepared a workplan and monitoring report for MNA.

Sola began conducting MNA-type monitoring in 2003, based upon EPA's approval of their 2002 workplan. The plan consisted of continued semi-annual groundwater monitoring, with water level being measured for 4 wells and water quality sampling conducted for 1 well (W-27). (See Figure 2). Contaminant concentrations in the other wells had been below MCLs for several years or more. The work was performed by Sola's contractor, LFR/Arcadis. EPA later approved this workplan as the remedial design (EPA, 2008).

Sampling results showed concentrations of the two contaminants continuing to decline. In 2006, EPA prepared a Proposed Plan (issued in January 2007) for the MNA remedy. In March 2007, EPA signed the ROD Amendment that formally selected MNA and ICs to achieve and sustain clean-up standards. In accordance with the 2007 ROD Amendment, no additional facilities were constructed for the implementation of the ROD Amendment.

Sola conducted the semi-annual sampling through December 2009, followed by one groundwater monitoring event conducted in 2010, none in 2011, and one in 2012. In 2012, EPA determined that the clean-up standards had been achieved and sustained, as documented in a Remedial Action Report for the MNA remedy, signed on May 11, 2012 (EPA, 2012). The groundwater sampling results from these events are discussed in detail in Sections III and IV.

Institutional Controls

The 1991 ROD did not include ICs as part of the remedy (EPA, 1991). The 1991 ROD evaluated the need for ICs and concluded that none were necessary, on the basis that groundwater at the Site would soon be cleaned up to federal and state groundwater standards, rendering it available for domestic uses.

The Second Five-Year Review (5YR) report, however, determined that ICs would address an existing risk to human health and the environment during the clean-up period (EPA, 2005). Accordingly, the 2007 ROD Amendment added a requirement that ICs be implemented to protect against inappropriate use of the contaminated groundwater until the clean-up standards are achieved. As soon as the clean-up standards were achieved, the ICs would not be necessary.

The primary IC selected for the Site is a restrictive covenant (EPA, 2007). The objective of the restriction is to prevent use of the groundwater that could result in unacceptable exposure of humans or the environment to contaminants. The restrictive covenant has not been implemented. However, now that the groundwater cleanup goals have been achieved, the ROD Amendment specifies that the ICs are no longer needed.

The 2007 ROD Amendment includes an additional IC, which involves the local well permitting process. The County of Sonoma Permit and Resource Management Department (CSPRMD) is responsible for issuing all well installation permits (EPA, 2007). The CSPRMD has a computerized system called Permits Plus that is used to maintain information about properties in Sonoma County (EPA, 2007). As described in the 2007 ROD Amendment, EPA requested that the CSPRMD place a note within the Permits Plus system regarding the Site parcel that lies directly above the contaminated groundwater (EPA, 2007). This note would indicate that the parcel is part of a Superfund site and that well permits should not be issued before consulting with the CSPRMD and EPA. If anyone requests a permit for the Sola Site parcel, this note would appear within the Permits Plus system and the CSPRMD would review the permit request within the context of the Site requirements. This note was implemented in October 2011 (Sonoma County, 2011).

III. Monitoring Results

Site closure criterion was agreed upon by the Site team in January 2006, in response to recommendations presented in the 5YR report. It was agreed that groundwater monitoring at well W-27 would be continued until it was demonstrated that the cleanup goal for 1,1-DCA (i.e., the California Maximum Contaminant Limit (MCL) of 5 µg/l) and other VOCs had been maintained for four consecutive semiannual sampling events, or a minimum of two years. At that time, 1,1-DCA was the only constituent whose concentration in groundwater remained above the MCL.

As shown in Table 2, 1,1-DCA concentrations in well W-27 have been below the MCL in three of the last four monitoring events, and have remained below the MCL since June 2010 (greater than two years). In addition, the July 2012 1,1-DCA concentration is the lowest ever detected in this well, indicating the continued attenuation of 1,1-DCA. The 1,1-DCE concentration has also decreased from the June 2010 concentration to below the laboratory reporting limit of 0.5 µg/l. This is the first 1,1-DCE concentration below the reporting limit in this well since November 2000.

The trend of 1,1-DCA concentrations in well W-27 was assessed using both the concentration-versus-time graph (Figure 3) and a Mann-Kendall trend analysis (Figure 5). The concentration trend graph presents all 1,1-DCA data collected at well W-27 from 1987 through the present. The Mann-Kendall analysis was conducted using 1,1-DCA concentrations from 2003 through the present. This date range was selected because 2003 marked the initiation of a monitored natural attenuation program at the Site.

As previously mentioned, the concentration-versus-time trend graph for 1,1-DCA in W-27 illustrates a generally decreasing trend, especially from samples collected in 2003 to the present

(Figure 3). This decreasing trend is further supported by the Mann-Kendall trend analysis that was conducted. As shown in Figure 5, a decreasing trend was calculated with high confidence for the 1,1-DCA concentrations in W-27.

Based on the two consecutive years of VOC concentrations below their respective MCLs and the decreasing concentration trend of 1,1-DCA in well W-27, EPA believes the groundwater cleanup standards have been achieved and the Site can be closed-out.

IV. Attainment of Groundwater Restoration Clean-up Levels

Since 2005, the only constituents detected in the aquifer were 1,1 DCA, and 1,1,1-TCA. Table 2 shows the maximum concentrations of 1,1-DCE, 1,1-DCA, and 1,1,1-TCA detected in groundwater samples from the seven shallow wells (W-22, W-25, W-27, LF-2, E-3, E-5, and E-7) from 2005 to 2010 (LFR/Arcadis, 2009 and Roth, 2010). Table 2 presents all groundwater quality data since 1997. The concentrations of all three chemicals in most wells had shown a dramatic decline from high initial concentrations in 1986 to low concentrations or non-detect by 2005 and later. In well W-27, concentrations of 1,1-DCE, 1,1-DCA, and 1,1,1-TCA were non-detect in 1986 and rose later. Their concentrations fluctuated until April 1991, when 1,1-DCA started to steadily increase and remained above the MCL through 2009, except for an occasional dip in concentration. As of 2009, only one well (W-27) in the shallow aquifer was still monitored for VOCs. The 1,1-DCE concentrations over time in W-27 are shown in Figure 4, and the 1,1-DCA concentrations over time in the same well are shown in Figure 3.

The concentration of 1,1-DCA in well W-27 had dropped below the MCL of 5 µg/L in the June 2010 sampling, and it remained below the MCL in the 2012 sampling. The Mann-Kendall trend analysis demonstrated the decreasing trend (Figure 5). Since 2005, the 1,1-DCE concentration had been below the MCL (6 µg/L) in all locations.

Since 2005, 1,1,1-TCA has not been detected in groundwater samples collected from any of the shallow wells on the Site.

Groundwater was continuously analyzed and data reported for 1,2-DCA, TCE, and Freon 113, but most often these constituents were non-detect in all of the wells. Since 2005, 1,2-DCA, TCE, and Freon 113 have not been detected in any of the groundwater samples collected from shallow wells on the Site. No emerging constituents of concern have been identified in soil or soil gas at the Site (EPA, 2005).

V. Summary of Operation and Maintenance Required

No operation and maintenance (O&M) activities are required at this site. All clean-up goals have been met, consisting of attaining drinking water MCL standards in the groundwater. No further remedial actions or O&M thereof are required. No ICs are required to remain in place.

VI. Demonstration of Clean-up Activity Quality Assurance/Quality Control (QA/QC)

Construction QA/QC

The remedial actions selected by the 2007 ROD Amendment did not require any additional construction activities. The remedial actions consisted of MNA and ICs. The MNA utilized existing wells for ongoing monitoring. Thus no construction QA/QC plan was prepared for the remedial action.

Operation and Maintenance QA/QC

The O&M activity associated with the MNA remedy consists of semi-annual groundwater monitoring. In 2005, 2006, and early 2007, ten wells were monitored for groundwater elevation semi-annually, seven wells were sampled for VOCs annually, and four wells were sampled for VOCs semi-annually. In July 2007, three groundwater monitoring wells (W-22, W-25, and LF-2) and three extraction wells (E-3, E-5, and E-7) were abandoned and sealed in accordance with California Department of Water Resources guidelines (LFR, 2007) and pursuant to California State Department of Health Services Environmental Health Division permit number 05582 HMW. Sampling had shown that VOC concentrations in these wells had been consistently below clean-up standards. Figure 2 shows the status of the monitoring wells in 2010. No intermediate or deep wells remain; all remaining wells are shallow. One or more of the remaining extraction wells may be used for future sampling if the need is identified. Since October 2007, the remaining four wells have been monitored for groundwater elevation and one of them (W-27) continues to be monitored for VOCs.

No O&M activities are necessary or conducted relating to the IC remedy component.

To provide quality control for the semi-annual groundwater monitoring, the MNA Work Plan specified that one field blank and one duplicate sample would be taken during each sampling event (LFR, 2002). The duplicate samples were taken, and their results reported only once during the two sampling events in 2003, twice annually during 2004 and 2005, only once in 2006, and no times in 2007, 2008 and 2009. Duplicate samples were taken and reported during each of the events (annual only) in 2010 and 2012. Although duplicate samples were not reported during a three-year span from 2007 through 2009, the historical data did not indicate strong fluctuations of data and the concentrations appeared to be consistent, hence duplicates were not critical to the data quality. The low concentrations and non detects further support this conclusion.

No data validation reporting was made, as none were required by the work plan. At the time the work plan was established, it was agreed that the data set did not require validation because none of the previous data were flagged, and there were many non detect data points.

Sampling and Analysis

Sampling and analysis for the routine groundwater monitoring, which, since 2009, had consisted solely of Well W-27, was conducted in accordance with the following protocol. The well was purged using a clean, disposable polyvinyl chloride (PVC) bailer prior to collection of a sample. Groundwater pH, temperature, specific conductance, and turbidity were measured following the purging of each well casing volume. After three well casing volumes of water were purged, samples were collected using a clean, disposable PVC bailer at the well. Collected samples were decanted into 40-milliliter volatile organic analysis (VOA) vials preserved with hydrochloric acid and labeled with the project number, well number, date, time, and analytical method. The lid of each VOA was then secured with a chain-of custody seal, and the VOAs were stored in an ice-cooled chest and transported under chain-of-custody protocol to the analytical laboratory.

Groundwater samples were submitted to Curtis & Tompkins, Ltd., a California-certified laboratory, for analysis of VOCs by EPA Method 8260B (using an 8010 analyte list).

VII. Five-Year Review

No further 5YRs will be conducted, as they are no longer required. No wastes were left in place above an unlimited use, unrestricted exposure level. To date, three 5YRs have been conducted. These reviews were conducted because contaminant levels in the groundwater exceeded the ROD clean-up standards. The groundwater has since attained all clean-up standards.

Summary of Last Five-Year Review

The most recent 5YR was completed in September 2010 (EPA, 2010). The Protectiveness Statement (page 10-1) was as follows:

> The remedy at the Sola Site currently protects human health and the environment because the groundwater contamination has been reduced below drinking water standards (MCLs) in all but a very limited area around one well, no exposure pathways to the remaining contamination exist, and no one is using the groundwater resource. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:
>
> - The well permitting restriction IC within the CSPRMD Permits Plus system must be properly implemented to ensure the protectiveness of the remedy.
> - Determine whether the restrictive covenant IC is required to protect human health in the short-term, and implement it if so.

The Issues noted (page 8-1) were as follows:

1. Although no additional wells have been installed on the Site since 2005, the well permitting restriction IC is not properly in place, which impacts the protectiveness of the 2007 ROD Amendment remedy.

2. The restrictive covenant IC has not yet been implemented.

The Recommendations and Follow-up Actions (page 9-1) were as follows:

a. The County of Sonoma needs to be contacted to ensure that the Permits Plus system is corrected so that the notice regarding the Site well installation restriction comes up when a well permit application is entered into the system.

b. Determine whether the restrictive covenant IC is required to protect human health in the short-term, and implement it, if so.

Follow-up Actions Since the Last 5-Year Review

Issue #1, proper implementation of the well permitting restriction IC, has been fully addressed since the date of the 5YR. To implement this recommendation, EPA contacted the CSPRMD and asked them to place a warning regarding contamination in the groundwater, in the County's Permit Plus database. The warning applied to the two properties that comprise the Superfund site, and included a statement that some of the groundwater is contaminated with 1,2-DCA at a level that exceeds the drinking water standard and that no drinking water well permit should be issued for those properties without EPA approval. On October 24, 2011, EPA received confirmation from the County that the notice was entered into their system (Sonoma County, 2011).

Issue #2, implementation of the restrictive covenant IC which had not yet been implemented, was addressed through EPA's determination that the groundwater clean-up standard had been attained and therefore the restrictive covenant was no longer needed. The ROD Amendment had specified that the ICs would only be needed until the groundwater clean-up standards were attained (EPA, 2007).

VIII. Site Completion Criteria

The implemented remedy achieves the degree of cleanup specified in the ROD and ROD Amendment for all pathways of exposure. All selected remedial action objectives and clean-up goals are consistent with agency policy and guidance. No further Superfund responses are needed to protect human health and the environment at the Site.

IX. Completion of Institutional Controls

With the achievement of the groundwater cleanup standards, the ICs are no longer needed. The 2007 ROD Amendment required that, until the cleanup standards are achieved, ICs be implemented to protect against inappropriate use of the contaminated groundwater. After the clean-up standards are achieved, the ICs would not be needed. As documented in this report, the groundwater cleanup standards have now been achieved; therefore, the ICs are no longer necessary.

The ROD Amendment required that two ICs be implemented: a restrictive covenant and a governmental control involving well permitting. The governmental control was implemented,

but the restrictive covenant was not. Because the one IC was never implemented, the Operational and Functional (O&F) determination for the ICs had never been made. Now that the groundwater cleanup goals have been achieved and the ICs are no longer needed, the date of this report shall be considered the date of the O&F determination.

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XI. Tables and Figures

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Table 1
ROD-Specified MCLs and Drinking Water Standards
Sola Optical USA, Inc., Sonoma County, CA

Chemical	Drinking Water Standard (µg/L)		RAO (µg/L)
	State	Federal	
1,1-DCE	6	7	6
1,1-DCA	5	NE	5
1,1,1-TCA	200	200	200
Freon 113	1,200	NE	1,200

NE = none established

Table 2
Groundwater-Quality Data
Primary VOCs (1997 to Present)
Former Sola Optical U.S.A., Inc., Facility
Petaluma, California

All concentrations expressed in micrograms per liter (µg/l)

Well ID	Sample Date	Lab	Method	1,1-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	Freon 113
W-14	20-Jun-97		EPA8010	19	52	<0.5	<0.5	<0.5	<0.5
	9-Sep-97		EPA8010	24	54	<0.5	<0.5	<0.5	<0.5
	11-Jun-98		EPA8010	3.1	7.8	<0.5	<0.5	<0.5	<0.5
	16-Oct-98		EPA8010	8.9	24	<0.5	<0.5	<0.5	<1.0
duplicate	16-Oct-98		EPA8010	9.1	24	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	1.7	3.7	<0.5	<0.5	<0.5	<1.0
duplicate	17-Mar-99		EPA8260A(8010)	1.7	3.7	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	3.4	8.1	<0.5	<0.5	<0.5	<5.0
duplicate	23-Sep-99		EPA8260A(8010)	3.4	7.9	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	1.0	1.9	<0.5	<0.5	<0.5	<5.0
duplicate	12-Apr-00		EPA 8260B	1.1	1.9	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	1.2	2.9	<0.5	<0.5	<0.5	<5.0
duplicate	8-Sep-00	C&T	EPA 8260B	1.0	2.7	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	<0.5	0.7	<0.5	<0.5	<0.5	<5.0
duplicate	2-Apr-01	C&T	EPA 8260B	<0.5	0.8	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	0.9	1.9	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	0.6	<0.5	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	0.5	0.8	<0.5	<0.5	<0.5	<5.0
***	06-Apr-04								
W-19	16-Oct-98		EPA8010	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	0.7	<.5	<.5	<.5	<.5	<1.0
	23-Sep-99		EPA8260A(8010)	0.9	<.5	<.5	<.5	<.5	<5.0
	12-Apr-00		EPA8260B	1.1	<0.5	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA8260B	1	<0.5	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	0.9	<0.5	<0.5	<0.5	<0.5	<5.0
***	14-May-01								
W-22	16-Oct-98		EPA8010	2.7	1.6	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	3	1.8	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	2.3	1.5	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	2.2	1.4	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	1.4	1.1	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	2.4	1.6	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	1.3	0.9	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	1.7	1.2	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	1.3	1.0	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	1.0	0.9	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	1.5	0.9	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	1.0	0.7	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	0.7	0.6	<0.5	<0.5	<0.5	<5.0
***	03-Jul-07								
W-25	16-Jun-97		EPA 8010	4.1	1.8	<0.5	0.5	<0.5	<0.5
duplicate	16-Jun-97		EPA 8010	3.8	1.7	<0.5	<0.5	<0.5	<0.5
	10-Sep-97		EPA 8010	2.4	0.5	<0.5	<0.5	<0.5	<0.5
duplicate	10-Sep-97		EPA 8010	2.7	0.5	<0.5	<0.5	<0.5	<0.5
	12-Jun-98		EPA 8010	1.9	1.1	<0.5	<0.5	<0.5	<0.5
	16-Oct-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
duplicate	16-Oct-98		EPA 8010	3.1	1.4	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	3.3	1.7	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	3.3	1.8	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	3.9	1.8	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	2.4	1.5	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	2.9	1.5	<0.5	<0.5	<0.5	<5.0

Table 2
Groundwater-Quality Data
Primary VOCs (1997 to Present)
Former Sola Optical U.S.A., Inc., Facility
Petaluma, California

All concentrations expressed in micrograms per liter (µg/l)

Well ID	Sample Date	Lab	Method	1,1-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	Freon 113
	19-Oct-01	C&T	EPA 8260B	2.7	1.2	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	2.3	1	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	2.1	0.9	<0.5	<0.5	<0.5	<5.0
	8-Apr-03	C&T	EPA 8260B	2.3	0.8	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	1.6	0.9	<0.5	<0.5	<0.5	<5.0
	17-May-04	C&T	EPA 8260B	1.3	0.5	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	1.2	0.5 J	<0.5	<0.5	<0.5	<5.0
	3-May-05	C&T	EPA 8260B	1.5	0.5	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	1	0.4 J	<0.5	<0.5	<0.5	<5.0
	6-Jun-06	C&T	EPA 8260B	1.3	0.4 J	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	0.9	0.4 J	<0.5	<0.5	<0.5	<5.0
	11-Apr-07	C&T	EPA 8260B	0.7	0.3 J	<0.5	<0.5	<0.5	<5.0
***	03-Jul-07								
W-27	02-Jul-97		EPA 8010	7.1	12	<0.5	<0.5	<0.5	<0.5
	10-Sep-97		EPA 8010	6.8	12	<0.5	<0.5	<0.5	<0.5
duplicate	10-Sep-97		EPA 8010	6.4	12	<0.5	<0.5	<0.5	<0.5
	11-Jun-98		EPA 8010	10	15	<0.5	<0.5	<0.5	<0.5
duplicate	11-Jun-98		EPA 8010	11	15	<0.5	<0.5	<0.5	<0.5
	16-Oct-98		EPA8260A(8010)	12	15	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	11	16	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	9.9	15	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	10	20	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	6.3	16	<0.5	<0.5	<0.5	<5.0
**	21-Nov-00	C&T	EPA 8260B	3.6	14	<0.5	<0.5	<0.5	<5.0
*	21-Nov-00	CLI	EPA 8260B	<0.5	14	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	7.1	18	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	8.3	16	<0.5	<0.5	<0.5	<5.0
duplicate	19-Oct-01	C&T	EPA 8260B	7.9	15	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	4.9	12	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	5.6	15	<0.5	<0.5	<0.5	<5.0
duplicate	8-Oct-02	C&T	EPA 8260B	5.7	15	<0.5	<0.5	<0.5	<5.0
	8-Apr-03	C&T	EPA 8260B	4	14	<0.5	<0.5	<0.5	<5.0
duplicate	8-Apr-03	C&T	EPA 8260B	4.9	15	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	4.7	21	<0.5	<0.5	<0.5	<5.0
	17-May-04	C&T	EPA 8260B	3.9	14	<0.5	<0.5	<0.5	<5.0
duplicate	17-May-04	C&T	EPA 8260B	3.9	14	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	4.8	20	<0.5	<0.5	<0.5	<5.0
duplicate	16-Nov-04	C&T	EPA 8260B	4.9	20	<0.5	<0.5	<0.5	<5.0
	3-May-05	C&T	EPA 8260B	3.8	20	<0.5	<0.5	<0.5	<5.0
duplicate	3-May-05	C&T	EPA 8260B	3.6	19	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	2.6	16	<0.5	<0.5	<0.5	<5.0
duplicate	20-Oct-05	C&T	EPA 8260B	3.2	17	<0.5	<0.5	<0.5	<5.0
	6-Jun-06	C&T	EPA 8260B	3	16	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	1.5	12	<0.5	<0.5	<0.5	<5.0
duplicate	26-Oct-06	C&T	EPA 8260B	1.6	12	<0.5	<0.5	<0.5	<5.0
	11-Apr-07	C&T	EPA 8260B	1.2	8	<0.5	<0.5	<0.5	<5.0
	19-Oct-07	C&T	EPA 8260B	1.9	8.8	<0.5	<0.5	<0.5	<5.0
	4-Apr-08	C&T	EPA 8260B	1.2	9	<0.5	<0.5	<0.5	<5.0
	29-Sep-08	C&T	EPA 8260B	2.2	11	<0.5	<0.5	<0.5	<5.0
	15-May-09	C&T	EPA 8260B	0.6	4.7	<0.5	<0.5	<0.5	<5.0
	30-Dec-09	C&T	EPA 8260B	0.8	6.5	<0.5	<0.5	<0.5	<5.0
	23-Jun-10	C&T	EPA 8260B	0.3 J	2.6	<0.5	<0.5	<0.5	<5.0
duplicate	23-Jun-10	C&T	EPA 8260B	0.3 J	2.7	<0.5	<0.5	<0.5	<5.0
	25-Jul-12	C&T	EPA 8260B	<0.5	1.7	<0.5	<0.5	<0.5	<2.0
duplicate	25-Jul-12	C&T	EPA 8260B	<0.5	1.6	<0.5	<0.5	<0.5	<2.0

Table 2
Groundwater-Quality Data
Primary VOCs (1997 to Present)
Former Sola Optical U.S.A., Inc., Facility
Petaluma, California

All concentrations expressed in micrograms per liter (µg/l)

Well ID	Sample Date	Lab	Method	1,1-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	Freon 113
W-33	16-Jun-97		EPA 8010	3.1	0.7	<0.5	<0.5	<0.5	<0.5
	9-Sep-97		EPA 8010	2.7	<0.5	<0.5	<0.5	<0.5	<0.5
	12-Jun-98		EPA 8010	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
**	21-Nov-00	C&T	EPA 8260B	1.6	0.8	<0.5	<0.5	<0.5	<5.0
*	21-Nov-00	CLI	EPA 8260A	1.3	0.53	0.5	<0.5	<0.5	<5.0
***	15-May-01								
LF-2	20-Jun-97		EPA 8010	30	61	<0.5	<0.5	<0.5	<0.5
	09-Sep-97		EPA 8010	4.6	2.4	<0.5	<0.5	<0.5	<0.5
	09-Jun-98		EPA 8010	4	2	<0.5	<0.5	<0.5	<0.5
duplicate	09-Jun-98		EPA 8010	4.6	2	<0.5	<0.5	<0.5	<0.5
	16-Oct-98		EPA 8010	5.0	2.3	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	5.5	2.2	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	5.0	2.4	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	5.4	2.3	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	4.1	2.1	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	5.3	2.4	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	3.3	1.7	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	3.9	1.9	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	4.1	2.3	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	2.6	2.4	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	1	0.4 J	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	2.0	1.4	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	1.1	1	<0.5	<0.5	<0.5	<5.0
***	03-Jul-07								
LF-25	19-Jun-97		EPA 8010	2.8	1	<0.5	<0.5	<0.5	<0.5
	09-Sep-97		EPA 8010	3.1	1.1	<0.5	<0.5	<0.5	<0.5
duplicate	09-Sep-97		EPA 8010	2.6	1	<0.5	<0.5	<0.5	<0.5
	10-Jun-98		EPA 8010	2.3	1.1	<0.5	<0.5	<0.5	<0.5
duplicate	10-Jun-98		EPA 8010	2.4	1.1	<0.5	<0.5	<0.5	<0.5
	16-Oct-98		EPA 8010	2.5	1	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	3	1.1	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	2.6	1.1	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	2.6	0.9	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	<0.5	1.2	0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	2.8	1.4	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	1.8	0.8	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	2.2	0.8	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	1.7	0.7	<0.5	<0.5	<0.5	<5.0
***	06-Apr-04								
LF-26	19-Jun-97		EPA 8010	4.2	1	<0.5	0.6	<0.5	<0.5
duplicate	19-Jun-97		EPA 8010	4.1	0.9	<0.5	0.6	<0.5	<0.5
	09-Sep-97		EPA 8010	2.8	<0.5	<0.5	<0.5	<0.5	<0.5
	10-Jun-98		EPA 8010	4.3	1.1	<0.5	0.5	<0.5	<0.5
duplicate	10-Jun-98		EPA 8010	4.2	1.1	<0.5	0.5	<0.5	<0.5
	23-Sep-99		EPA8260A(8010)	3.6	1.1	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	3.2	1.0	<0.5	<0.5	<0.5	<5.0
	8-Sep-00	C&T	EPA 8260B	2.5	0.8	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	2.6	1	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	1.9	0.6	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	2.3	0.9	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	2	0.9	<0.5	<0.5	<0.5	<5.0
***	06-Apr-04								

Table 2
Groundwater-Quality Data
Primary VOCs (1997 to Present)
Former Sola Optical U.S.A., Inc., Facility
Petaluma, California

All concentrations expressed in micrograms per liter (µg/l)

Well ID	Sample Date	Lab	Method	1,1-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	Freon 113
E-3	18-Jun-97		EPA 8010	7.6	10	<0.5	<0.5	<0.5	<0.5
	11-Sep-97		EPA 8010	9	11	<0.5	<0.5	<0.5	<0.5
	11-Jun-98	C&T	EPA 8010	15	18	<0.5	<0.5	<0.5	<0.5
	8-Apr-03	C&T	EPA 8260B	4.2	3.8	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	3.6	2.9	<0.5	<0.5	<0.5	<5.0
	17-May-04	C&T	EPA 8260B	4.8	3.5	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	1.8	1.4	<0.5	<0.5	<0.5	<5.0
	3-May-05	C&T	EPA 8260B	0.9	1	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	2.0	1.9	<0.5	<0.5	<0.5	<5.0
	6-Jun-06	C&T	EPA 8260B	1.9	1.4	<0.5	<0.5	<0.5	<5.0
duplicate	6-Jun-06	C&T	EPA 8260B	2.0	1.5	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	2.2	2.3	<0.5	<0.5	<0.5	<5.0
	11-Apr-07	C&T	EPA 8260B	1.8	2.3	<0.5	<0.5	<0.5	<5.0
***	05-Jul-07								
E-5	18-Jun-97		EPA 8010	10	4	<0.5	<0.5	<0.5	<0.5
	11-Sep-97		EPA 8010	11	3.7	<0.5	<0.5	<0.5	<0.5
	15-Jun-98		EPA 8010	9.7	3.1	<0.5	<0.5	<0.5	<0.5
	16-Oct-98		EPA 8010	12	3.7	<0.5	<0.5	<0.5	<1.0
	17-Mar-99		EPA8260A(8010)	13	3.7	<0.5	<0.5	<0.5	<1.0
	23-Sep-99		EPA8260A(8010)	15	4.3	<0.5	<0.5	<0.5	<5.0
	12-Apr-00		EPA 8260B	12	3.7	<0.5	<0.5	<0.5	<5.0
	08-Sep-00	C&T	EPA 8260B	12	3.5	<0.5	<0.5	<0.5	<5.0
**	21-Nov-00	C&T	EPA 8260B	10	3.6	<0.5	<0.5	<0.5	<5.0
*	21-Nov-00	CLI	EPA 8260B	6.5	2.9	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	13	4.5	<0.5	<0.5	<0.5	<5.0
	19-Oct-01	C&T	EPA 8260B	8.3	3.4	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	5.1	2.2	<0.5	<0.5	<0.5	<5.0
duplicate	16-Apr-02	C&T	EPA 8260B	6.4	2.4	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	9.3	3.3	<0.5	<0.5	<0.5	<5.0
	8-Apr-03	C&T	EPA 8260B	7.2	2.9	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	7.1	3.4	<0.5	<0.5	<0.5	<5.0
duplicate	22-Oct-03	C&T	EPA 8260B	6.9	3.3	<0.5	<0.5	<0.5	<5.0
	17-May-04	C&T	EPA 8260B	5.1	2.2	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	4.5	1.8	<0.5	<0.5	<0.5	<5.0
	3-May-05	C&T	EPA 8260B	3.7	1.8	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	5.6	2	<0.5	<0.5	<0.5	<5.0
	6-Jun-06	C&T	EPA 8260B	3.3	1.5	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	4.7	1.9	<0.5	<0.5	<0.5	<5.0
	11-Apr-07	C&T	EPA 8260B	2.8	1.1	<0.5	<0.5	<0.5	<5.0
duplicate	11-Apr-07	C&T	EPA 8260B	2.7	1.1	<0.5	<0.5	<0.5	<5.0
***	05-Jul-07								
E-7	18-Jun-97		EPA 8010	<0.5	0.5	<0.5	<0.5	<0.5	<0.5
	11-Sep-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12-Jun-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	19-Oct-01	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
	16-Apr-02	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
	08-Oct-02	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
	22-Oct-03	C&T	EPA 8260B	<0.5	0.3 J	<0.5	<0.5	<0.5	<5.0
	16-Nov-04	C&T	EPA 8260B	<0.5	0.3 J	<0.5	<0.5	<0.5	<5.0
	20-Oct-05	C&T	EPA 8260B	<0.5	0.3 J	<0.5	<0.5	<0.5	<5.0
	26-Oct-06	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
***	05-Jul-07								

Field Blanks

Table 2
Groundwater-Quality Data
Primary VOCs (1997 to Present)
Former Sola Optical U.S.A., Inc., Facility
Petaluma, California

All concentrations expressed in micrograms per liter (µg/l)

Well ID	Sample Date	Lab	Method	1,1-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	Freon 113
W-33-FB	16-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LF-16-FB	17-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LF-3-FB	18-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LF-25-FB	19-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W-28-FB	20-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W33-FB	9-Sep-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LF-6-FB	10-Sep-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W-28-FB	9-Jun-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LF-16-FB	10-Jun-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
W-25-FB	16-Oct-98	(1)	EPA8260A(8010)	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
W-14-FB	17-Mar-99		EPA8260A(8010)	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0
W-19-FB	23-Sep-99		EPA8260A(8010)	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	12-Apr-00		EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
LF-26FB	8-Sep-00	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27FB	2-Apr-01	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
EX-7-FB	19-Oct-01	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27FB	16-Apr-02	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-14FB	8-Oct-02	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
FB040803	8-Apr-03	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
LF-2FB	22-Oct-03	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	17-May-04	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
LF-2-B	16-Nov-04	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
5-03-05-B	3-May-05	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-25-FB	20-Oct-05	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
EB 060606	6-Jun-06	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-25-FB	26-Oct-06	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-25-FB	11-Apr-07	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	19-Oct-07	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	4-Apr-08	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	29-Sep-08	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	15-May-09	(2)	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	30-Dec-09	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
W-27-FB	23-Jun-10	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.1
W-27-FB	25-Jul-12	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0
Trip Blanks									
	17-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TB	20-Jun-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9-Sep-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10-Sep-97		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9-Jun-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12-Jun-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	15-Jun-98		EPA 8010	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
*	21-Nov-00	CLI	EPA8260A(8010)	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
	2-Apr-01	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0
	25-Jul-12	C&T	EPA 8260B	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0

Data updated by AAV. Proofed by .

Notes:

(1) = Chloroform detected at 1.7 micrograms per liter.

(2) = Chloroform detected at 0.8 microgram per liter.

1,1-DCE = 1,1-Dichloroethene

1,1-DCA = 1,1-Dichloroethane

1,2-DCA = 1,2-Dichloroethane

1,1,1-TCA = 1,1,1-Trichloroethane

Table 2
Groundwater-Quality Data
Primary VOCs (1997 to Present)
Former Sola Optical U.S.A., Inc., Facility
Petaluma, California

All concentrations expressed in micrograms per liter (µg/l)

Well ID	Sample Date	Lab	Method	1,1-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	Freon 113

TCE = Trichloroethene
VOCs = Volatile organic compounds
J = Estimated value.
* = Samples collected by Environ.
** = Split sample collected by LFR.
*** = Well destroyed.

Analytical Laboratories:
C&T = Curtis & Tompkins, Ltd., Analytical Laboratories, Berkeley, California.
CLI = Chroma Lab, Inc., Environmental Services, Pleasanton, California.

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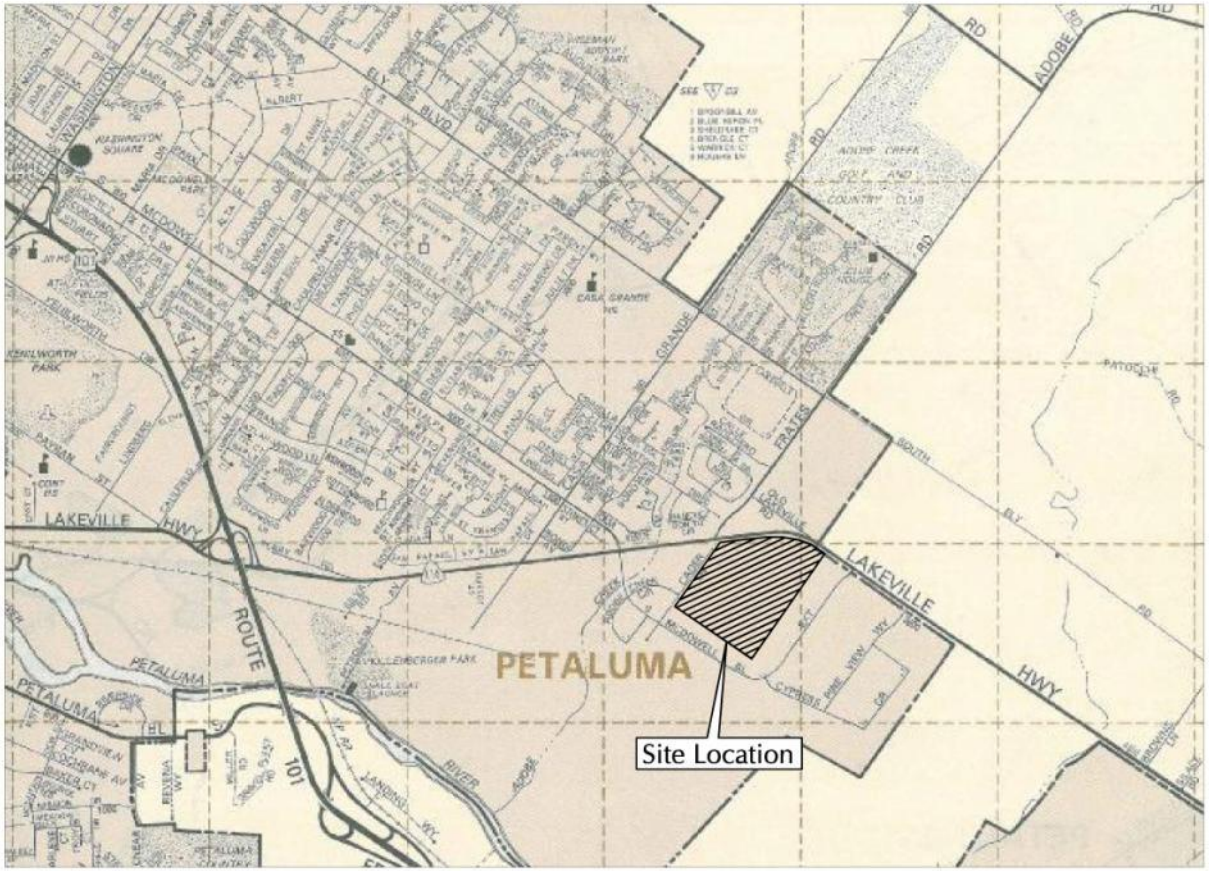
CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Emeryville\ACT\EM001954\0012\000001\GWMR July-2012\DWG\EM001954 N01.dwg LAYOUT: 1 SAVED: 8/13/2012 4:37 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 8/13/2012 4:39 PM BY: REYES, ALEC



0 1,100 2,200 FEET

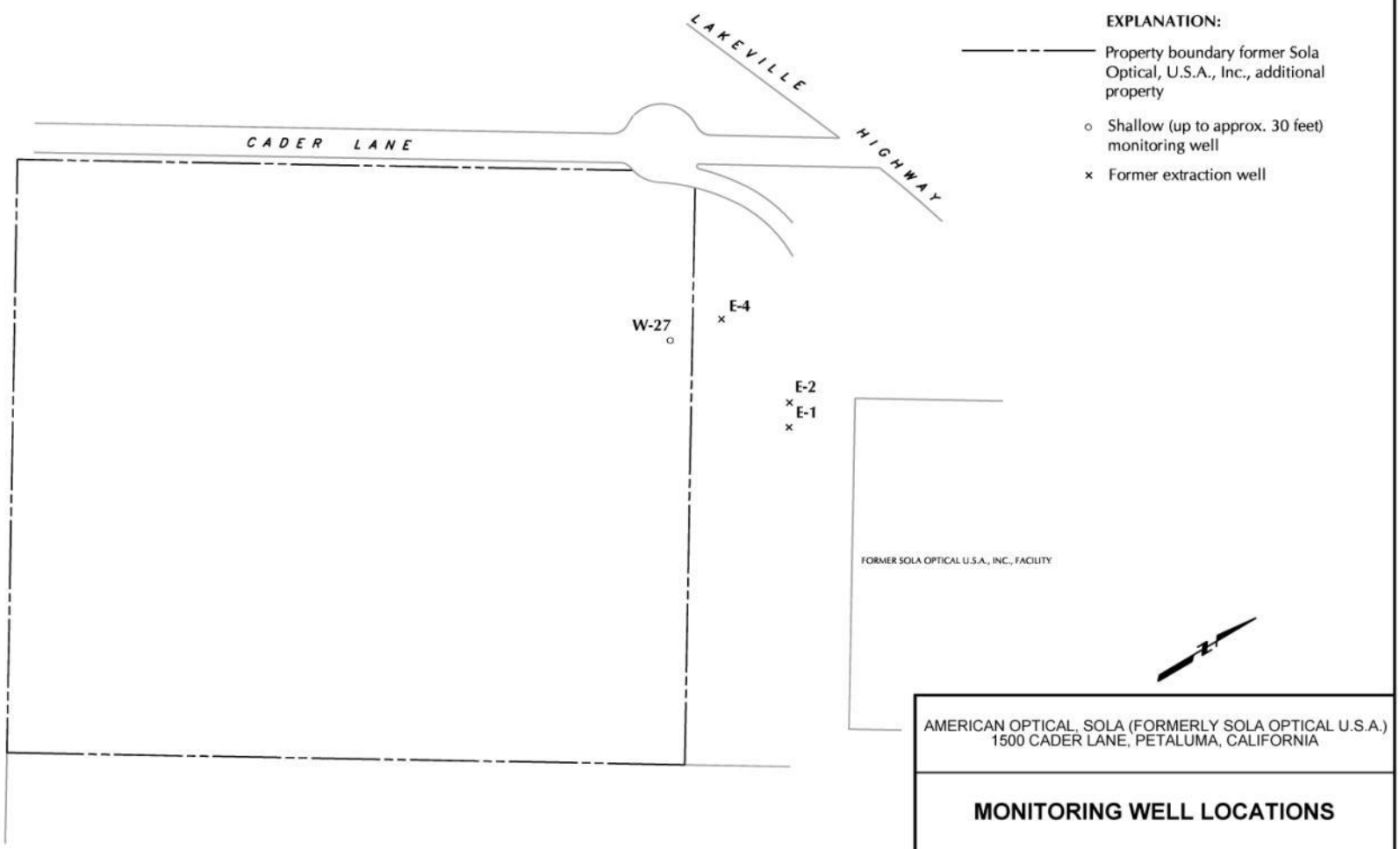
AMERICAN OPTICAL, SOLA (FORMERLY SOLA OPTICAL U.S.A.)
1500 CADER LANE, PETALUMA, CALIFORNIA

SITE VICINITY MAP

ARCADIS

FIGURE
1

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Emeryville\ACT\EM001954\0012\00001\GWMR July-2012\DWG\EM001954 B02.dwg LAYOUT: 2 SAVED: 8/13/2012 4:39 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 8/13/2012 4:40 PM BY: REYES, ALEC
XREFS: IMAGES: PROJECTNAME: ----



EXPLANATION:

- Property boundary former Sola Optical, U.S.A., Inc., additional property
- o Shallow (up to approx. 30 feet) monitoring well
- × Former extraction well

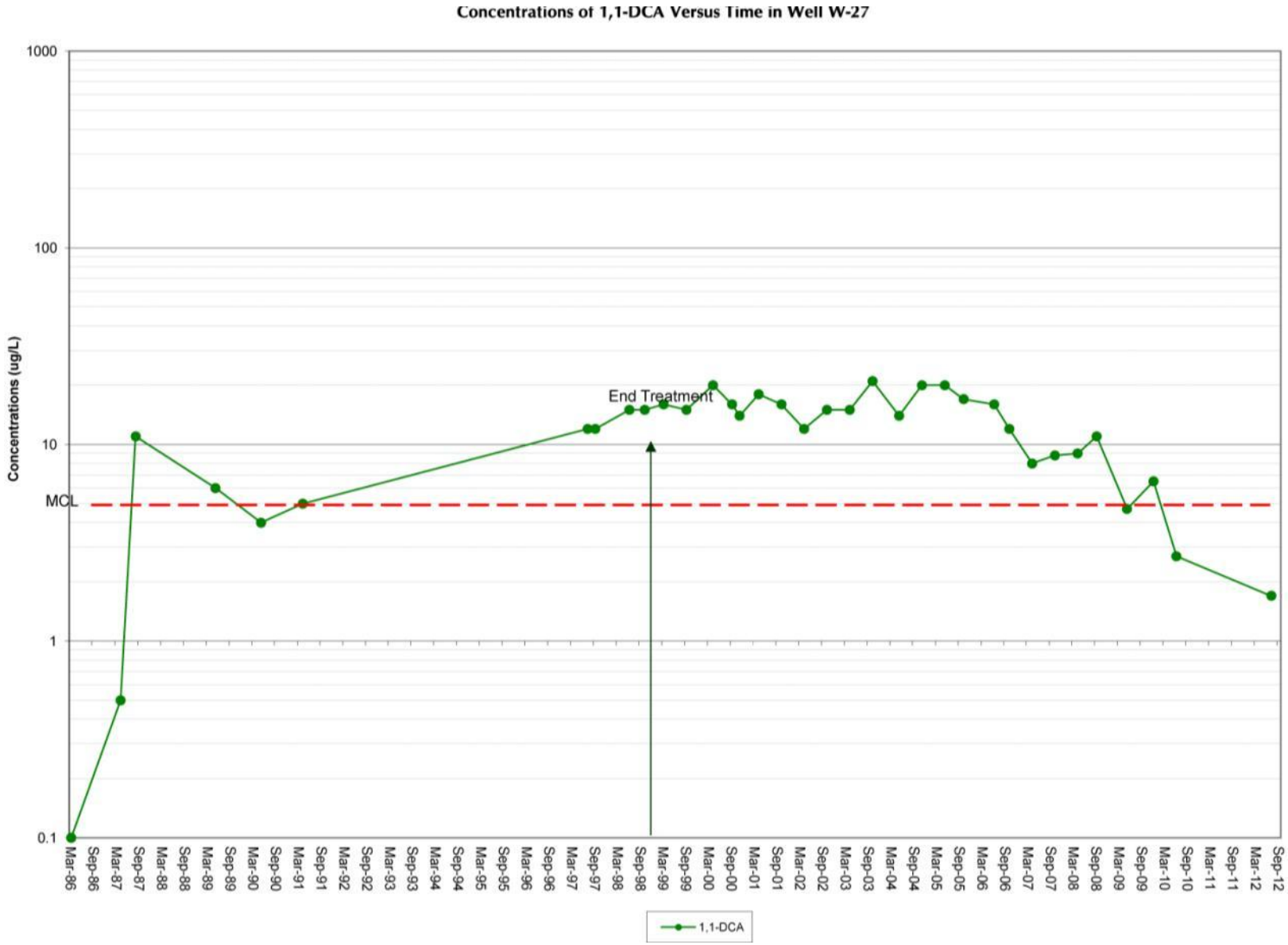
AMERICAN OPTICAL, SOLA (FORMERLY SOLA OPTICAL U.S.A.)
1500 CADER LANE, PETALUMA, CALIFORNIA

MONITORING WELL LOCATIONS

ARCADIS

FIGURE
2

Figure 3


Concentrations of 1,1-DCA Versus Time in Well W-27
Concentrations (ug/L)
1000
100
10
MCL
1
0.1
End Treatment
Mar-86
Sep-86
Mar-87
Sep-87
Mar-88
Sep-88
Mar-89
Sep-89
Mar-90
Sep-90
Mar-91
Sep-91
Mar-92
Sep-92
Mar-93
Sep-93
Mar-94
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Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
1,1-DCA

Figure 4

Concentrations of 1,1-DCE Versus Time in Well W-27

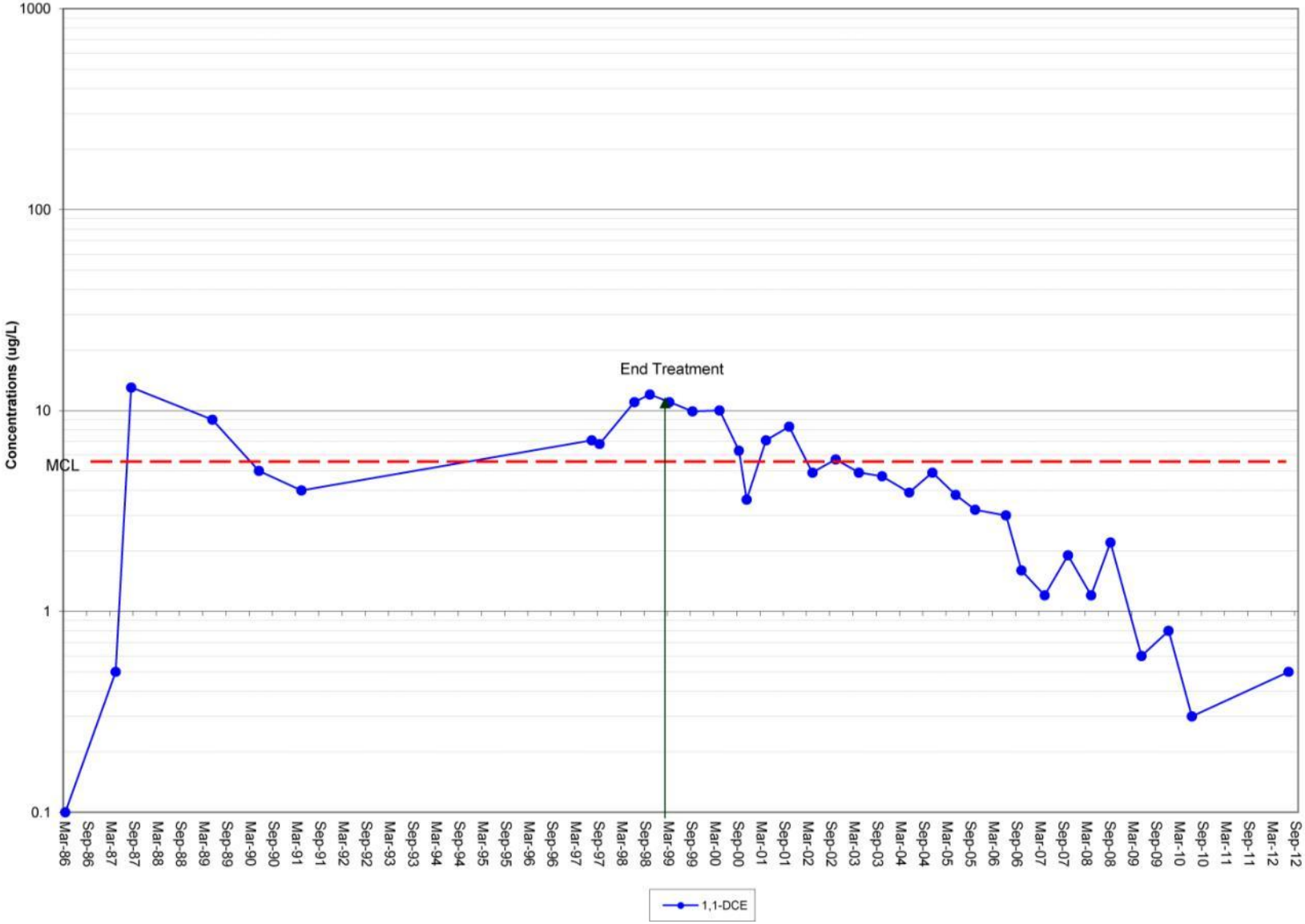


Figure 5

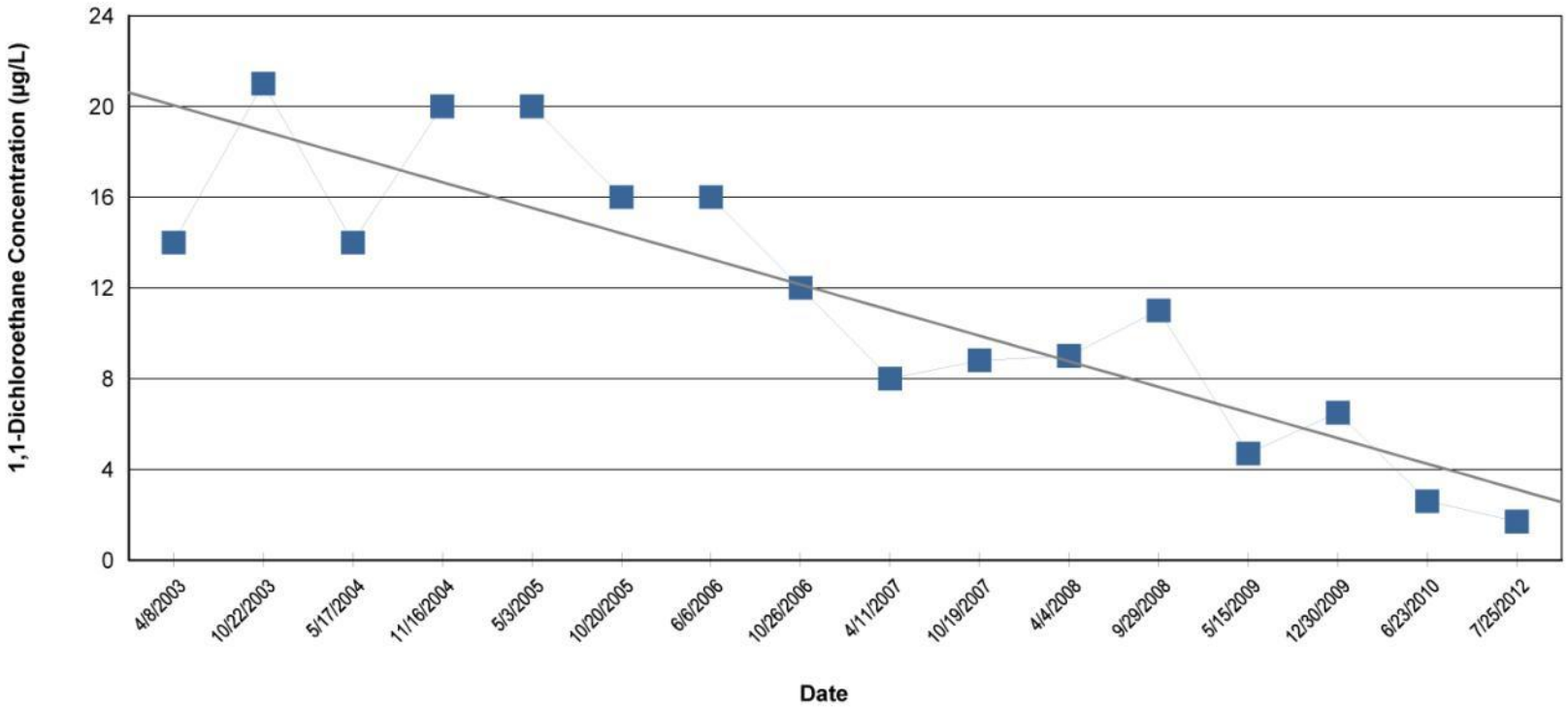
1,1-Dichloroethane

ARCADIS

Mann Kendall Trend Analysis

Results for 1,1-Dichloroethane

Well	Samples	Non-Detects	S Statistic	80% Trend	90% Trend	95% Trend
W-27	16	0	-85	Decreasing	Decreasing	Decreasing



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