Health Consultation

FORMER SIEMENS-STROMBERG SITE

LAKE MARY, SEMINOLE COUNTY, FLORIDA

EPA FACILITY ID: FLD061989448

Prepared by the
Florida Department of Health

JUNE 10, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Foreword

Since 1986, the US ATSDR (Agency for Toxic Substances and Disease Registry) has been authorized to conduct public health assessment activities at hazardous waste sites. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Environmental scientists and health scientists from ATSDR and from the state, tribal and territorial programs with which ATSDR has cooperative agreements, carry out public health assessments. The public health assessment process allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be compilation of several health consultations - the structure may vary from site to site. Whatever the form of the public health assessment, the process is not considered complete until the public health issues at the site are addressed.

Exposure

As the first step in the evaluation, Florida Department of Health (DOH) scientists review environmental data to see how much contamination is at a site, where it is and how people might come into contact it. Generally, rather than collecting its own environmental sampling data. Florida DOH reviews information provided by the US Environmental Protection Agency (EPA), other government agencies, business, and the public. When there is not enough environmental information available, the report will indicate what further sampling data are needed.

The route of a contaminant's movement is called an exposure pathway, which has five elements: (1) a source of contamination, (2) an environmental media (such as, soil, water, or air), a point source, (4) a route of human exposure, and (5) a receptor population. The source is the place where the chemical or radioactive material was released. The environmental media transport the contaminants. The route of exposure is the place where persons come into contact with the contaminated environmental media. The route of exposure (for example, ingestion, inhalation, or dermal contact) is the way the contaminant enters the body. The people actually exposed are called the receptor population.

Health Effects

If there are potential or completed exposure pathways, where people have or could come into contact with hazardous substances, Florida DOH scientists then evaluate whether these contacts may result in harmful effects. Florida DOH recognizes that children, because of their play and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, Florida DOH considers children likely to be more sensitive and vulnerable to hazardous substances than adults. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The impacts to other high-risk groups within the community (such as the elderly, chronically ill, and people engaging in high-risk practices) also receive special attention during evaluation.

Florida DOH uses existing scientific information, which can include the results of medical, toxicological, and epidemiologic studies and data collected in the disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is

not available. Florida DOH identifies those types of information gaps and documents public health actions needed in the public health assessment documents.

If, after reading this report, you have questions or comments, please contact:

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Summary

The purpose of this report is to determine if vapor intrusion is likely and if there is a health threat to employees working indoors in the former Siemens-Stromberg building currently being occupied by Laser Photonics.

The former Siemens-Stromberg facility is at 400 Rinehart Road in Lake Mary, Florida, approximately ½-mile north of Lake Mary Boulevard. Past disposal of volatile organic chemical cleaning solvents such as tetrachloroethene and trichloroethene have contaminated the ground water. In July 2008, a former worker who is also a nearby resident claimed illness among former workers and requested an investigation of vapor intrusion from the ground water into the building.

INTRODUCTION At the former Siemens-Stromberg hazardous waste site, the Florida Department of Health (DOH) and the US Agency for Toxic Substances and Disease Registry (ATSDR) serve the public by using scientific information included in ATSDR's Toxicological Profiles, taking responsive public health actions, and providing trusted health information to prevent people from coming into contact with harmful toxic substances.

CONCLUSION #1 Because of inadequate data, the Florida DOH can not conclude whether breathing volatile organic chemicals (VOCs) inside the former Siemens-Stromberg building could harm people's health.

- The facility tested indoor air in 2004. More recent testing is necessary to determine the current health threat for workers. Recent time-weighted samples over 24 hours are preferred over 8 hour samples to check the contaminant concentrations over time and to compare sample results to health-based guidelines.

- The soil gas samples collected in 2002 using the Emflux method were reported as a weight of contaminant (nanograms) without a measure of air volume. Without a measure of air volume it is not possible to estimate concentration or determine the health risk.

BASIS FOR DECISION Florida DOH reviewed 2002 soil gas test results, 2004 indoor air test results, and 2007-2009 ground water test results. DOH concluded migration of volatile organic chemicals from the surficial (shallow) aquifer up into the air of the former Siemens-Stromberg main building (vapor intrusion) is possible. The indoor air tests are not recent. In addition the indoor air results are from grab samples (i.e. one minute to one hour). DOH is unable to check the contaminant concentrations over time or to compare sample results to health-based guidelines. Therefore, DOH is unable to determine health risk from breathing indoor air. Since

the soil gas tests were reported without a measure of air volume, DOH is unable to use the results to determine health risk from inhalation.

NEXT STEPS

Florida DOH recommends the responsible party test the indoor air for VOCs during the 8 to 10 hours when workers are present, and periodically repeat this testing (e.g., once every three months) for at least one year. As an alternative to repeated testing, the responsible party should consider using technologies to eliminate or reduce the vapor intrusion exposure pathway (e.g., a sub slab depressurization system or SSD). If properly installed and operated, a SSD system would negate the need for ongoing indoor air testing. Indoor air testing only measures one point in time and does not reduce exposure.

CONCLUSION #2

Because of inadequate data, however, the Florida DOH can not currently conclude whether drinking water from private wells near the former Siemens facility could harm people's health.

- Private drinking water wells approximately 1000 feet south of the Siemens-Stromberg building have only been tested sporadically for VOCs.
- The Florida DOH does not have enough data to determine if off-site groundwater contaminant migration is impacting those with private wells.

BASIS FOR DECISION

Private drinking water wells approximately 1000 feet south of the Siemens-Stromberg building have only been tested sporadically for VOCs. Therefore, the Florida DOH does not have enough data to determine if off-site groundwater contaminant migration is impacting those with private wells.

NEXT STEPS

The responsible party should test private drinking water wells quarterly for VOCs within one mile radius of the facility's property boundaries to ensure contaminated ground water does not impact off-site communities.

FOR MORE INFORMATION

If you have concerns about your health or the health of your children, you should contact your health care provider. You may also call Susan Skye with the Florida DOH toll-free at 877-798-2772 and ask for information about the former Siemens-Stromberg hazardous waste site.

Background

In the 1980s, General Dynamics Corporation owned the facility. In 1984, the facility assembled electronic telecommunication components. The facility had several areas including: printed circuit board assembly, frame and sum assembly, cable assembly, magnetics assembly, micro hybrid electronics, prepack, shipping, printed circuit area, and machine shop.

From the early 1980's the Department of Environmental Protection (DEP) (aka Department of Environmental Regulation or DER) noted drums of the following hazardous waste on the site: degreasers, freon, ammonium hydroxide, acid, paint primer, and lacquer thinner. By 1984, the facility had switched from degreasing with 1,1,1-trichloroethane (TCA) to steam cleaning (DER 1984). The facility reported using the following chemicals: 1,1,1-TCA, lacquer thinner, denatured alcohol, Freon 11, paint thinners, oil, naptha, mercury paint, lead paint, paint primer, acid, isopropyl alcohol and flux, resin, flammable liquid, mixed salts, photo lab chemicals, hazardous liquids, glycol mono butyl ether, ethyl alcohol, methanol, phosphate liquids, and petroleum liquids. The facility generated wastes containing these chemicals and transported them to another facility (Drage, et al 1998).

As of 1989, the facility was cleaning printed circuit boards with Freon in either a vapor degreaser or a dip tank containing isopropyl alcohol (IPA). In 1993, the facility reported generating one 55-gallon drum of IPA waste every three months. The facility stored this waste for recycling in a small building along the southeastern side of the manufacturing building (HAS 1993). In 1993, the facility employed approximately 2,000 people (HAS 1993).

Siemens-Stromberg-Carlson and its predecessors have operated at this location since the early 1970s. Siemens-Stromberg-Carlson Corporation currently leases the north-central portion of this site. Siemens took over this facility in the 1990s with several corporate name changes over the years (Stromberg Carlson, Siemens Telecom Networks, Siemens Information and Communication Networks, etc). Currently, the portion of the site leased by Siemens-Stromberg Carlson includes manufacturing and administrative buildings concentrated in the north-central portion of the property within a one-story concrete block building and adjacent office building with a large asphalt parking lot. They manufacture commercial telephone system components, telephone transfer stations, and other commercial communication equipment. Currently, approximately 20 people work for Laser Photonics located in the former Siemens-Stromberg building**.**

Since 2001, the Seminole County Health Department (CHD) has tested several nearby private drinking water wells and one on-site drinking water well for VOCs. These wells are not tested on a routine basis. The CHD tests wells for VOCs and other chemicals when requested and explain the results to the well owners. In June 2004, Florida DEP sent a concerned resident information about the facility's ground water including six color maps showing levels of VOCs in the ground water.

In 2004 the facility's consultant tested indoor air in all the rooms of the former Siemens-Stromberg building for VOCs. Florida DOH evaluated these data in this report. Since February 2007, the facility's contractor has operated a ground water VOC treatment system consisting of a

stainless steel air stripper with three shallow trays. The system also uses ozone, hydrogen peroxide, and nitrogen to oxidize 1,4-dioxane. The facility reports to the Florida DEP system operation effectiveness. In February 2008 and again in November 2008, the facility's consultant reported ground water test results.

In March 2008, the facility connected to city water. In July 2008, the Seminole CHD visited the site and found the facility recently connected to the municipal water supply and no longer relies on their on-site well (Seminole 2008). The Florida DOH will address past on and off-site drinking water well data in another health consultation.

The closest neighborhood is approximately 1900 feet east of the facility. South of the facility, neighborhoods begin within 1000 feet of the facility. Based on a review of the most recent ground water data, residents east of the facility are at least 1900 feet away from wells with elevated VOC contamination. The residents south of the site (approximately 1000 feet from the former Siemens' manufacturing building) have not had private wells sampled for VOCs on a consistent basis over the years.

As of 2009, General Dynamics Corporation, MONI Holdings, LLC, Rinehart Development & Investment Group, LLC, Siemens and United Technologies Corporation are collectively the site PRPs (primary responsible parties) for properties surrounding the site. This surrounding property is currently owned and operated by Rinehart Development & Investment Group, LLC (the Rinehart Parcel). Crescent Resources, Inc. (Crescent) also owns property surrounding the Siemens site (Figures 1 & 2).

For a complete history of documents on this site, please see Florida DEP's Oculus database which includes waste cleanup information from 1980 to 2009[1]:

Community Health Concerns

In July 2008, a nearby resident who is also a former worker requested the Florida DOH investigate the threat of contaminated ground water to the health and safety of current workers. This person was particularly concerned with trichloroethene (TCE) and other VOCs. This person reported a number of unusual illnesses among workers including lymphadenopathy and leukemia. The person was especially concerned about the potential for vapor intrusion in the vicinity of the shipping area/loading dock on the central eastern side of the main building (Figure 2). There is also a truck loading area directly northeast of the main building.

For worker health and safety issues, Florida DOH provided the nearby resident who is also a former worker with contact information for the US Occupational Safety and Health

1 http://dwmedms.dep.state.fl.us/Oculus/servlet/shell?command=hitlist&[catalog=5]&[entityType=any]&[searchBy=property]&[sortBy=Document+Date]&[createdDate=]&[freeText=]&[creator=]&[createdDateTo=]&{County=_EQ_SEMINOLE}&{Facility-Site+ID=_EQ_COM_22379} (Enter "netuser" as the password on the first page. Select the document you are interested in by clicking on the box and click on "select".)

Administration (OSHA) and the US National Institute for Occupational Safety and Health (NIOSH). Florida DOH agreed to assess the possibility of ground water vapor intrusion (DOH 2008). In April and December 2009, the Florida DOH updated this resident and explained the details and length of the assessment process.

In December 2009, an attorney representing 69 former workers from the former Siemens site sent the Florida DOH a list of their 104 reported illnesses and medical conditions (Appendix A). DOH responded to this request in a separate letter to the attorney.

Ground Water Background

General Dynamics is the lead responsible party for assessing and remediating the groundwater contamination from the main plant. Contamination is in both the surficial and Floridan (deep) aquifers. Both the facility and Florida DEP have assessed the surficial aquifer (shallow) contamination (Figures 4-13). Florida DEP is still assessing the Floridan aquifer contamination (DEP 2009c). To assess the health threat of vapor intrusion, this health consultation report focuses on shallow ground water.

According to the facility's consultant, ground water flow in the surficial aquifer is toward the southwest. Recovery wells, however, cause ground water in the surficial aquifer directly under the building to flow toward the north (Figure 14). The highest ground water contaminant levels are contained on site. Although some off-site monitoring wells are contaminated, ground water contamination does not extend under residential areas south and east of the site (Sims 2007a).

According to the facility's consultant, the ground water treatment system has removed 93 pounds of VOCs since it began in 2008. The treatment system is sampled monthly for 1,1-dichloroethene (DCE), 1,1,1-TCA, TCE and tetrachloroethene (PCE). The recovery wells are sampled quarterly for these same contaminants. Also according to the facility's consultant, the June 2008 data confirm that the system is removing VOCs and 1,4-dioxane from the surficial aquifer and is achieving horizontal and vertical containment at certain locations and time periods (Sims 2008).

Private well background

When requested, the Seminole CHD tests private drinking water wells near the site. From 2006 to 2008 a few wells within ½ mile of the site had more than the drinking water standard of 7 micrograms per liter (µg/l) of 1,1-dichloroethylene (DCE). The Seminole CHD and Florida DEP are currently monitoring wells in the area to ensure the safety of everyone's water supply and to ensure that no one is private well water that contains high levels of contamination. Since 2009, no nearby tested private drinking water wells have had VOC concentrations above drinking water standards. DOH will address past drinking water well data both on and off-site in a separate health consultation. The Seminole CHD will continue to test private drinking water wells upon request.

Discussion

Since ground water vapor intrusion into buildings is dependent upon many factors including structure, hydrogeology, temperature and seasonal factors; vapor intrusion is always a possibility for buildings over VOC-contaminated ground water. Migration of VOCs from the shallow ground water up into the air of the Siemens-Stromberg main building (vapor intrusion) is possible.

Due to community concerns about vapor intrusion into on-site buildings, the Florida DOH evaluated levels of specific VOCs 1,1-DCE, 1,1,1-TCA, TCE and PCE in the on-site surficial (shallow) aquifer to see if ground water vapor intrusion is occurring at levels of health concern for current workers. VOCs in the surficial aquifer are more likely to migrate up into overlying buildings than VOCs in the deeper Floridan aquifer. This evaluation included ground water, soil gas and indoor air data.

Evaluation of Ground Water Results

This report concentrates on the surficial ground water underneath the former Siemens-Stromberg main building (Figure 2). The facility's contractor tested wells on the east/northeast side of the property. The main building where people still work is shown in the center of Figure 2, outside of the yellow property lines.

Ground water under and near the Siemens-Stromberg main building:
Surficial aquifer monitoring wells exist near the southeast corner of the main building and extend predominantly east and northeast (wells SAS 1 - SAS 22)(Figures 4-13) . In August 2008, depth to ground water ranged from 14-34 feet. In December 2008, depth to ground water ranged from 14.14 to 27.95 feet. Soils in the surficial aquifer are sandy/sandy clay, typical of Florida. Historically from 2003 to 2008, shallow aquifer ground water results show the shallow ground water is significantly contaminated with 1,1-DCE, 1,1,1--TCA, TCE and PCE (Figures 4-13).

Although the ground water treatment system is decreasing contaminant concentrations, the levels of 1,1-DCE, 1,1,1-TCA, TCE and PCE in the southeast corner of the Siemens-Stromberg building remain high. Concentrations of 1,4-dioxane are also above comparison values. Ground water under the Crescent property (south, west and southwest of Siemens-Stromberg) is contaminated with lower levels of 1,1-DCE and 1,4-dioxane.

In June 2008, the levels of 1,1-DCE , PCE, TCE and 1,4-dioxane were all above guidance levels (MCLs) in certain wells near the site. In December 2008, the levels decreased slightly but were still elevated. See the following table for a summary of surficial monitoring well contaminant levels.

Chemical	June 2008 range (µg/L)	December 2008 range (µg/L)	MCL (µg/L)
1,1-DCE	ND – 28,000	ND – 14,000	7
1,1,1-TCA	ND - 39,000	ND – 30,000	200
TCE	ND - 180	ND - 160	5
PCE	ND- 280	ND - 160	5

ND = not detected

The Florida DOH evaluated the possibility of ground water vapor intrusion using ATDSR's "Evaluating Vapor Intrusion Pathways at Hazardous Waste Sites" (ATSDR 2008). Since VOC concentrations within 100 feet of the building **significantly exceed comparison** values, **Florida DOH concludes vapor intrusion is possible**. The facility's consultant determined ground water flow in the surficial aquifer is south, south west, and west. Recovery wells also cause some ground water to flow north, under the building. A review of building construction details (concrete slab with no crawl spaces) support the possibility of vapor intrusion. According to the City of Lake Mary, buried utility lines run east to west between 396 and 400 Rinehart Road, southeast of the main building.

Because of their high volatility and low water solubility, it is possible that 1,1-DCE, 1,1,1-TCA, TCE, and PCE to migrate from the shallow ground up into the air of overlying buildings. Because of its high water solubility, however, 1,4-dioxane is not likely to migrate. Detailed information for each chemical is included in Appendix B.

Evaluation of Soil Gas Data

In 2002, the facility's consultant collected 122 soil gas samples using an Emflux procedure (Appendix C). They analyzed these samples using EPA Method 8021 (thermal desorption and a capillary column gas chromatograph with a photoionization detector).

These data, however, are not useful in determining the health risk. These data were reported as a weight of contaminant (nanograms) without a measure of air volume. Without a measure of air volume it is not possible to estimate concentration or determine the health risk. The contaminants found in soil gas however were 1,1-DCE, 1,1,1-TCA, TCE and PCE. Therefore, even though these data are not useful for a health evaluation it shows that these chemicals are migrating up through the soil. The facility should request the contractor to conduct test methods which include air volume when testing soil gas in the future.

Evaluation of Indoor Air Data

For this health consultation DOH compared the indoor air sample results to ATSDR air comparison values. These values were used because workers were not working with these chemicals in 2004. OSHA does not require testing for contaminants present that are not part of current employee tasks. ATSDR CVs are extremely conservative values to use in this situation because: 1) workers, by definition, are healthier than the general population; 2) workplace exposures are likely limited to a 40-hour work week; 3) workers are not exposed for a lifetime (the basis for ATSDR chronic comparison values).

Any indoor air test results that may be available to evaluate past occupational exposures when employee tasks included using these solvents, should be evaluated using occupational exposure guidelines. DOH does not perform these evaluations.

In June 2004, the facility's consultant collected 8-hour indoor air samples from each of 39 rooms in the building. Galson Labs in N.Y. analyzed for 1,1-DCE, 1,1,1-TCA, TCE, and PCE using

OSHA (Occupational Safety and Health Administration) method PV2120/TO15. The concentrations were all < 5 ppbv (parts per billion by volume) which are below ATSDR's air comparison values (Table I). DOH prefers 24 hour time weighted samples to check the contaminant concentrations over time and to compare sampling results to health-based guidelines. Further recent indoor air sampling is needed to fully evaluate the potential for vapor intrusion and possible health effects.

Child Health Considerations

Little information exists on how VOCs differ in their effects between children and adults (ATSDR 2007). Children drink more fluids, eat more food, and breathe more air per kilogram of body weight than do adults. Children have a larger skin surface in proportion to their body volume. For this health consultation former workers may have included pregnant women and nursing mothers in the former Siemens-Stromberg building. Children are not a concern as they are not in the work place. Florida DOH reviewed the 2004 air test results in terms of sensitive populations such as pregnant women and nursing mothers and determined that not enough data is available to determine if illness is likely for these sensitive populations.

Conclusions

Because of inadequate data the Florida DOH can not currently conclude whether breathing volatile organic chemicals (VOCs) inside the former Siemens building could harm people's health.

- The facility tested indoor air in 2004. More recent testing is necessary to determine the current health threat for workers. Time-weighted samples over 24 hours are preferred over 8 hour samples to check the contaminant concentrations over time and to compare sample results to health-based guidelines.

- The soil gas samples collected in 2002 using the Emflux method were reported as a weight of contaminant (nanograms) without a measure of air volume. Without a measure of air volume it is not possible to estimate concentration or determine the health risk.

Because of inadequate data, however, the Florida DOH can not currently conclude whether drinking water from private wells near the former Siemens facility could harm people's health.

- Private drinking water wells approximately 1000 feet south of the Siemens-Stromberg building have only been tested sporadically for VOCs.

- The Florida DOH does not have enough data to determine if off-site groundwater contaminant migration is impacting those with private wells.

Recommendations

1. The responsible party should test the indoor air for VOCs during the 8 to 10 hours when workers are present, and periodically repeat this testing (e.g., once every three months) for at least one year. As an alternative to repeated testing, the responsible party should consider using technologies to eliminate or reduce the vapor intrusion exposure pathway (e.g., a sub slab depressurization system or SSD). If properly installed and operated, a SSD system would negate the need for ongoing indoor air testing. Indoor air testing only measures one point in time and does not reduce exposure.

2. The responsible party should test private drinking water wells quarterly for VOCs within one mile radius of the facility's property boundaries to ensure contaminated ground water does not impact off-site communities.

Public Health Action Plan

The Florida DOH will evaluate additional private well water, ground water, soil gas, or indoor air quality data as necessary.

DOH will prepare another health consultation evaluating on and off-site drinking water well data.

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[DEP 2008b] Department of Environmental Protection. Presentation by George Houston with DEP: Siemens PRP Meeting September 11, 2008

[DEP 2009a] Department of Environmental Protection. Letter to Mr. Siros with General Dynamics from Mr. George Houston with DEP dated February 23, 2009.

[DEP 2009b] Department of Environmental Protection. Letter to Mr. Abdulhussein with Rinehart Development from Bret LeRoux with DEP dated February 18, 2009.

[DEP 2009c] Email Mr. Houston, DEP to Ms. Skye, DOH dated April 28, 2009.

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CERTIFICATION

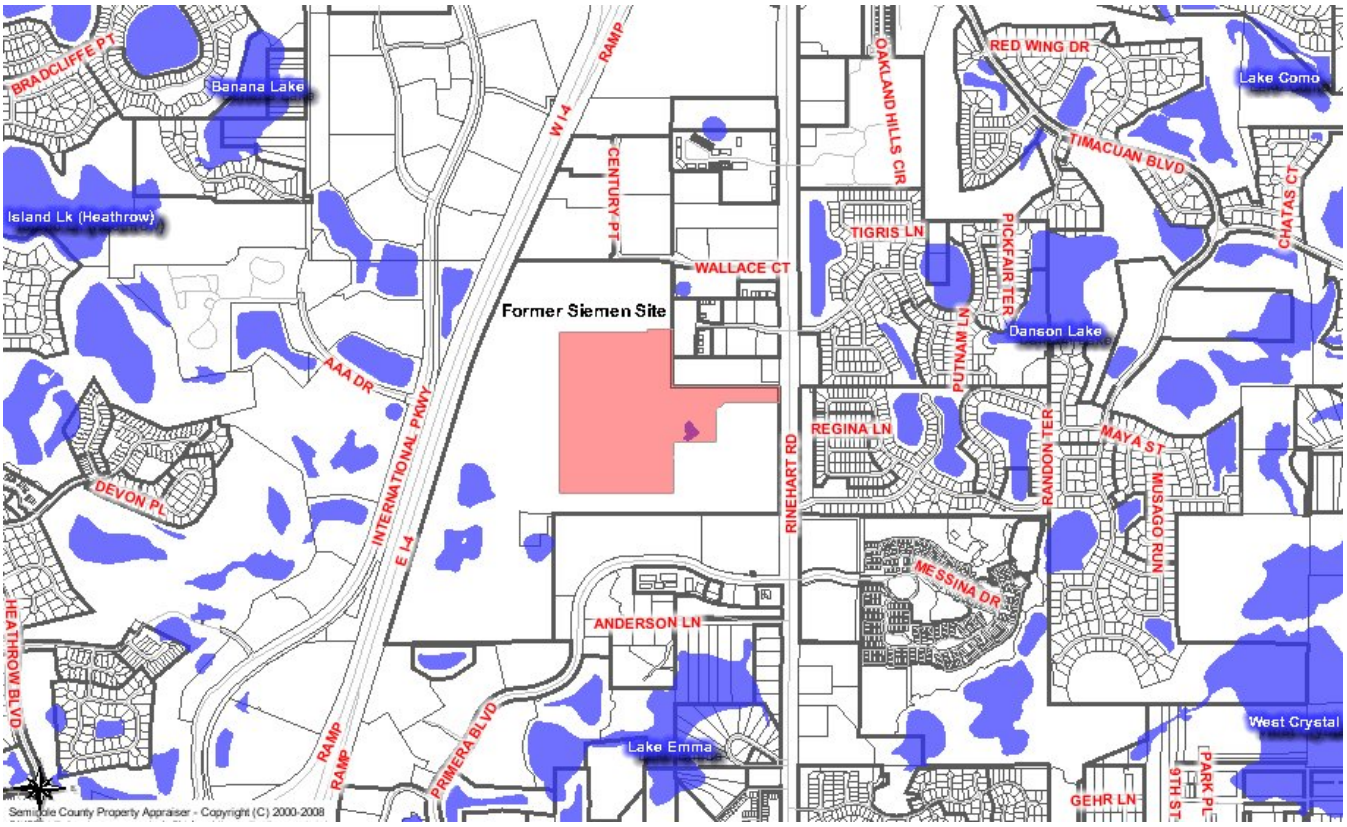
The Florida Department of Health, Division of Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began and completed editorial review.

Jennifer Freed
Technical Project Officer,
CAT, CAPEB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

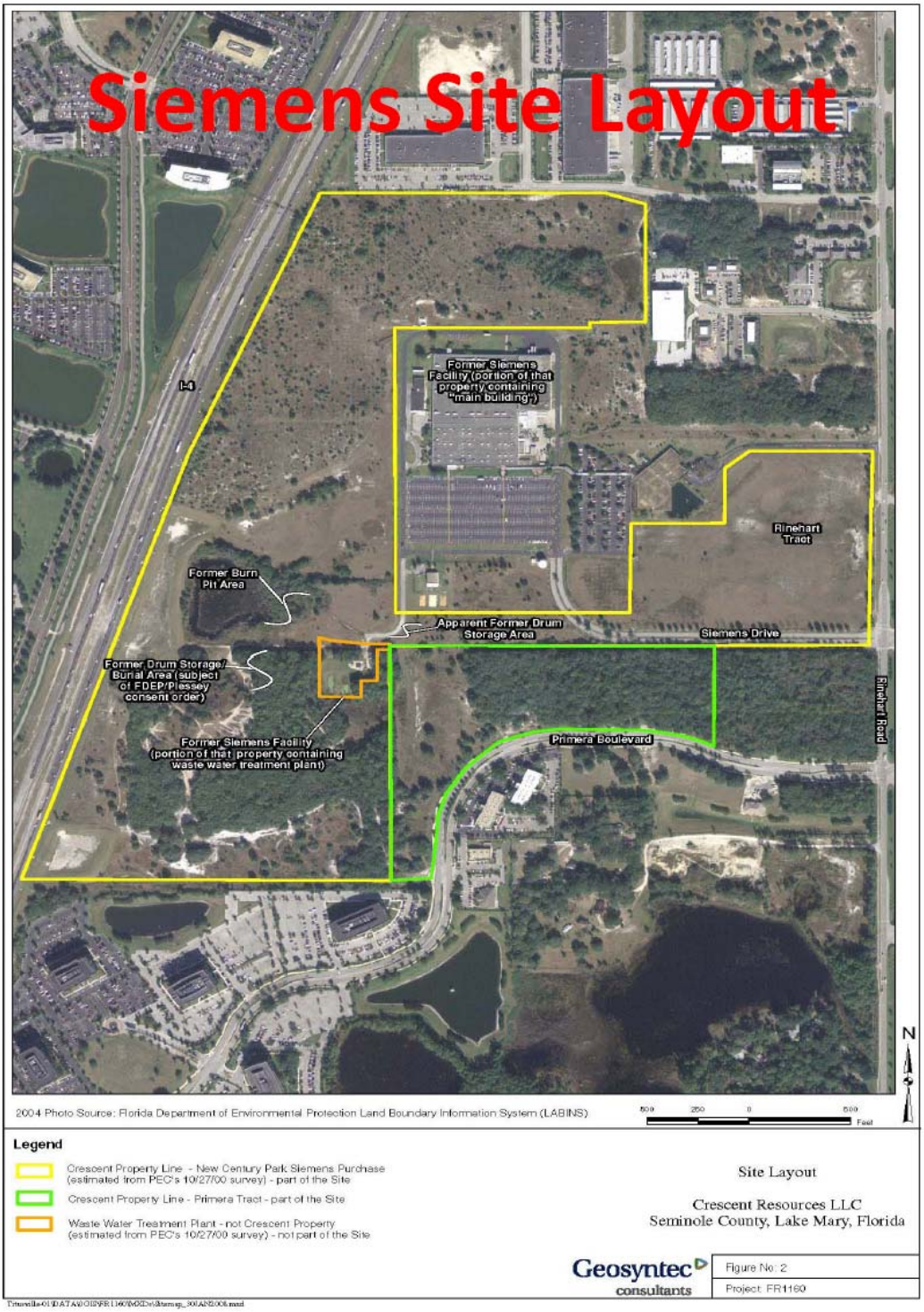
Alan Yarbrough
Team Lead
CAT, CAPEB, DHAC, ATSDR

FIGURE 1
Former Siemens Site (shown in pink) and Surrounding Neighborhoods



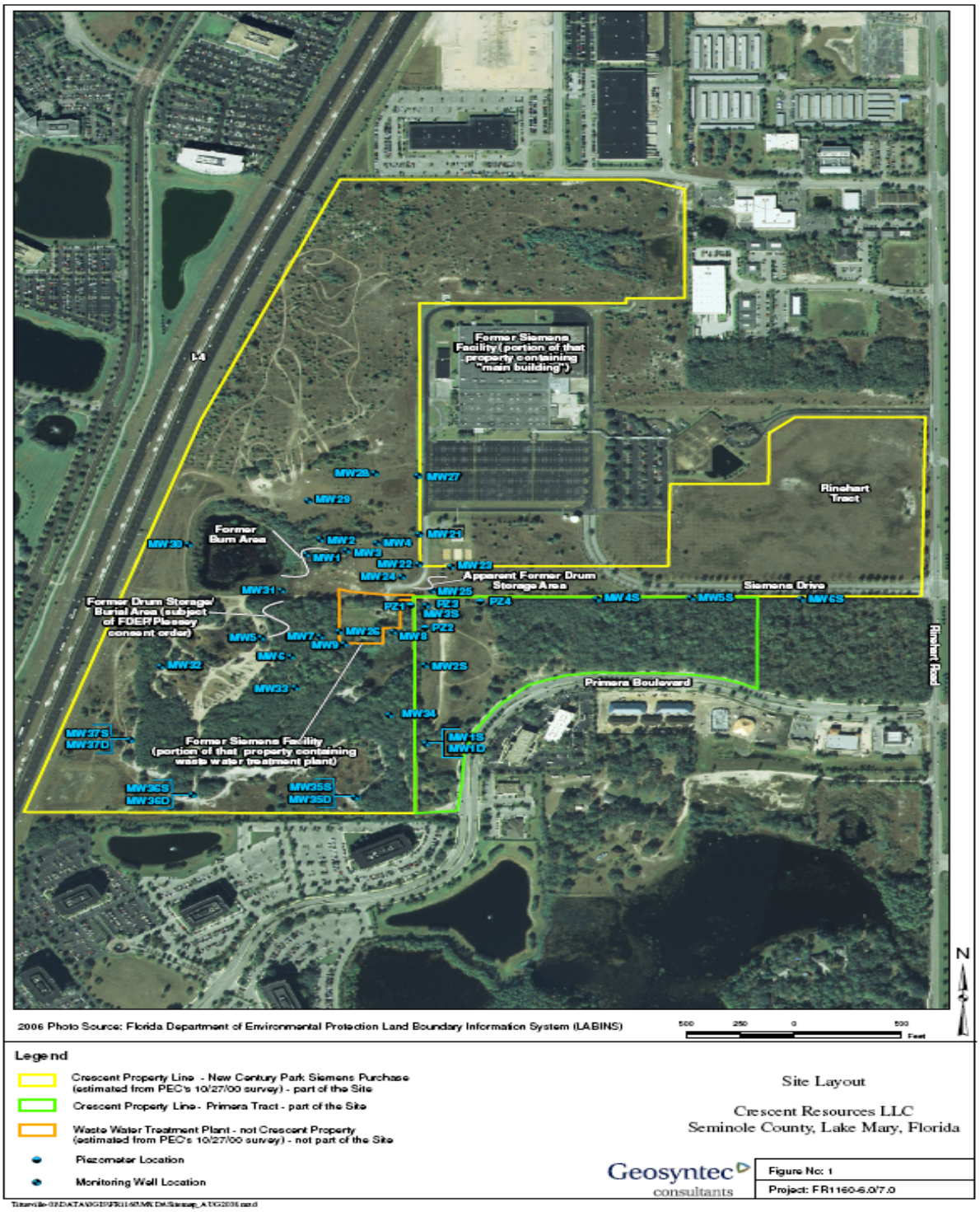
Reference: SPA 2008

FIGURE 2
Site Layout – Aerial View



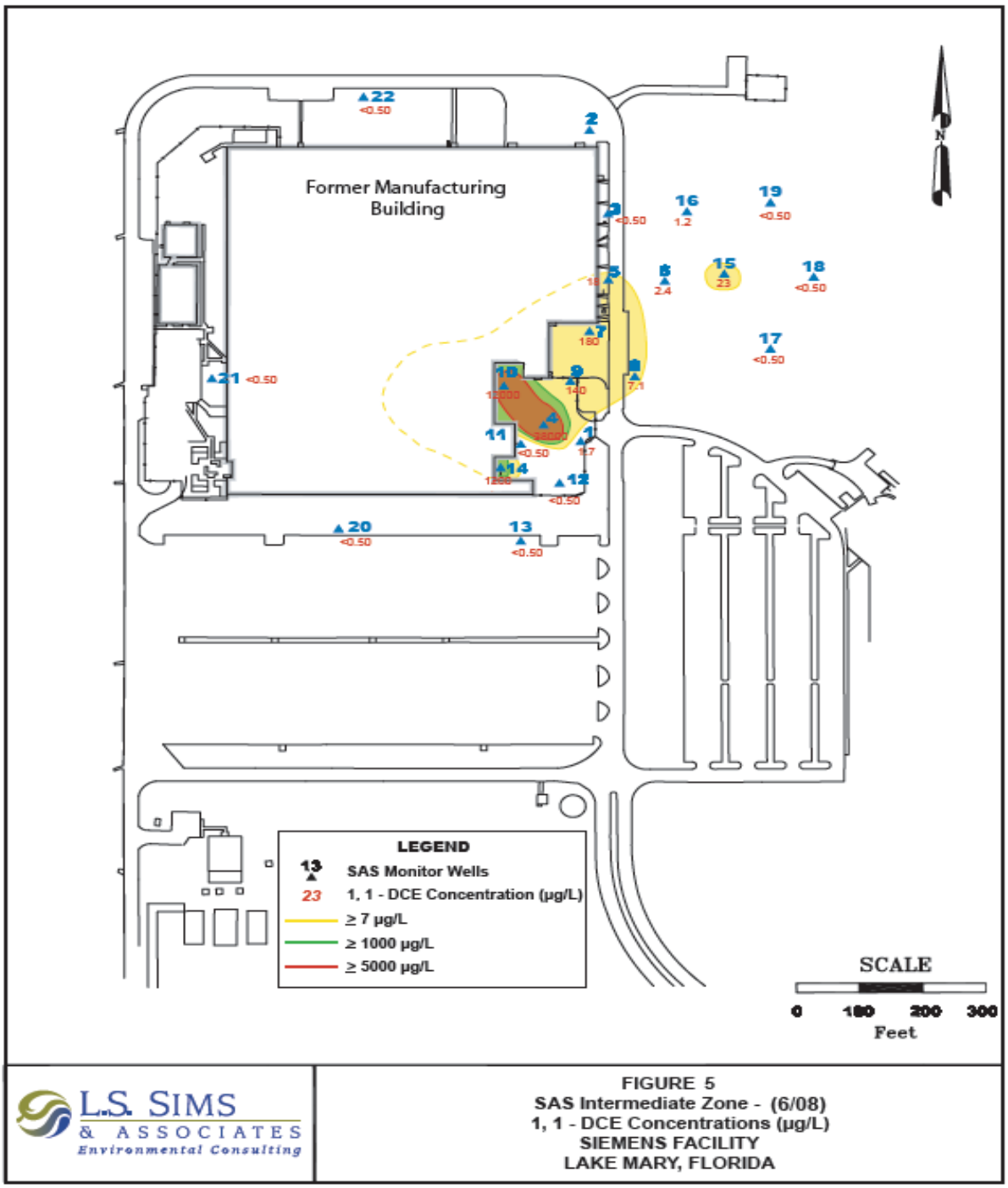
Reference: Geosyntec 2008

FIGURE 3
Property Lines of Crescent LLC and Monitoring Wells



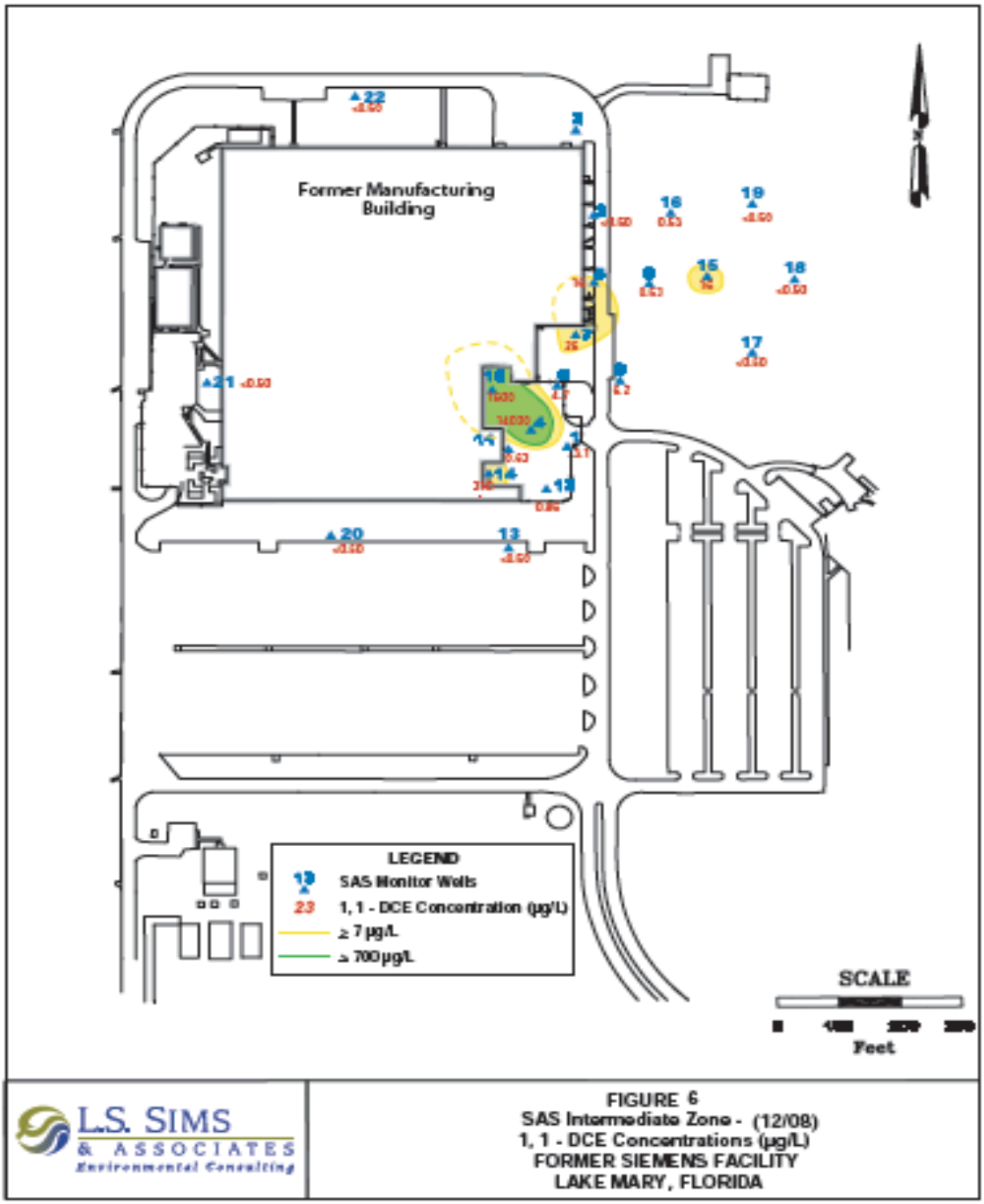
Reference: Geosyntec 2008

FIGURE 4
June 2008 1,1-DCE Shallow Ground Water Levels Near the Former Manufacturing Building



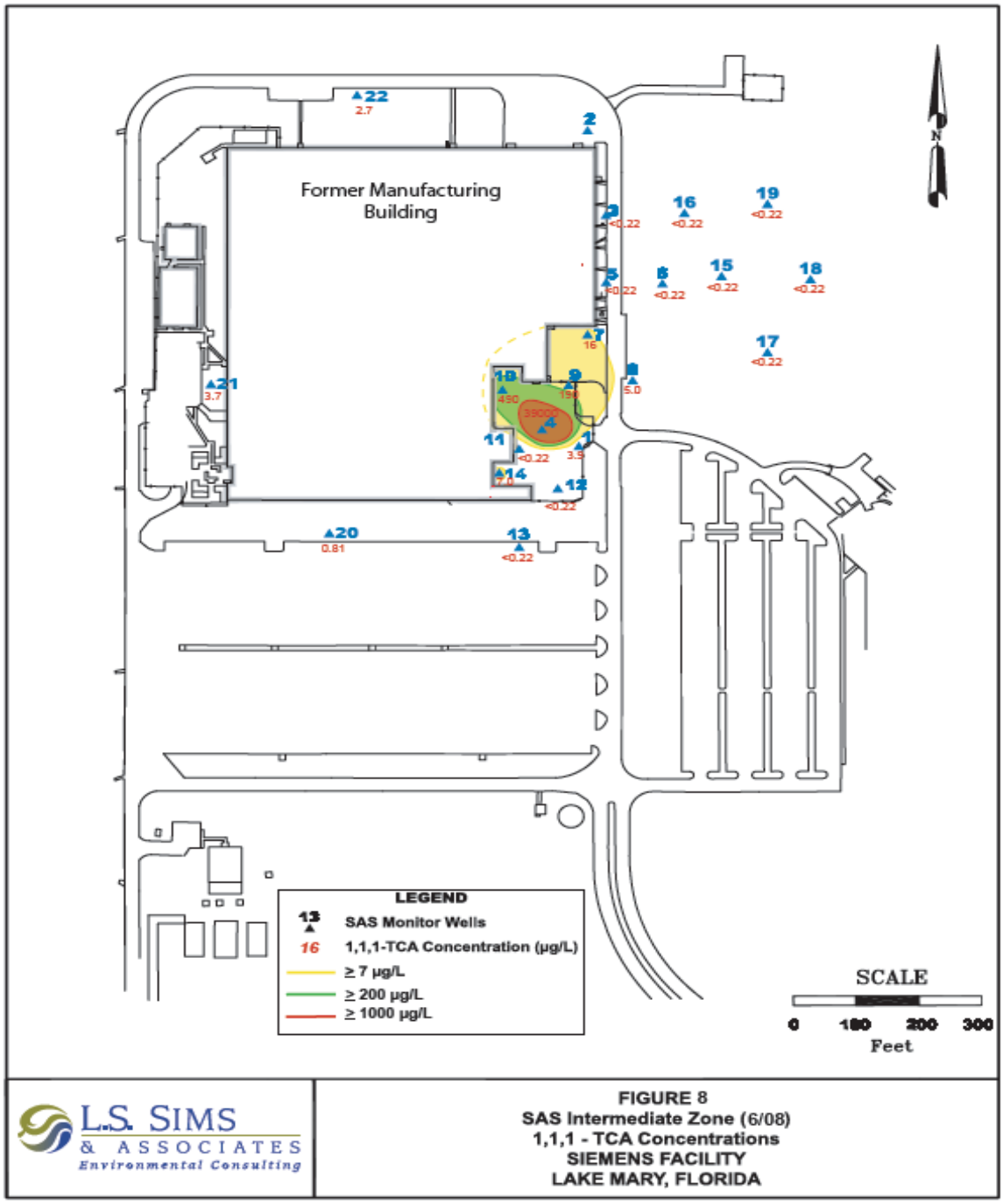
Reference: Sims 2008

FIGURE 5
December 2008 1,1-DCE Shallow Ground Water Levels Near the Former Manufacturing Building



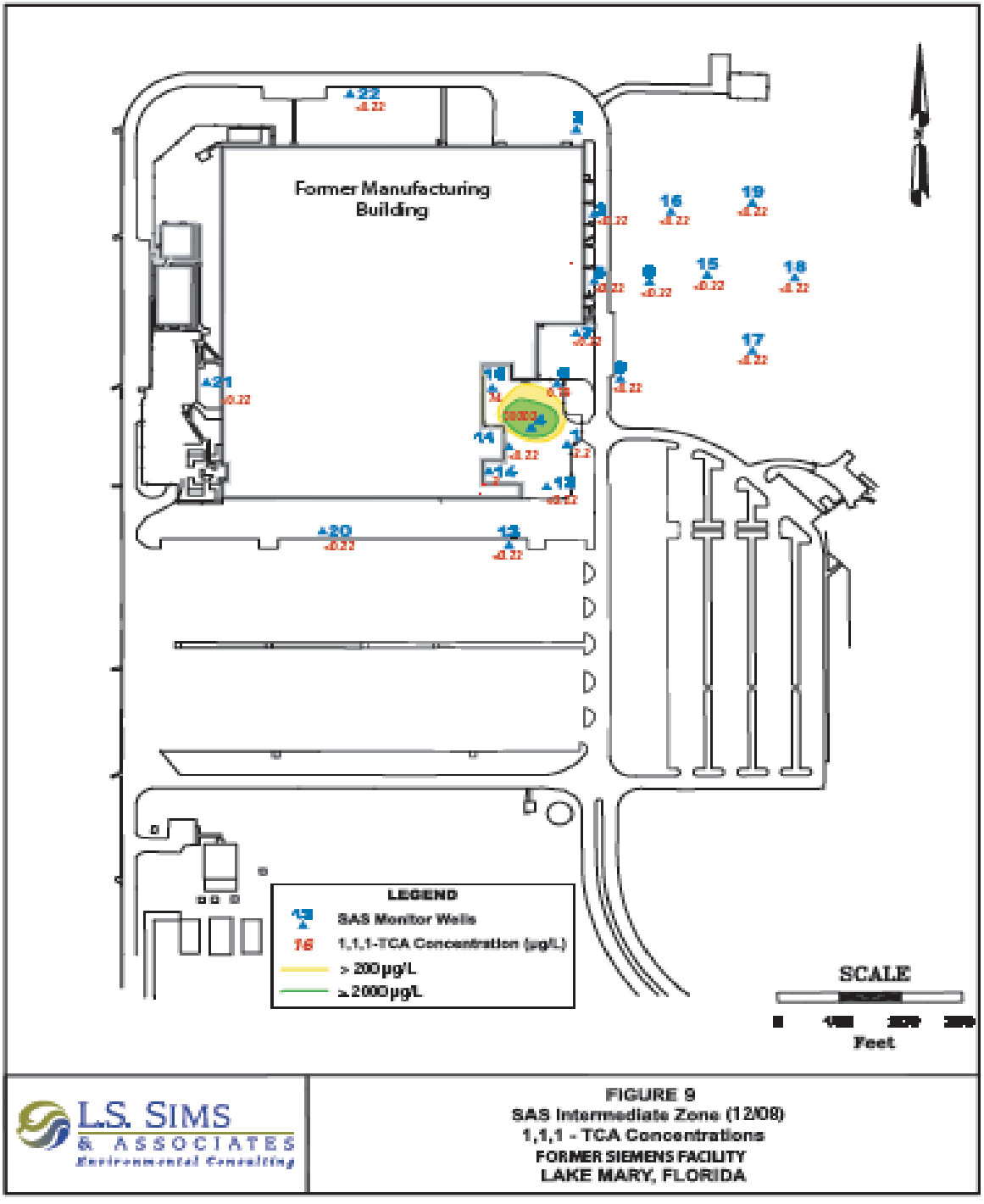
Reference: Sims 2009

FIGURE 6
June 2008 1,1,1-TCA Shallow Ground Water Levels Near the Former Manufacturing Building



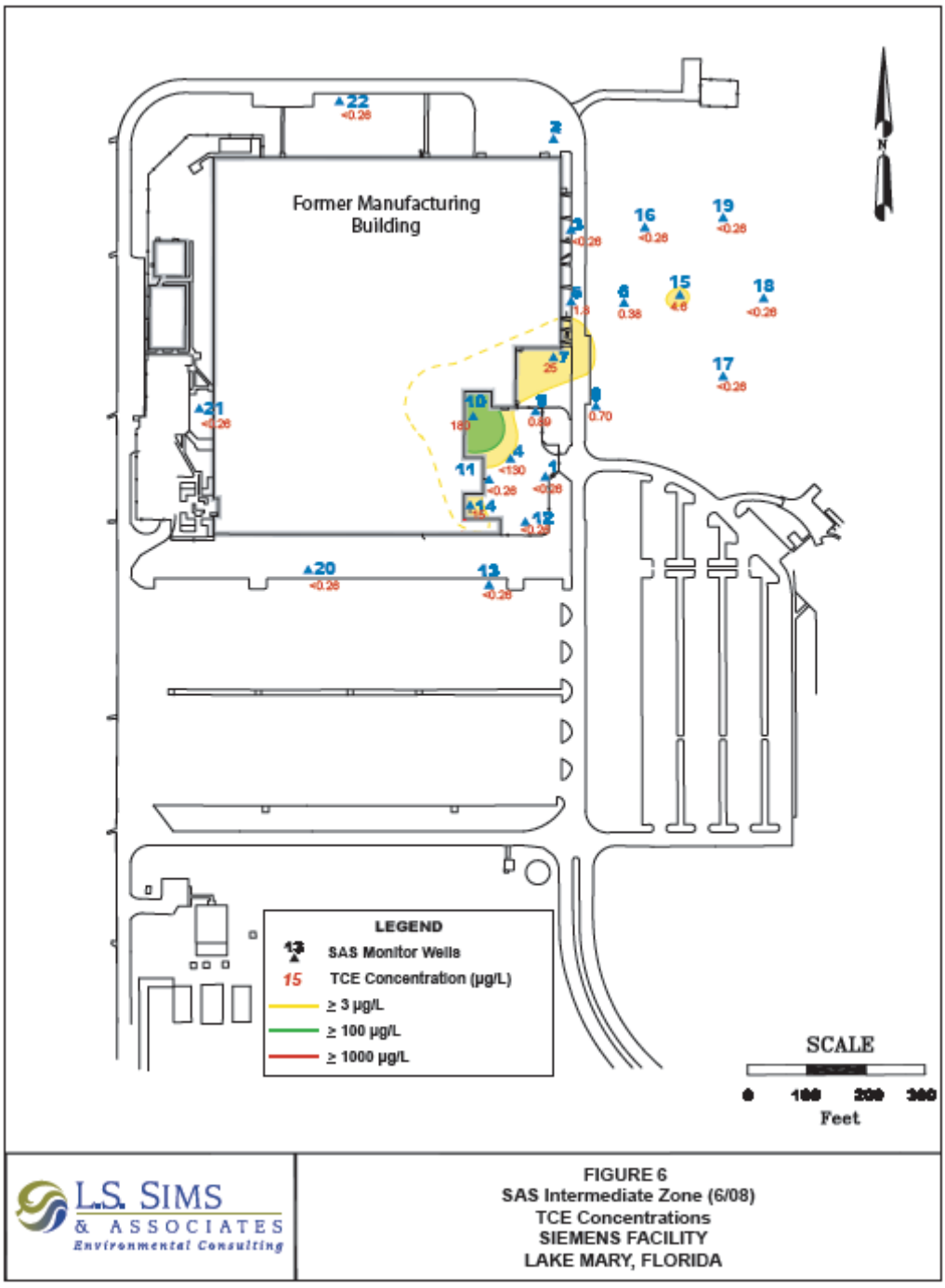
Reference: Sims 2008

FIGURE 7
December 2008 1,1,1-TCA Shallow Ground Water Levels Near the Former Manufacturing Building



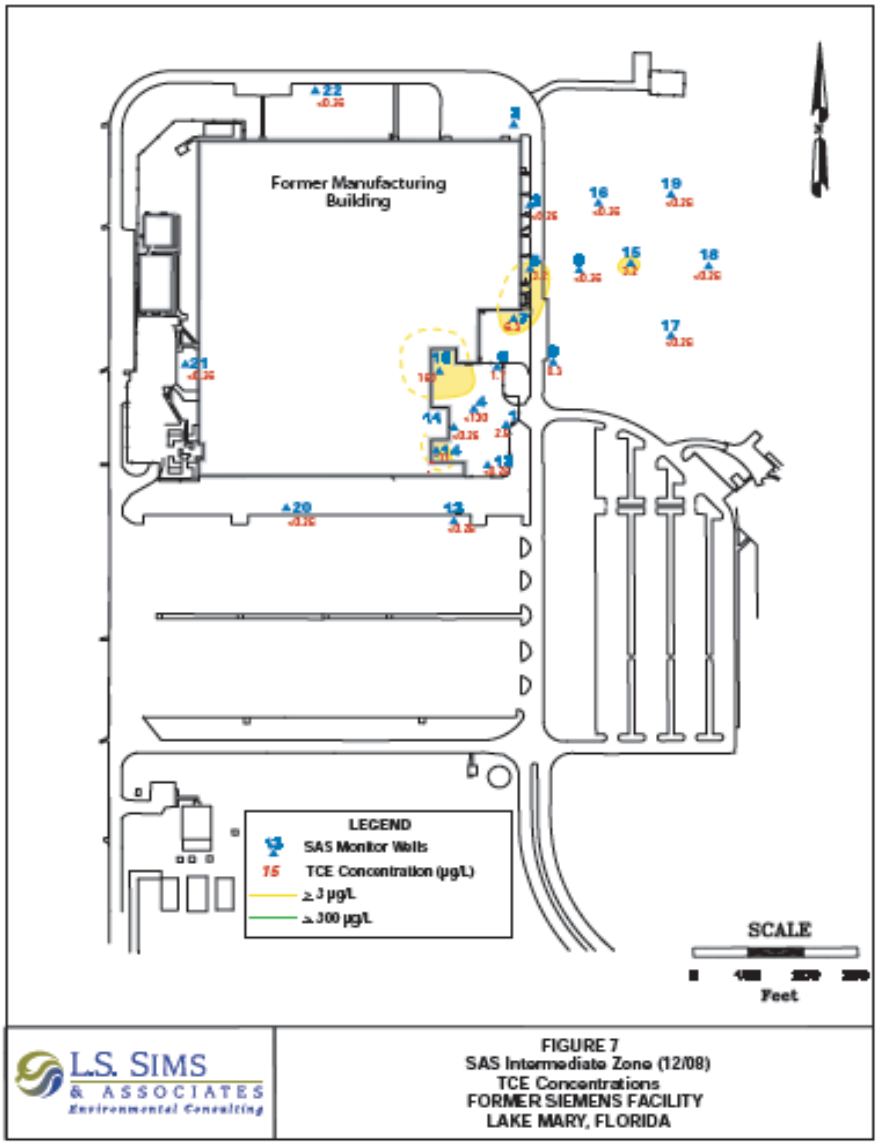
Reference: Sims 2009

FIGURE 8
June 2008 TCE Shallow Ground Water Levels Near the Former Manufacturing Building



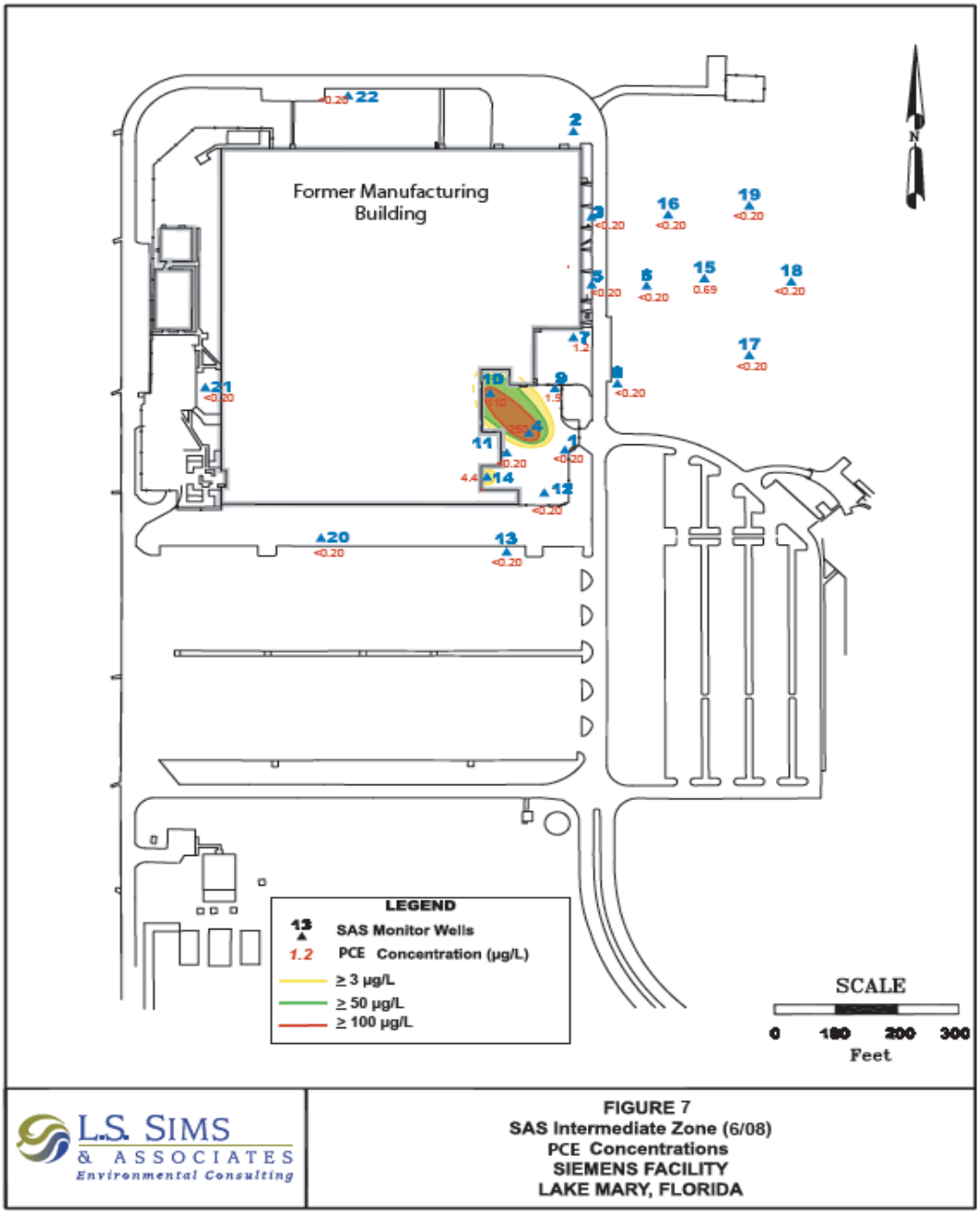
Reference:Sims 2008

FIGURE 9
December 2008 TCE Shallow Ground Water Levels Near the Former Manufacturing Building



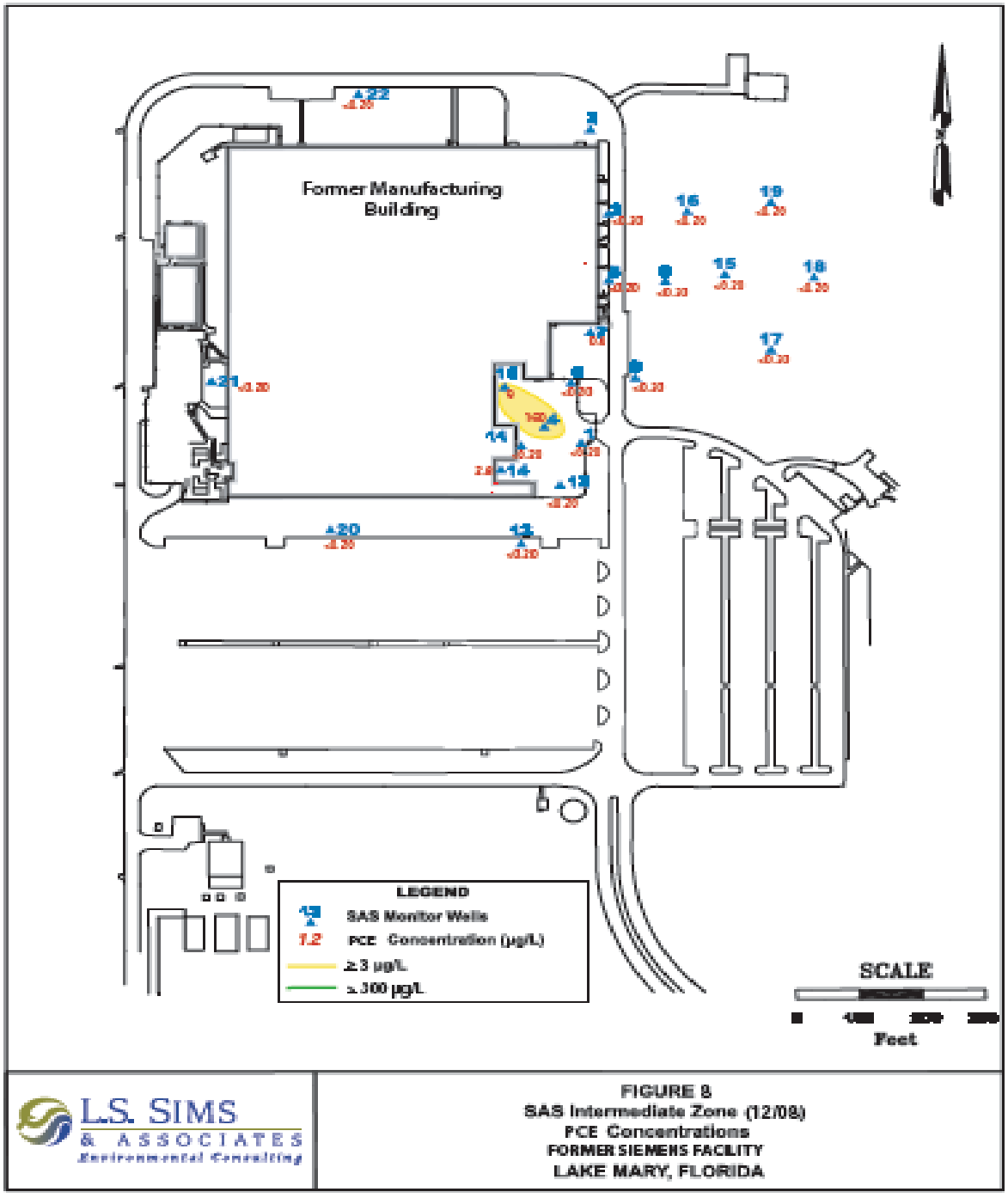
Reference: Sims 2009

FIGURE 10
June 2008 PCE Shallow Ground Water Levels Near the Former Manufacturing Building



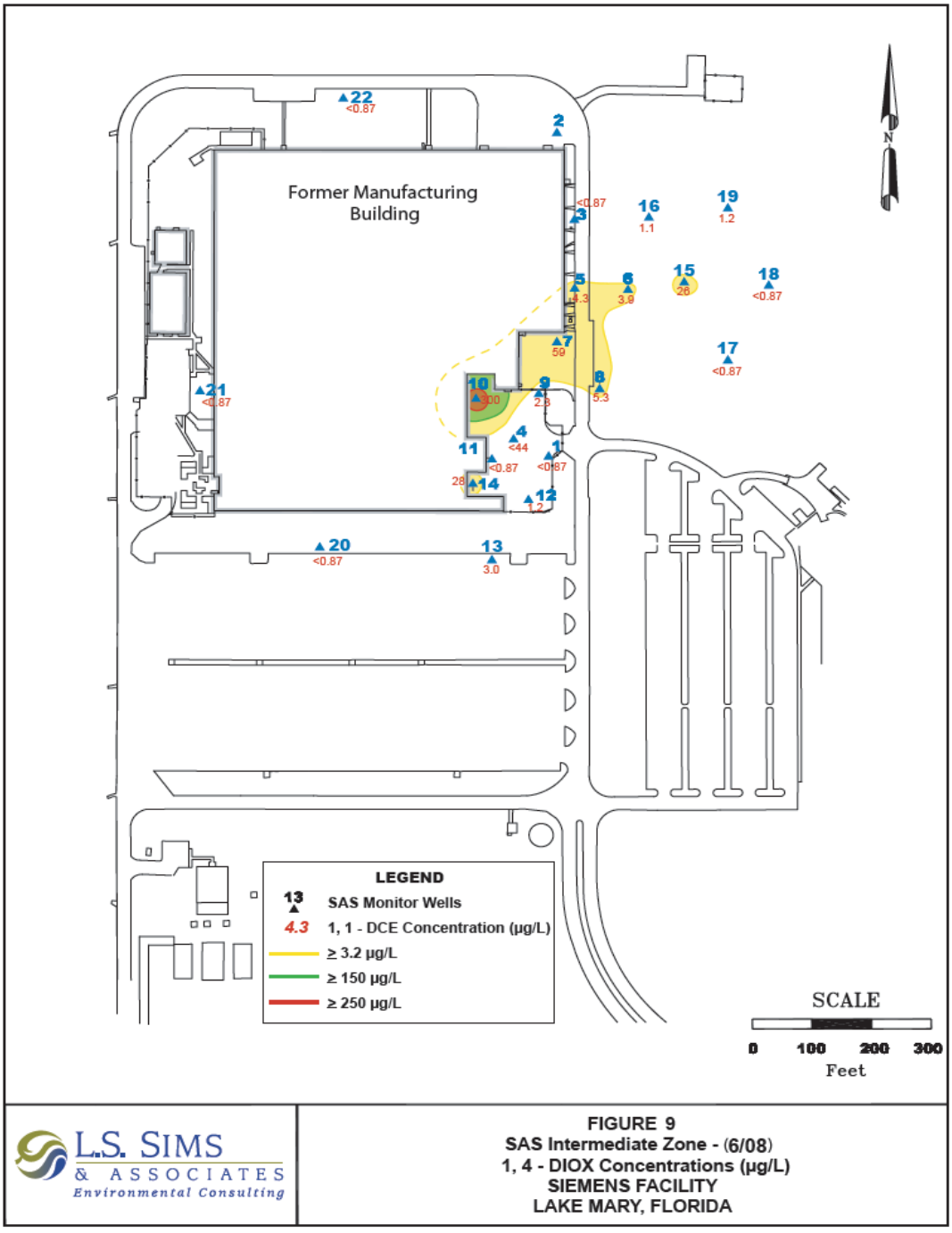
Reference: Sims 2008

FIGURE 11
December 2008 PCE Shallow Ground Water Levels Near the Former Manufacturing Building



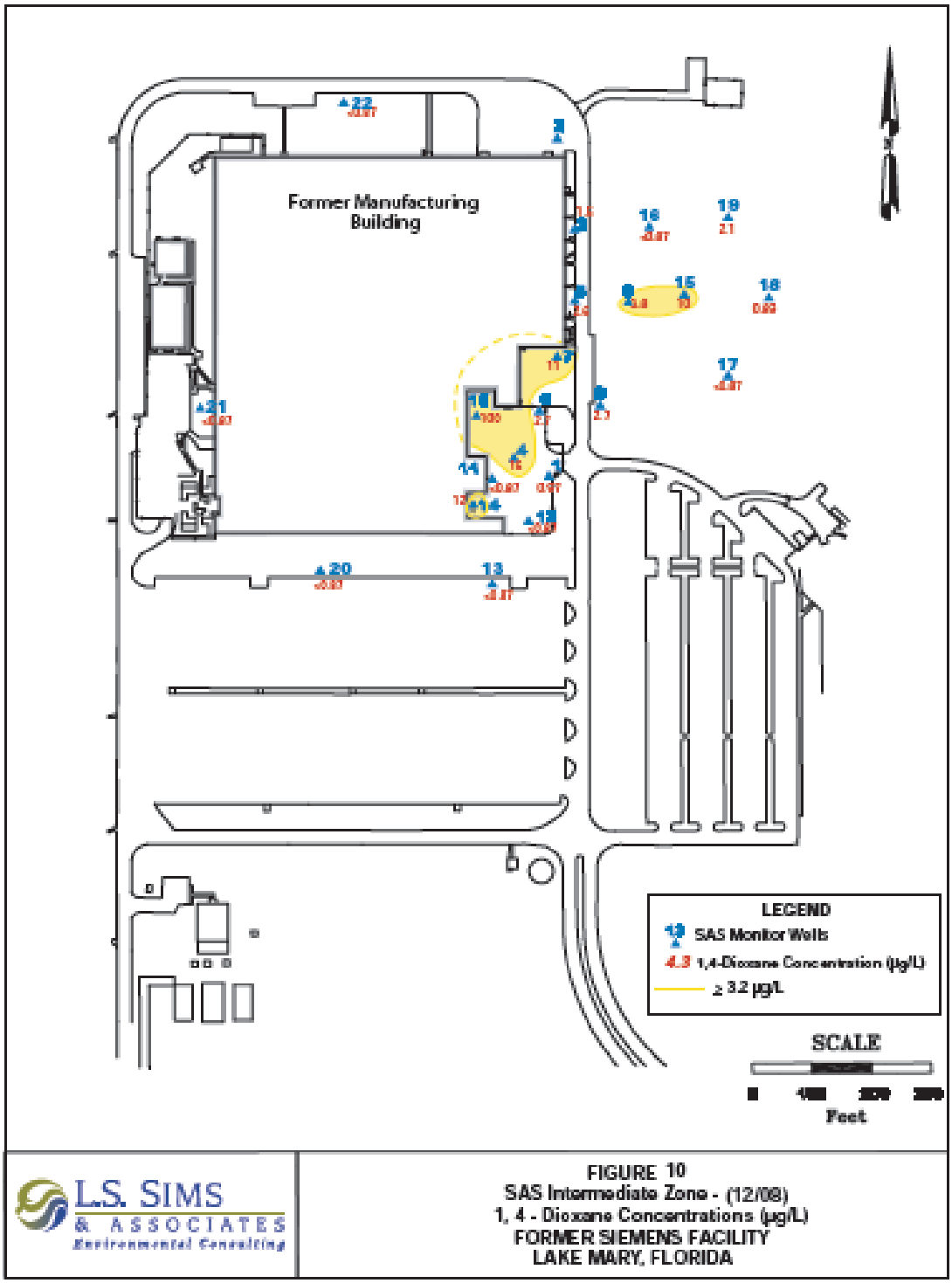
Reference: Sims 2009

FIGURE 12
June 2008 1,4-Dioxane Shallow Ground Water Levels Near the Former Manufacturing Building



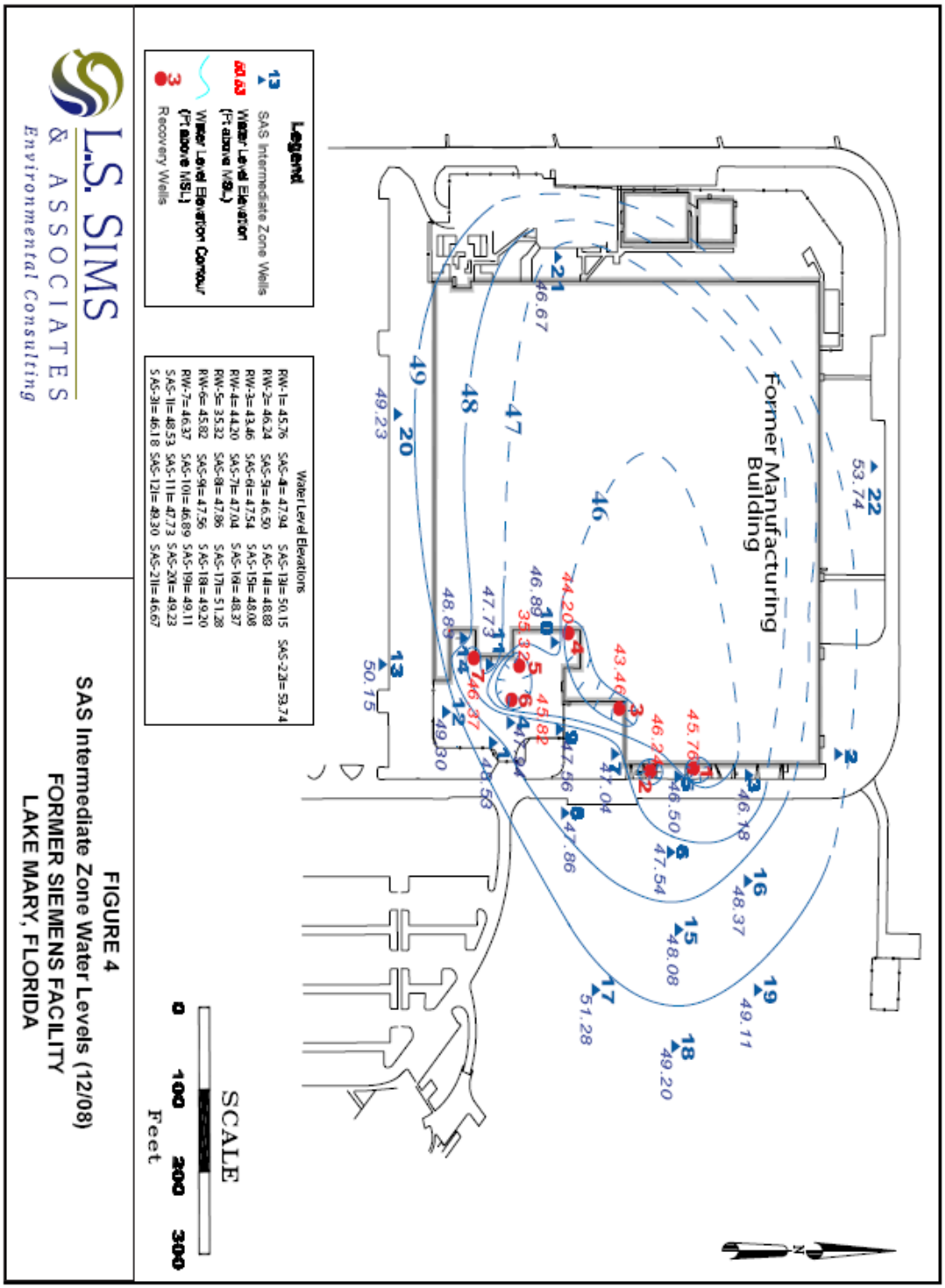
Reference: Sims 2008

FIGURE 13
December 2008 1,4-Dioxane Shallow Ground Water Levels Near the Former Manufacturing Building



Reference: Sims 2009

FIGURE 14
Ground Water Flow and Water Elevations
December 2008



Reference: Sims 2009

Table I
Facility's Maximum 8-hourVOC Indoor Air Results vs. ATSDR and EPA Comparison Values

	ATSDR Comparison Values				EPA Comparison Values		Sampling Results	
Volatile Organic Compounds	acute (ppbv)	interm (ppbv)	chronic (ppbv)	cancer (ppbv)	EPA RFC (ppbv)	EPA Inhalation Unit Risk ($ug/m^3)^{-1}$	Maximum 8-hr conc detected (ppbv)	Above a comparison value?
1,1-dichloroethene (1,1-DCE)	none	20	none	none	50	none	<5	No
Tetrachloroethene (PCE)	1000	none	300	none	none	none	<5	No
1,1,1-trichloroethane (TCA)	2000	700	none	none	900	none	<5	No
Trichloroethene (TCE)	2000	100	none	none	none	none	<5	No

Bold and underline cells indicate an exceedance of a comparison value.
acute= <14 days exposure
chronic= >365 days exposure
EPA=Environmental Protection Agency
interm=intermediate (14-365 day exposure)
RfC= reference concentration
ppbv= parts per billion by volume
TCE Proposed changes: CSF range from 0.02-0.4 $(mg/kg/day)^{-1}$; RfC = 40 ug/m^3(EPA tox summary draft 1/28/01)

PHOTOS OF WELLS AND THE SITE

Photo 1: Former Siemens-Stromberg Building: now Laser Photonics

Photo 2: Former Siemens-Stromberg Building Facing North

Photo 3: Former Siemens-Stromberg Building Facing North

Photo 4: City of Lake Mary Well #5, with Treatment System

Photo 5: Loading Dock Area, Former Siemens-Stromberg Building

Photo 6: Water Treatment System with Carbon Tank

APPENDIX A

In December 2009, an attorney representing 69 former workers from the former Siemens site sent the Florida DOH a list of their 104 reported illnesses and medical conditions. Below are the reported conditions and illnesses from these former workers:

ADD
ADHD
alveolar bone erosion
Aortic insufficiency
anxiety disorder
Asperger's Syndrome
atrial fibrillation
Bell's Palsy
bipolar disease
bone spurs (spinal)
bradyarrhythmias
brain and bone metastases
bursitis
CAD
Cardiac dysrhythmias
cardiomyopathy
cerum impaction
Cervicalgia
Cholelithiasis
cirrhosis (liver)
congestive heart failure
coronary artery disease
cyst (eyelid)
breast cancer (Metastatic)
bone disease (degenerative)
congenital hip dysplasia
Disc degeneration
Non-cardiac chest pain
coronary artery disease
depression
diabetes,
dysphonia
dyslipidemia
dyspenea
dysplasia (cervical and hip)
emphysema
Epstein Barr
esophageal cancer to liver
Eustachian tube dysfunction

Fatigue syndrome
fibromyalgia
folliculitis
goiters
granulomas
Head and Neck cancer
heart attack
heart disease (ischemic, organic and valvular)
heart murmur
Subarachnoid hemorrhage
homonymous hemianopsia,
hepatitis
hyperplasia
hyperlipidemia
hypertension
hypoxia
hyperparathyroidism
hypothyroidism
insomnia
jaundice
kidney cancer (metastatic)
labyrinthitis,
leukemia
leukoplakia
lung cancer
lymphodemia
Lymphadenopathy
Mastodynia
Meniere's Disease
MI
myalgias
mycobacterium infection
myeloproliferative disorder,
neuropathy
neuritis
odynophagia
Osteoperosis,
osteopenia,
otitis
osteomyelitis (jaw)
osteodystrophy (renal)
pancreatic cancer
Respiratory Failure
Streptococcus agalactiae sepsis
strep pharyngitis
Pancreatitis

parasthesias
polyps (nasal and vocal chord)
restless leg syndrome
tonsil polyps
scarlet fever
shingles
Sicca syndrome
Streptococcus pyogenes bacteremia
syncopal
tachycardia
thrush
thyroid abnormalities
tinnitus
ulcer (peptic)
vascular disease
valvular heart disease
venous stasis ulcers and disease
vein thrombosis
vertigo

APPENDIX B

1,1-Dichloroethene

1,1-Dichloroethene (1,1-DCE) is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. It is also called vinylidene chloride.1,1-DCE is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It is also used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications (ATSDR 1995).

- 1,1-DCE enters the environment from industries that make or use it.
- 1,1-DCE evaporates very quickly from water and soil to the air.
- In the air, it takes about 4 days for it to break down.
- 1,1-DCE breaks down very slowly in water.
- It does not accumulate very much in fish or birds.
- In soil, 1,1-DCE is slowly transformed to other less harmful chemicals.

The main effect from breathing high levels of 1,1-DCE is on the central nervous system. Some people lost their breath and fainted after breathing high levels of the chemical. Breathing lower levels of 1,1-DCE in air for a long time may damage your nervous system, liver, and lungs. Workers exposed to 1,1-DCE have reported a loss in liver function, but other chemicals were present.

Animals that breathed high levels of 1,1-DCE had damaged livers, kidneys, and lungs. The offspring of some of the animals had a higher number of birth defects. We do not know if birth defects occur when people are exposed to 1,1-DCE (ATSDR 1995).

1,1,1-Trichloroethane (1,1,1-TCA)

1,1,1-TCA is a synthetic chemical that does not occur naturally in the environment. It also is known as methylchloroform, methyltrichloromethane, trichloromethylmethane, and α−trichloromethane. Its registered trade names are chloroethene NU® and Aerothene TT®.

No 1,1,1-TCA is supposed to have been manufactured for domestic use in the United States after January 1, 2002 because it affects the ozone layer. 1,1,1-TCA had many industrial and household uses, including use as a solvent to dissolve other substances, such as glues and paints; to remove oil or grease from manufactured metal parts; and as an ingredient of household products such as spot cleaners, glues, and aerosol sprays (ATSDR 2006).

Most of the 1,1,1-TCA released into the environment enters the air, where it lasts for about 6 years. Once in the air, it can travel to the ozone layer where sunlight can break it down into chemicals that may reduce the ozone layer. Contaminated water from landfills and hazardous waste sites can contaminate surrounding soil and nearby surface water or groundwater. Water can carry 1,1,1-TCA through the soil and into the groundwater where it can evaporate and pass through the soil as a gas, then be released to the air. 1,1,1-TCA will not build up in plants or animals (ATSDR 2006).

Because 1,1,1-TCA was used so frequently in home and office products, you are likely to be exposed to higher levels indoors than outdoors or near hazardous waste sites. However, since its manufacture and use was banned in 2002, 1,1,1-TCA is not expected to be commonly used. Therefore, the likelihood of being exposed nowt is remote. Prior to it's phase out, people could have been exposed to 1,1,1-TCA while using some metal degreasing agents, paints, glues, and cleaning products (ATSDR 2006).

If you breathe air containing high levels of 1,1,1-TCA for a short time, you may become dizzy and lightheaded and possibly lose your coordination. These effects rapidly disappear after you stop breathing contaminated air. If you breathe in much higher levels, you may become unconscious, your blood pressure may decrease, and your heart may stop beating. Whether breathing low levels of 1,1,1-TCA for a long time causes harmful effects is not known. Studies in animals show that breathing air that contains very high levels of 1,1,1-TCA damages the breathing passages and causes mild effects in the liver, in addition to affecting the nervous system (ATSDR 2006).

Trichloroethene (TCE)

Trichloroethene (or trichloroethylene, TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers (ATSDR 2003). It's use has been decreasing in the US since the 90's (EPA web site).

TCE is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical. TCE dissolves a little in water, but it is heavier than water and can remain in ground water for a long time. TCE quickly evaporates from surface water. TCE evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time. TCE may stick to particles in surface water, which will cause it to eventually settle to the bottom sediment. TCE does not build up significantly in plants and animals. Contact with soil contaminated with TCE, such as near a hazardous waste site (ATSDR 2003).

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating. Breathing large amounts of TCE may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage (ATSDR 2003).

Tetrachloroethene (PCE)

Tetrachloroethene (tetrachloroethylene, perchloroethylene, or PCE) is a manufactured chemical widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

PCE is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell PCE when it is present in the air at a level of 1 part PCE per million parts of air (ppm) or more, although some can smell it at even lower levels. Much of the PCE that gets into water or soil evaporates into the air. Microorganisms can break down some of the PCE in soil or underground water. In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of PCE are not known (ATSDR 1997). Exposure to very high concentrations of PCE can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. PCE has been found in at least 771 of the 1,430 National Priorities List sites identified by EPA (ATSDR 1997).

APPENDIX C

FIELD PROCEDURES FOR EMFLUX® SOIL-GAS SURVEYS

The following field procedures are routinely used during EMFLUX® Soil-Gas Surveys. Modifications can be and are incorporated from time to time in response to individual project requirements. In all instances, BEACON adheres to EPA-approved Quality Assurance and Quality Control practices.

A. Field personnel carry EMFLUX® system components and support equipment to the site and deploy the EMFLUX® Collectors in a prearranged survey pattern. An EMFLUX® Collector consists of a glass vial containing hydrophobic adsorbent cartridges with a length of wire attached to the vial for retrieval. Although EMFLUX® Collectors require only one person for emplacement and retrieval, the specific number of field personnel required depends upon the scope and schedule of the project. Each Collector emplacement generally takes less than two minutes.

B. For those sample locations covered with soils or vegetation, a field technician clears vegetation and debris exposing the ground surface. Using a hammer and a ¼"-diameter pointed metal stake, the technician creates a hole approximately three inches deep. For those locations covered with an asphalt or concrete cap, the field technician drills a 1½"-diameter hole through the cap to the soils beneath. (If necessary, the Collector can be sleeved with a ¾" i.d. copper pipe for either capped or uncapped locations).

C. The technician then removes the solid plastic cap from an EMFLUX® Collector and replaces it with a Sampling Cap (a plastic cap with a hole covered by screen meshing). The technician inserts the Collector, with the Sampling Cap end facing down, into the hole (see **attached figure**). The Collector is then covered with either local soils for uncapped locations or, for capped locations, aluminum foil and a concrete patch. The Collector's location, time and date of emplacement, and other relevant information are recorded on the Field Deployment Form.

D. One or more trip blanks are included as part of the quality-control procedures.

E. Once all EMFLUX® Collectors have been deployed, field personnel schedule Collector recovery (typically 72 hours after emplacement) and depart, taking all no-longer-needed equipment and materials with them.

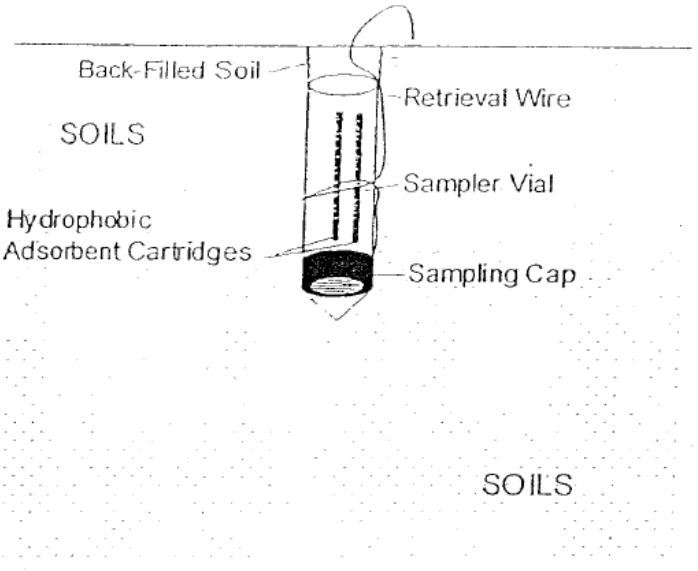
F. Field personnel retrieve the Collectors at the end of the exposure period. At each location, a field technician withdraws the Collector from its hole, removes the retrieval wire, and wipes the outside of the vial clean using gauze cloth; following removal of the Sampling Cap, the threads of the vial are also cleaned. A solid plastic cap is screwed onto the vial and the sample location number is written on the label. The technician then records sample-point location, date, time, etc. on the Field Deployment Form.

G. Sampling holes are refilled with soil, sand, or other suitable material. If Collectors have been installed through asphalt or concrete, the hole is filled to grade with a plug of cold patch or cement.

H. Following retrieval, field personnel ship or carry the EMFLUX® Collectors to the analytical laboratory.

EMFLUX® COLLECTOR

DEPLOYMENT IN SOILS



DEPLOYMENT THROUGH CONCRETE OR ASPHALT