PUBLIC HEALTH ASSESSMENT

SOUTHERN SOLVENTS, INCORPORATED
(a/k/a SOUTHERN SOLVENTS, INCORPORATED SITE)

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

EPA FACILITY ID: FL0001209840

Prepared by:

Florida Department of Health
Bureau of Environmental Epidemiology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. 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. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program 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 a compilation of several health consultations the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health 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 the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in 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. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, fullscale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E56), Atlanta, GA 30333.

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1.0 SUMMARY

Southern Solvents Inc., Tampa, Hillsborough County, stored and distributed tetrachloroethylene from 1977 to 1985. Small businesses and two residential developments surround the site. In 1988 and 1989, the Florida Department of Health and Rehabilitative Services (DHRS) discovered chlorinated solvents in the on-site well and in several wells at area businesses. The discovery of groundwater contamination led to the Environmental Protection Agency (EPA) considering this site for the Superfund National Priorities List. Because of the rapid progression of this site in the Superfund Program, the Florida Department of Health (FDOH), Bureau of Environmental Epidemiology, and the Agency for Toxic Substances and Disease Registry (ATSDR) conducted this public health assessment.

Between 1989 and 1998, EPA and the Florida Department of Environmental Protection (FDEP) collected numerous soil and groundwater samples from both on and off the site. Subsurface soil samples beneath the site contained concentrations of tetrachloroethylene well in excess of the ATSDR comparison value. However, surface soil did not contain any contaminants at concentrations that exceed the ATSDR comparison value. FDOH concludes that incidental ingestion of either on- or off-site soil is unlikely to cause illness because no contamination was present in soil that humans would likely contact (i.e., surface soil). Groundwater beneath the site and off of the site contained tetrachloroethylene concentrations well above the ATSDR comparison value. Based on the groundwater data, the contaminants are present in both the surficial and Floridian aquifers.

FDOH classifies this site as "no apparent health threat" because no completed exposure pathway exists. Although groundwater contamination is present beneath and south of the site, area residential developments receive municipal water. It should be noted that several area businesses have private wells, which could serve as a source of exposure. FDOH evaluated health issues that might arise in the unlikely completion of an exposure pathway. Since surface soil contained very low levels of contamination, FDOH focused this evaluation on the residential use of on- and off-site groundwater. Using standard default assumptions of frequency and duration of use, FDOH estimated the likely child and adult doses following ingestion of groundwater containing the maximum on- and off-site contaminant concentrations. Ingestion of groundwater by adults is unlikely to cause illness. Ingestion of off-site groundwater is unlikely to cause illness. The use of either on- or off-site groundwater for showering will likely produce potentially irritating air concentrations of tetrachloroethylene. Beyond irritation of the eyes, FDOH does not anticipate further health effects from shower exposure. Little evidence exists to suggest that the estimated doses of tetrachloroethylene and trichloroethylene are likely to cause cancer.

To prevent the completion of any exposure pathways in the future, the FDOH will inform area residents of the potential danger of use of contaminated groundwater. The FDOH will also recommend that the Southwest Florida Water Management District restrict permits for new deep groundwater wells in or around the area of contaminated water.

2.0 PURPOSE

The purpose of this report is to assess the public health threat of the Southern Solvents Inc., hazardous waste site. This is the first assessment of this site by either Florida Department of Health (FDOH) or the federal Agency for Toxic Substances and Disease Registry (ATSDR). In this report, FDOH assesses the past, current and future public health threats that could result from exposure to chemicals in the environment at and around the Southern Solvents Inc., hazardous waste site. FDOH estimates which groups of people may be at risk under current conditions, or are at risk of exposure under potential future conditions. FDOH estimates if these exposures are likely to be causing illness now, or may likely cause illness in the future. FDOH also uses the health assessment process to identify public health actions that, if implemented, can serve to reduce exposures to susceptible populations. Financial support for this project was provided entirely by ATSDR.

3.0 BACKGROUND

In this public health assessment, the FDOH, in cooperation with ATSDR, evaluates the public health significance of this site. ATSDR, in Atlanta, GA, is a federal agency within the U.S. Department of Health and Human Services. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) authorizes ATSDR to conduct public health assessments of hazardous waste sites. Specifically, FDOH decides whether illness is possible from exposure to contaminants from the site and recommends actions to reduce or prevent these exposures.

3.1. Site Description and History

The Southern Solvents Inc., site is at 4109 West Linebaugh Avenue, Tampa, Hillsborough County, Florida. The site is approximately 500 ft. west of the intersection of Gunn Highway and West Linebaugh Avenue and measures approximately 185 feet by 100 feet (Figures 1 and 2, Appendix A). The only structure on the site is a one-story metal building with a concrete slab at the north end (Figure 2). Aerial photographs from 1965 showed that this parcel of land was originally part of an orchard. Since 1965, the area including the site changed from rural to commercial. By 1972, this area had become largely commercial and the metal building was built on the site. Between 1977 and 1985, Southern Solvents Inc. stored and distributed the solvent tetrachloroethylene to area dry-cleaners. Aerial photographs from 1980 show vertical and horizontal storage tanks on the site. These tanks were on or near the concrete slab north of the building. Tetrachloroethylene was also stored in small trucks in the north and northeast parts of the site. In the mid-1980s, accidental spills of tetrachloroethylene to the north of the building were reported and are thought to be the source of the soil and groundwater contamination. PJ's Spas leased the facility from 1985 to August of 1989. By 1991, all storage tanks had been removed from the site. Southern Solvents Inc. still owns the property but leases it to AAA Diversified Services, a commercial painting company (Bechtel Engineering Inc., 1998).

The Environmental Protection Agency (EPA) and the Florida Department of Environmental Protection (FDEP), formerly the Florida Department of Environmental Regulation (FDER), have conducted many studies at this site since the contamination was first discovered in 1988. FDOH, formerly Florida's Department of Health and Rehabilitative Services, discovered contamination in the wells at Southern Solvents Inc. and in the surrounding area. In response, bottled water was provided to businesses with contaminated wells and the well on the Southern Solvents Inc., site was closed. In 1989, Mortensen Engineering Inc. completed a Preliminary Contamination Assessment of the surficial aquifer on the site and of potable groundwater wells surrounding the site. This report concluded, first, that the tetrachloroethylene contamination of the on-site groundwater could only be due to the operations of Southern Solvents Inc. Second, the off-site potable groundwater was also contaminated with tetrachloroethylene and its breakdown products. The surrounding contaminated sites included Gold Cup Coffee to the north and Primat Inc., to the south. Subsequent Contamination Assessment Reports from 1991 and 1993 characterized the nature and extent of contamination of the surficial and Upper Floridian aquifers. Both contamination assessments documented the presence of tetrachloroethylene and its breakdown products, trichloroethylene and 1,2-dichloroethylene, in both on-site and off-site groundwater. The contamination of the well at Gold Cup Coffee was unusual since this business is north of Southern Solvents Inc., and therefore, up-gradient to the predicted direction of groundwater flow. The contamination of the well at Gold Cup Coffee is presumably due to the pumping of area supply wells which may influence the direction of local groundwater flow. More details on the nature and extent of contamination are given in Section 4.0. In 1998, Bechtel Engineering Inc., under EPA contract, completed a Remedial Investigation and further characterized the vertical and horizontal extent of contamination on the Southern Solvents Inc., site (Bechtel Engineering Inc., 1998).

3.2 Site visit - On October 19, 1999, Davis Daiker and Randy Merchant, with the FDOH, Bureau of Environmental Epidemiology, visited the site. They observed the Southern Solvents Inc., site on the north side of Linebaugh Avenue, just west of Gunn Highway. They also toured the surrounding areas. The only entrance to the property is from Linebaugh Avenue. They observed little on the site to attract trespassers. The metal office/building is on the west side of the site. The remainder of the site is unpaved. AAA Diversified Services, a commercial painting company, uses the property for office operations, parking, and storage of paint and equipment (Bechtel Engineering Inc., 1998). An intact 6' chain-link fence and a locked gate secure the site, therefore, unauthorized access is unlikely. As discussed previously, the area is commercialized, with few residences nearby. Mr. Daiker and Mr. Merchant observed the St. Andrew Square Town Homes approximately 200 yards south-southwest of the site. Mr. Daiker and Mr. Merchant observed no signs of children or their activities. The Amoco station east of the site is closed. Gold Cup Coffee and Express Printing continue operations.

3.3 Demographics, Land Use and Natural Resource Use

3.3.1 Demographics - Based on the 1990 census information, the area within one mile of the site contains approximately 9,000 residents (Table 1, Appendix B), with approximately 2,000 under the age of 17. Of the population, 92% were white, 5% were black, and 3% were from other racial/ethnic groups.

3.3.2 Land Use - As previously mentioned, land use in this region was originally rural, but shifted to commercial by the early 1970's. Gold Cup Coffee borders the site to the north, Express Printing to the west, West Linebaugh Avenue to the south and a closed Amoco gas station to the east. In addition, many other businesses exist in the immediate vicinity. Table 2 shows the businesses in the area. Although we did not evaluate the health risk to their employees, we have included the source of drinking water for these businesses. Most of the area businesses consume bottled water or municipal water, but many still have functioning private wells. The nearest residential area is a small development (St. Andrew Square Town Homes) approximately 200 yards south-southwest of the site. The nearest school, Carrollwood Elementary, is one mile northeast of the site. Several other schools exist in the area. However, they are more than 1.5 miles away from the site.

3.3.3 Natural Resource Use - This region of Florida has both the surficial aquifer and the Floridian aquifer. The surficial aquifer is encountered between three and six feet below the surface and extends approximately 15-35 feet. Groundwater in the surficial aquifer flows to the southwest. Beneath the surficial aquifer lies an intermediate clay layer that ranges in thickness from 10-20 feet. This clay layer is discontinuous, and therefore, allows contaminants in the surficial aquifer to migrate down to the underlying Floridian aquifer. The Floridian aquifer extends several hundred feet deep and flows to the northeast. This contrasts 1997 studies that report a southwest direction of flow. The current flow to the northeast is presumably due to the influences of area wells. Because of the poor water quality and the low flow-rate in the surficial aquifer, the Floridian aquifer is predominantly used for drinking water. However, this region of Tampa is served with Hillsborough County Water Department municipal drinking water. This municipal water is drawn from three wells in Hillsborough County and four wells in Pasco County, and therefore, should not be affected by site contamination. The 1990 census suggested there may be private residential drinking wells within a mile of the site. Although municipal water is available to the area, some private wells are still present at many nearby businesses.

4.0 DISCUSSION

Uncertainties are inherent in the public health assessment process. These uncertainties fall into four categories: 1) science is never 100% certain, 2) the inexactness of the risk assessment process, 3) the incompleteness of the information collected thus far, and 4) differences in opinion as to the implications of the information (NJDEP, 1990). These uncertainties are addressed in Public Health Assessments by using worst-case assumptions when estimating or interpreting health risks. They also incorporate uncertainties by using wide safety margins when setting health-related threshold values. The assumptions, interpretations, and recommendations made throughout this Public Health Assessment err in the direction of protecting public health.

4.1 Environmental Contamination

We used the following ATSDR standard comparison values (ATSDR 1992, 1999). These comparison values are calculated based on an exposure to a contaminated medium for at

least one year. In order of priority, the comparison values that FDOH used to select contaminants of concern at this site are:

1 CREG–Cancer Risk Evaluation Guide--is calculated from EPA's cancer slope factor and is the contaminant concentration estimated to result in no more than one excess cancer per one million persons exposed over a lifetime.

2. EMEG–Environmental Media Evaluation Guide--is derived from the ATSDR's Minimal Risk Level (MRL) using standard exposure assumptions, such as ingestion of two liters of water per day and body weight of 70 kg for adults. MRL's are estimates of daily human exposure to a chemical likely to be without an appreciable risk of noncancerous illnesses, generally for a year or longer.

3. RMEG–Reference Dose Media Evaluation Guide--is derived from EPA's Reference Dose (RfD) using standard exposure assumptions. RfDs are estimates of daily human exposure to a chemical likely to be without an appreciable risk of noncancerous illness, generally for a year or longer.

4. LTHA-- is EPA's estimate of the concentration of a drinking-water contaminant at which illnesses are not expected to occur over lifetime exposure. LTHA's provide a safety margin to protect sensitive members of the population.

We use ATSDR standard comparison values to select chemicals for further consideration, not for determining the possibility of illness. Identification of a contaminant of concern in this section does not necessarily mean that exposure will cause illness. Identification of contaminants of concern serves to narrow the focus of the public health assessment to those contaminants most important to public health. When we selected a contaminant of concern in one medium, we also reported that contaminant in all other media. We evaluate the contaminants of concern in subsequent sections and estimate whether exposure is likely to cause illness. The maximum concentrations of each contaminant of concern in each medium and the comparison value used are given in Tables 3, 4, 5 and 6 (Appendix A). When examining these tables, if a contaminant level exceeds the comparison value, we give that particular chemical further consideration in this public health assessment. However, simply exceeding the comparison value is not a predictor of illness. Based on the soil and groundwater data presented in the Remedial Investigation (Bechtel Engineering Inc., 1998), FDOH chose tetrachloroethylene, trichloroethylene, 1,2-dichloroethylene, and 1,1,1,2-tetrachloroethane as contaminants of concern.

4.1.1 On-Site Contamination - For this public health assessment, "on-site" refers to the area within the Southern Solvents Inc., property boundaries as shown in Figure 2 (Appendix A). Through extensive sampling of on-site soil, surficial aquifer groundwater and Floridian aquifer groundwater, EPA characterized the extent of on-site contamination. For this health assessment, we consider the surficial and Floridian aquifers a single source of groundwater. Recall, a semipermeable clay layer, which allows contaminants to travel from the surficial aquifer to the Floridian aquifer, separates the aquifers.

Ziegler and Mortensen (1993; 1994) initially characterized the nature and extent of the groundwater contamination in two Contamination Assessment Reports. Bechtel Engineering Inc., under an EPA contract, gathered further data in 1998 for the completion of the Remedial Investigation Report. These reports conclude that both the surficial and Floridian aquifers beneath the site contain tetrachloroethylene and its breakdown products, trichloroethylene and 1,2-dichloroethylene. Of the 18 on-site groundwater samples, 16 contained tetrachloroethylene at concentrations that exceed the ATSDR groundwater comparison value. Surficial aquifer samples taken from beneath the on-site storage area contained tetrachloroethylene concentrations, as high as 170,000 micrograms per liter (µg/L). The locations of the groundwater monitoring wells are given in Figure 3 (Appendix A). Table 5 (Appendix B) lists the contaminants detected in on-site groundwater and gives the comparison value used in determining which chemicals deserve further consideration. For the purpose of this assessment, EPA has adequately characterized the on-site groundwater.

Mortensen Engineering Inc. detected the maximum contaminant concentrations in soil below the concrete slab, the location of tetrachloroethylene storage (Mortensen, 1989). They further characterized the horizontal and vertical extent of soil contamination and identified the major soil contaminants. The most common contaminants were tetrachloroethylene and its breakdown products, trichloroethylene and 1,2-dichloroethylene. Overall, the highest levels of contamination were found around the concrete slab north of the building and at depths greater than six feet. The absence of contamination in the surface soil samples is not unexpected since these solvents tend to readily sink through soils into the underlying aquifers. Based on examination of the horizontal extent of contamination, the source of the contamination was likely the concrete storage area. The soil contamination is confined to within the site. As Table 3 (Appendix B) shows, only one top-soil sample contained tetrachloroethylene at a concentration above the ATSDR comparison value and this sample was taken from underneath the on-site building (Figure 2, Appendix A). The maximum concentration of tetrachloroethylene detected in on-site soil was 50,000,000 µg/kg (Table 4, Appendix B) from the region of tetrachloroethylene storage and more than 32 feet below the surface of the ground. For this assessment, on-site soil has been adequately characterized.

4.1.2. Off-site Contamination - For this public health assessment, we define "off-site" as the area outside the Southern Solvents Inc., property boundaries, as shown in Figure 2 (Appendix A). The Contamination Assessments (Mortensen, 1989; Ziegler and Mortensen, 1991; 1993) showed that the soil contamination was confined to within the site, thus EPA did not collect more off-site soil samples in the preparation of the Remedial Investigation (Bechtel Engineering Inc., 1998).

These assessments (Mortensen, 1989; Ziegler and Mortensen, 1991; 1993; Bechtel Engineering Inc., 1998) documented the presence of tetrachloroethylene and its breakdown products in both the surficial and Floridian aquifers off-site. Of the 26 off-site groundwater samples, ten samples contained tetrachloroethylene at a concentration above the ATSDR comparison value. In the surficial aquifer, the highest tetrachloroethylene concentration (10,000 µg/L) was detected south-southwest of the site. In the Floridian aquifer, the

maximum tetrachloroethylene concentration was 4,500 µg/L and was also detected south of the site. This is expected since groundwater in the surficial aquifer flows southward in this region. In 1998, groundwater samples collected near the St. Andrew Square Town Homes showed no tetrachloroethylene contamination. Figure 4 (Appendix A) summarizes the location of off-site groundwater samples and contamination. Table 6 (Appendix B) lists the contaminants detected in off-site groundwater, the maximum concentration detected and gives the comparison value used in determining which chemicals deserve further consideration. Following the initial discovery of contamination at Southern Solvents Inc., the Hillsborough County Health Department agreed to sample private business wells within one-quarter mile of the site annually. As of January 1999, groundwater from these wells showed no state or federal violations. For this assessment, off-site groundwater has been adequately characterized.

4.2 Quality Assurance and Quality Control

FDOH has reviewed the data and the quality assurance and quality control measures that EPA and FDEP took in the gathering of the referenced data. FDOH believes that the data is sufficient to support the conclusions made in the original documents for which the data was gathered, and the conclusions made in this document. Appropriate chain-of-custody and data reporting procedures were followed and appropriate laboratory, equipment and sample controls were analyzed. The completeness and reliability of the referenced information determine the validity of the analyses and conclusions drawn in this public health assessment.

4.3 Physical Hazards

Neither Mr. Daiker nor Mr. Merchant observed any on- or off-site physical hazards during the October 19, 1999 site visit.

4.4 Pathway Analysis

To estimate whether nearby residents have been exposed to contaminants migrating from the site, we evaluated the environmental and human components of exposure pathways. Exposure pathways consist of five elements: a source of contamination (e.g., chemical spill), transport through an environmental medium (e.g., contaminated water), a point of exposure (e.g., tap water), a route of human exposure (e.g., oral), and a susceptible population (e.g., area residents).

We eliminate an exposure pathway if at least one of the five elements is missing and will never be present. Exposure pathways that we do not eliminate are either complete or potential. With completed pathways, all five elements exist and exposure to a contaminant has occurred, is occurring, or will occur. Classification as a potential pathway occurs if at least one of five elements is missing, but may be present in the future. For both complete and potential pathways, we calculate a likely dose of each chemical of concern and use this dose in the toxicological evaluation.

4.4.1 Completed Exposure Pathways (Table 7) - The only completed exposure pathway is the consumption of contaminated water by workers from private wells on the properties of local businesses. FDOH found contaminated wells at Southern Solvents Inc., Gold Cup Coffee, the Metaphysical Academy, Leikam and Primat Inc. FDOH and ATSDR did not evaluate these pathways because worker health and safety are under the jurisdiction of the federal Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).

4.4.2. Potential Exposure Pathways (Table 8) - Two potential exposure pathways exist for this site. Both pathways are dependent on the land use changing to residential and the drilling of a potable water well. The first pathway would be complete if residential housing was constructed on-site and a well was drilled. The second potential pathway is dependent on the development of residential housing off-site and the drilling of a potable water well. Under both of these conditions, adult and child residents could be exposed to contaminated groundwater.

4.4.3. Eliminated Exposure Pathways - We eliminate contact with contaminated soil as an exposure pathway because the level of contaminants in surface soil is well below ATSDR comparison values. We also eliminate exposure of current workers on the site since exposure to surface soil is unlikely to cause illness and the on-site well in not in operation.

4.5 Public Health Implications- In this section, we calculate a dose of a chemical to which both adults and children could be exposed under all potential exposure pathways. We then review the toxicological profile for each chemical and determine if the estimated dose could be associated with a health effect. The main focus of this section is the potential health effects under future use conditions where the site is used for residential purposes.

4.5.1 Toxicological Evaluation - In this section, we discuss illnesses that could occur following exposure to individual contaminants of concern or various combinations of chemicals at this site. To help focus the analysis, ATSDR has developed Minimal Risk Levels (MRLs) for contaminants commonly found at hazardous waste sites. A MRL is a conservative estimate of daily human exposure to a contaminant below which non-cancer illnesses are unlikely to occur. The calculation of the MRL is based on both animal and human studies, when available. It is calculated very conservatively because the goal of the MRL is to protect public health. MRLs exist for each route of exposure, such as ingestion and inhalation, and for the different lengths of exposure, such as acute (less than 14 days), intermediate (15 to 364 days), and chronic (greater than 365 days). For this health assessment, we assumed people would be using the contaminated groundwater in household use over long periods. ATSDR presents these MRLs in Toxicological Profiles. These profiles are chemical-specific and provide information on health effects, environmental transport, human exposure, and regulatory status.

To apply the MRL, we estimate the daily dose for each contaminant of concern. We calculate the dose using standard assumptions of how much drinking water an adult or child consumes in a day. We calculate the number of milligrams of contaminant per day (mg/day) and then divide the amount of chemical that a person ingests by the average human body

weight giving the dose as milligrams per kilogram per day (mg/kg/day). In calculating the potential dose, we assume people are exposed to the maximum concentration measured for each contaminant in each medium. In Tables 9 and 10 (Appendix B), we summarize the maximum exposure concentrations for the contaminants of concern. These tables give the estimated doses for the contaminants of concern for each exposure pathway under future time frames. FDOH did not evaluate past or current time frame exposure pathways because exposure to area residents has not been documented. Bold lettering in these tables indicates a value that exceeds the appropriate MRL (oral vs. inhalation).

To estimate possible doses from exposure to contaminated groundwater, we made the following assumptions: (1) children between the ages of one and six ingest an average of 1 liter of water per day, (2) adults ingest an average of 2 liters of water per day, (3) children weigh an average of 15 kilograms (kg), (4) adults weigh an average of 70 kg, and (5) children and adults ingest contaminated groundwater at the maximum concentration measured for each contaminant. These values for daily water ingestion and body weight are the standard values used in this type of analysis (ATSDR, 1992; EPA, 1997). Since no completed exposure pathway was likely for contaminated soil, we did not estimate the dose via ingestion of soil or inhalation of vapors from soil.

4.5.1.1 Tetrachloroethylene - The primary route of exposure to tetrachloroethylene at this site is oral via consumption of contaminated drinking water. For adults, we also considered inhalation and dermal exposure during showering.

Tetrachloroethylene is detectable by smell at water concentrations of 300 µg/L (ATSDR, 1997a). The maximum detected groundwater concentration on-site was 170,000 µg/L, suggesting the groundwater from this area could possess the sharp, sweet odor, characteristic of tetrachloroethylene (ATSDR, 1997a).

4.5.1.1.1 Past and future, on-site and off-site exposure, commercial land use:

We did not assess the health threat to workers from exposure to contaminated groundwater. Occupational exposures are the jurisdiction of the federal Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH).

4.5.1.1.2 Future, on-site exposure to tetrachloroethylene, residential land use:

Oral exposure: Based on the maximum tetrachloroethylene concentration on-site (170,000 µg/L), the highest possible dose from drinking groundwater on this site would be approximately 11 mg/kg/day (Table 9, Appendix B). We estimated this dose for children living on-site and drinking contaminated groundwater. This dose could produce a mild developmental effect (i.e., hyperactivity) that would be apparent at adulthood (ATSDR, 1997a). This is based on a study which found adult mice were hyperactive when treated with 5 mg/kg/day tetrachloroethylene as pups (Fredericksson et al., 1993). This study was used to establish the MRL for tetrachloroethylene of 0.05 mg/kg/day. Adults under the same exposure scenario could likely receive 5 mg/kg/day of tetrachloroethylene (Table 9,

Appendix B). This dose is lower than the dose (14 mg/kg) which failed to produce a toxic effect in adult rats (Hayes et al., 1986) or adult mice (20 mg/kg/day)(Buben and O'Flaherty, 1985). In adult animal studies, doses of at least 100 mg/kg/day were required to produce mild toxicity (Buben and O'Flaherty, 1985). Therefore, under a future on-site, residential-use exposure scenario, children most likely would be the segment of the population at greatest risk of illness from oral exposure to tetrachloroethylene. It is unlikely, however, that this site would become residential because of the commercial nature of the immediate vicinity and the fact that this area is served with municipal water sources.

Inhalation exposure: Showering with contaminated water can enhance the evaporation of volatile chemicals, like tetrachloroethylene, into bathroom air and therefore, can provide a source for airborne and inhalation exposure. We estimated the potential shower air concentrations using Risk Assistant software (Hampshire Research Institute, Alexandria, VA). Showering with water containing 170,000 µg/L of tetrachloroethylene could result in an air concentration of 1,700 mg/m^3 (Table 9, Appendix B). Showering with water with the maximum tetrachloroethylene concentration would likely cause severe eye irritation, respiratory tract irritation, dizziness, loss of coordination and possibly, fainting (Carpenter, 1937; Rowe et al., 1952, ATSDR, 1997a). Beyond these short-term effects, FDOH does not anticipate showering to produce other illnesses due to the short duration of exposure.

Dermal exposure: In adults, dermal exposures totaling 3 mg/kg/day for adults and 5 mg/kg/day for children (Table 9, Appendix B) are likely to occur during showering with contaminated water. Available data suggests illnesses are unlikely from this route of exposure (ATSDR, 1997a).

4.5.1.1.3 Future, off-site exposure to tetrachloroethylene, residential land use:

Oral exposure: We evaluated the potential health effects of off-site residential exposure in case more residential areas were developed in the area and private wells were drilled for drinking water. Based on the maximum tetrachloroethylene concentration off-site (10,000 µg/L), the highest dose of tetrachloroethylene for an adult would be approximately 0.3 mg/kg/day (Table 10, Appendix B). For children living off-site, consumption of contaminated groundwater could deliver 0.7 mg/kg/day of tetrachloroethylene. Although these doses are slightly above the MRL of 0.05 mg/kg/day, we do not anticipate off-site concentrations to cause illness. These doses are almost 100 times less than the dose that caused illness in animals.

Inhalation exposure: Showering with water containing 10,000 µg/L of tetrachloroethylene could result in an air concentration of 100 mg/m^3 (Table 10, Appendix B). Based on the ATSDR toxicological profile, this air concentration could produce a mild neurological effect. Exposure to concentrations as low as 216 mg/m^3 have been associated with symptoms of dizziness and drowsiness (Rowe et al., 1952), fainting (Carpenter, 1937) and loss of coordination (Rowe et al., 1952).

Dermal exposure: In adults, dermal exposures totaling 0.2 mg/kg/day for adults and 0.3 mg/kg/day for children (Table 10, Appendix B) are likely to occur during showering with

contaminated water. Available data suggests illnesses are unlikely from this exposure route (ATSDR, 1997a).

4.5.1.1.4. Risks of Cancer from Exposure to Tetrachloroethylene:

The U.S. Department of Health and Human Services has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Based on evidence from animal studies, tetrachloroethylene is thought to be capable of causing cancer in humans. It should be emphasized, however, that currently available information is not sufficient to determine whether tetrachloroethylene causes cancer in humans (ATSDR, 1997a).

4.5.1.2. Trichloroethylene, 1,2-dichloroethylene, and 1,1,1,2-tetrachloroethane - FDOH did not consider the soil route of exposure since these contaminants were absent from the top two feet of soil.

The estimated doses from ingestion of groundwater (Tables 9 and 10, Appendix B) for each of these compounds were below their respective ATSDR oral MRL. Thus, these compounds are unlikely to cause illness following ingestion (ATSDR, 1996a; 1996b; 1997b). Shower-use of contaminated groundwater could result in air concentrations of dichloroethylene and trichloroethylene that exceed their respective ATSDR MRL. FDOH, however, does not anticipate these air concentrations to cause illness because of the (1) the estimated air concentrations that would result in relation to this site are at least 10-fold lower than the lowest concentrations shown to have an effect and (2) the duration of a shower inhalation exposure is much shorter than the typical exposure period in toxicological studies.

4.5.1.3. Mixtures- The literature on the effects of exposure to mixtures focuses on high doses and reports that doses well in excess of typical environmental concentrations are required to produce the effects associated with mixtures. Except for tetrachloroethylene, all of the contaminants associated with this site are present at levels below levels known to produce adverse health effects. Therefore, ATSDR considers the effect of mixtures of these contaminants to not be of public health concern.

4.5.2 Children and Other Unusually Susceptible Populations - The unique vulnerabilities of infants and children demand special emphasis in communities faced with the contamination of their environment. Children are at a greater risk than adults from certain kinds of exposure to hazardous substances emitted from waste sites. They are more likely to be exposed because they play outdoors and because they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors close to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care. Children are a special consideration in regards to this site because young animals are more sensitive to the behavioral effects of tetrachloroethylene and trichloroethylene. Currently the only residential development close to the tetrachloroethylene contamination is St. Andrews Square Town Homes and these residents receive county drinking water.

5.0 COMMUNITY HEALTH CONCERNS

In March 1998, EPA, Hillsborough County Health Department and the owners of local businesses met to discuss site cleanup plans. In April 1998, EPA held a meeting to inform the residents of the St. Andrew Square Town Homes of site cleanup plans. EPA posted flyers on doors to encourage attendance. Only two people attended this meeting. In November 1998, EPA conducted interviews with local officials and residents to address concerns regarding the cleanup decisions. In April 1999, EPA mailed a fact sheet presenting the conclusions of the remedial investigation to area residents and business owners. No one requested a public meeting or expressed health concerns. In September 1999, EPA mailed the proposed plan to individuals on the mailing list. Again, no one requested a public meeting or expressed health concerns.

On December 5, 2000, FDOH mailed approximately 450 fact sheets to homes within 0.5 miles of the Southern Solvents Inc., site. The purpose of the fact sheet was threefold. First, the fact sheet educated area residents about the Southern Solvents Inc., hazardous waste site and the work FDOH had done at this site. Second, the fact sheet informed nearby residents where they could obtain a copy of the draft public health assessment report. Third, the fact sheet solicited comments and concerns from nearby residents. FDOH received responses from seven residents. The following section addresses each concern that FDOH received in response to the fact sheet.

5.1 Resident Concerns-

1. "What about the water used by sprinkling systems and fire hydrants? Are people endangered by drinking or handling water from these sources?"

The City of Tampa supplies municipal water to area fire hydrants. FDOH estimates contamination from this site will not likely affect municipal water (Section 3.3.3). FDOH estimated that the concentration of the chlorinated solvents in the air that could result from sprinkler/outdoor use of contaminated water is not likely to cause illness.

2. "What exactly are the surficial aquifer and the Floridan aquifer?

An aquifer is defined as a permeable rock formation which contains recoverable amounts of water. At this site, the surficial aquifer begins several feet below the surface and extends vertically down to a semi-permeable clay layer. Since the top of the surficial aquifer is unconfined, if water levels in the aquifer increase enough, the top of the surficial aquifer can rise to the surface of the ground and result in flooding. The Floridan aquifer lies below the clay layer and is therefore, considered confined. The Floridan aquifer extends down several hundred feet and typically produces higher quality water. Section 3.3.3 gives additional details regarding these aquifers.

3. "Is there anything that can be done to neutralize the "bad" solvents in the deep soil?" "What is the solution?"

The cleanup of a hazardous waste site falls under the authority of the federal Environmental Protection Agency (EPA). EPA has considered several options to clean both the deep soil and groundwater contamination. Area residents should speak with an EPA representative in regard to the cleanup activities.

4. **"How often are the wells in this neighborhood tested? Do you think the testing should done more often?"**

Currently, the Hillsborough County Health Department tests two nearby business wells annually. Both wells have shown trace amounts of chlorinated solvents. The concentrations of none of the contaminants exceed any drinking water standards, so regular use of these wells is not likely to cause illness. More frequent testing at this time is not warranted. If in the future, the concentration of one of the contaminants exceeds its drinking water standard, then the state may consider more frequent testing or installing a filter.

5. **Several area residents asked why it has taken so long for FDOH to become involved with this site.**

FDOH became aware of this site in 1999 when EPA began considering this site to be included on their National Priorities List (NPL). In response to the finalization of the site to the NPL, FDOH began evaluating the environmental data, preparing a report, and is now informing area residents about the site. The Superfund Health Assessment and Education Program within FDOH works primarily on sites that have been placed on the NPL or are likely to be placed on the NPL.

6. **"Is it possible that the air quality in the area was or is affected?" "Does the road construction going with the widening of W. Linebaugh Ave. pose a threat of tetrachloroethylene being in the dust produced by this project?"**

FDOH does not anticipate this site to impact air quality. FDOH estimated that surface soil contained tetrachloroethylene concentrations that are unlikely to result in a hazardous air concentration. FDOH does not anticipate hazardous contaminant concentrations in the air due to the construction on W. Linebaugh Ave. These chlorinated solvents are denser than water and therefore, sink down through soil and groundwater. The distance from the source of the contamination to W. Linebaugh Ave. is far enough away such that the contamination beneath Linebaugh Ave. is well below the depth of any construction activity. In addition, FDOH estimated possible outdoor air concentrations of tetrachloroethylene from the generation of dusts. The estimated concentrations are well below the levels shown to cause any effect in humans.

7. **"Would the conclusions of FDOH change if the profile of chlorinated hydrocarbons was to change due to breakdown of tetrachloroethylene and trichloroethylene?"**

The classification of this site and the conclusions in this document would remain the same, regardless of a change in contaminants, because the classification is based on the absence of a complete exposure pathway. Therefore, FDOH classified this site as a "no apparent public health hazard". In addition, FDOH estimates that it is unlikely that a receptor population will be present in the future since the City of Tampa supplies municipal water to the immediate area. Although the conclusions would not change, FDOH would re-evaluate the toxicology section, if the profile of contaminants was to change.

8. How can FDOH classify this site "no apparent public health hazard" when the EPA has finalized this site to their National Priorities List of hazardous waste sites.

"No apparent public health hazard" and "National Priorities List" are classifications arising from two different government agencies. Each of these classifications is based on several different criteria. FDOH considers the following when classifying a hazardous waste site:

the nature, amount and location of contamination
the presence of a receptor population (i.e., area residents)
the presence of a means to expose the population (i.e., drinking water)

EPA uses different criteria in deciding which sites to add to their National Priorities List.

10. "Why would the Department of Health and Rehabilitative Services (DHRS) provide bottled water to nearby businesses with contaminated wells if there was not a health threat?"

DHRS provided bottled water to three area businesses because the wells at these businesses had at least one drinking water standard violation. If a chemical is present in drinking water at a concentration above its respective drinking water standard, FDOH prevents consumption of that chemical by either installing a filter or providing bottled water. Drinking water standards are calculated very conservatively using several safety factors. This ensures the safety of the public. FDOH has reviewed the data from these business well samples and has estimated that regular use of this water is unlikely to cause illness. In addition, these wells were not likely to be regularly used for potable water, since they are located at businesses.

11. "What is going on with the [storage] tanks and will they be removed?"

By 1991, all of the Southern Solvents Inc., storage tanks had been removed from the site. Tetrachloroethylene is no longer distributed from this site.

12. "Will the groundwater contamination appear in any other location and what is your recourse?"

The contamination in the surficial aquifer is flowing to the south, whereas the those in the Floridan aquifer are flowing northerly. The samples collected in the 1999 show the contaminants have migrated less than a tenth of a mile to the south in the surficial aquifer and northeast in the Floridan aquifer. Cleanup of the hazardous waste sites is under te authority of EPA.

13. "What action should we take and who should I contact?"

Residents using a potable well within 0.25 miles of the site should contact the Hillsborough County Health Department to arrange for testing. An approximate 0.25 mile radius is shown on Figure 5 (Appendix A). Residents should contact EPA with questions regarding cleanup.

5.2 Contact Information:

Florida Department of Health
Dr. Davis H. Daiker
Ms. Beth Copeland
877-798-2772 (toll-free)

Environmental Protection Agency
Mr. Kevin Misenheimer
404-562-8922

Hillsborough County Health Department
Mr. Jim Phillips
813-307-8015 ext. 5981

6.0 CONCLUSIONS

FDOH classifies this hazardous waste site as a "no apparent public health hazard". FDOH based this classification on the absence of clear evidence of exposures and the unlikelihood of the completion of an exposure pathway either on-site or off-site. In addition, the completion of these pathways are easily preventable since they are dependent on the residential use of contaminated groundwater. Based on the available data, we make the following conclusions:

1. On-site groundwater contains tetrachloroethylene at concentrations high enough to cause illness in children if ingested. Mild neurologic effects could be anticipated if on-site groundwater was ingested. Use of either on- or off-site groundwater for showering could generate air concentrations of tetrachloroethylene that could irritate the eyes and throat in both children and adults.

2. Oral exposure or inhalation exposure to tetrachloroethane, trichloroethylene and 1,2-dichloroethylene in groundwater are not likely to cause illness, either on-site or off-site.

3. Soil from this site is not likely to cause illness because human contact with the contaminants in soil is unlikely.

4. Employees of the area businesses where groundwater contamination (Southern Solvents Inc., Gold Cup Coffee, the Metaphysical Academy, Leikam and Primat Inc.) was found may have been exposed to tetrachloroethylene. We did not make a health evaluation for these persons in this report.

7.0 RECOMMENDATIONS

Because the only potential exposure pathways at this site involve the consumption of contaminated groundwater, the following recommendations focus on reducing the consumption of contaminated groundwater.

We can prevent the consumption of drinking water in the area of contamination by taking the following actions.

Restrict the installation of new drinking water wells within a 0.5 mile radius south of the site.

2. Discourage the consumption of groundwater from the irrigation wells in the area, which are functioning in the area.

FDOH recommends the federal Occupational Safety and Health Administration and National Institute for Occupational Safety and Health review and evaluate the potential of exposure to workers at area businesses that may have been come in contact with contaminated groundwater.

8.0 PUBLIC HEALTH ACTION PLAN

This section describes what ATSDR and/or FDOH plan to do at this site. The purpose of a Public Health Action Plan is to reduce any existing health hazards and to prevent any from occurring in the future. ATSDR and/or DOH will do the following:

1. FDOH, Bureau of Environmental Epidemiology, will inform and educate nearby residents about the potential public health threat at this site by circulating a fact sheet on tetrachloroethylene and contaminated groundwater.

2. FDOH, Bureau of Environmental Epidemiology, will offer to meet with area residents to discuss the site and the potential health hazards from the site.

3. FDOH, Bureau of Environmental Epidemiology, will encourage Southwest Florida Water Management District to restrict permits for new private drinking wells in or near the area of groundwater contamination.

4. FDOH, Bureau of Environmental Epidemiology, will continue to work with EPA and Florida Department of Environmental Protection to ensure that any site clean-up protects public health.

5. FDOH, Bureau of Environmental Epidemiology, will provide copies of this Public Health Assessment to the federal Occupational Safety and Health Administration and National Institute for Occupational Safety and Health.

The conclusions and recommendations in this report are based on the information reviewed. additional information becomes available, FDOH, Bureau of Environmental Epidemiology, if requested, will evaluate the information to determine what additional recommendations, if any, to make.

9.0 SITE TEAM/AUTHORS

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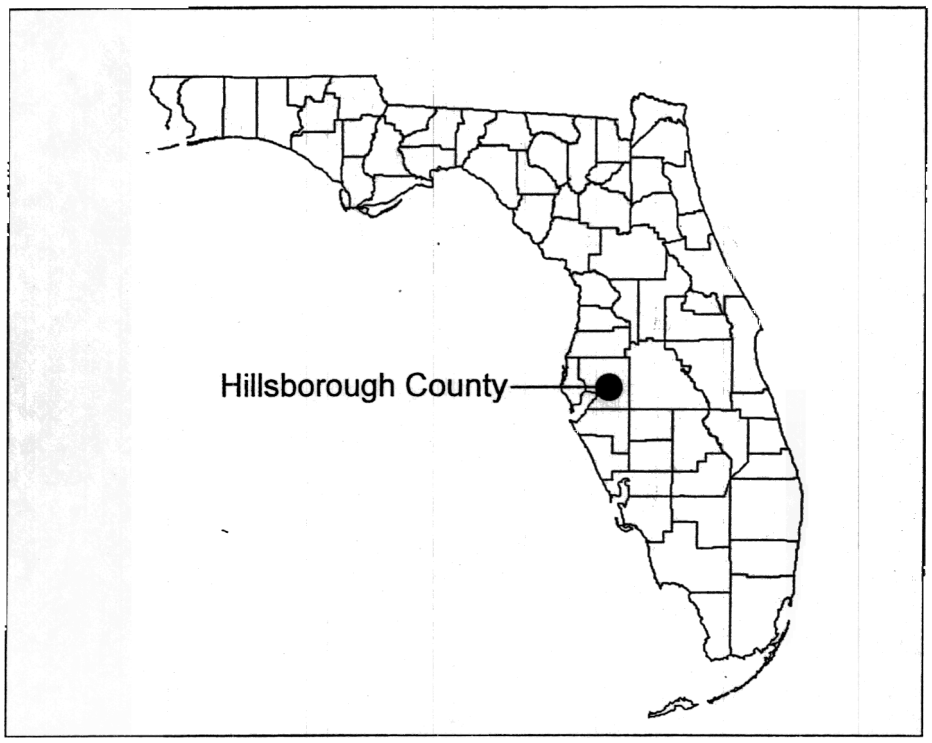
Ziegler, MD, and Mortensen, RA (1994). Mortensen Engineering Inc. Contamination Assessment Report Upper Floridan Aquifer System, Southern Solvents Inc., Site, Hillsborough County, FL. Case No. 89-0448.

APPENDIX A. FIGURES



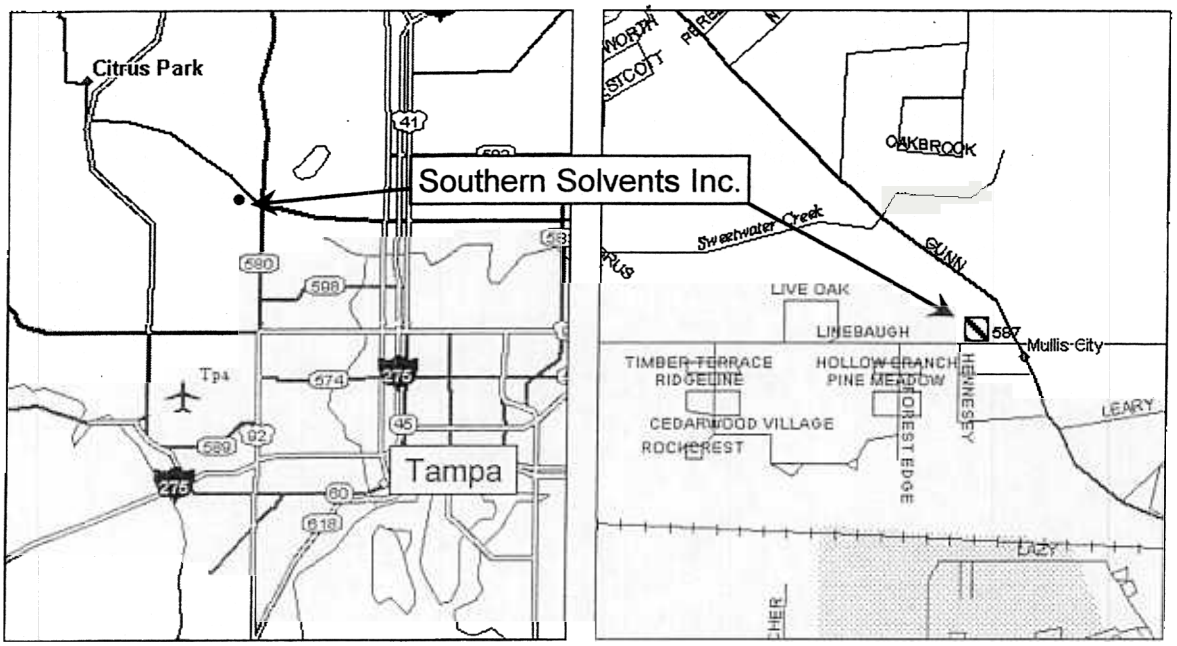


Figure 1. Site location

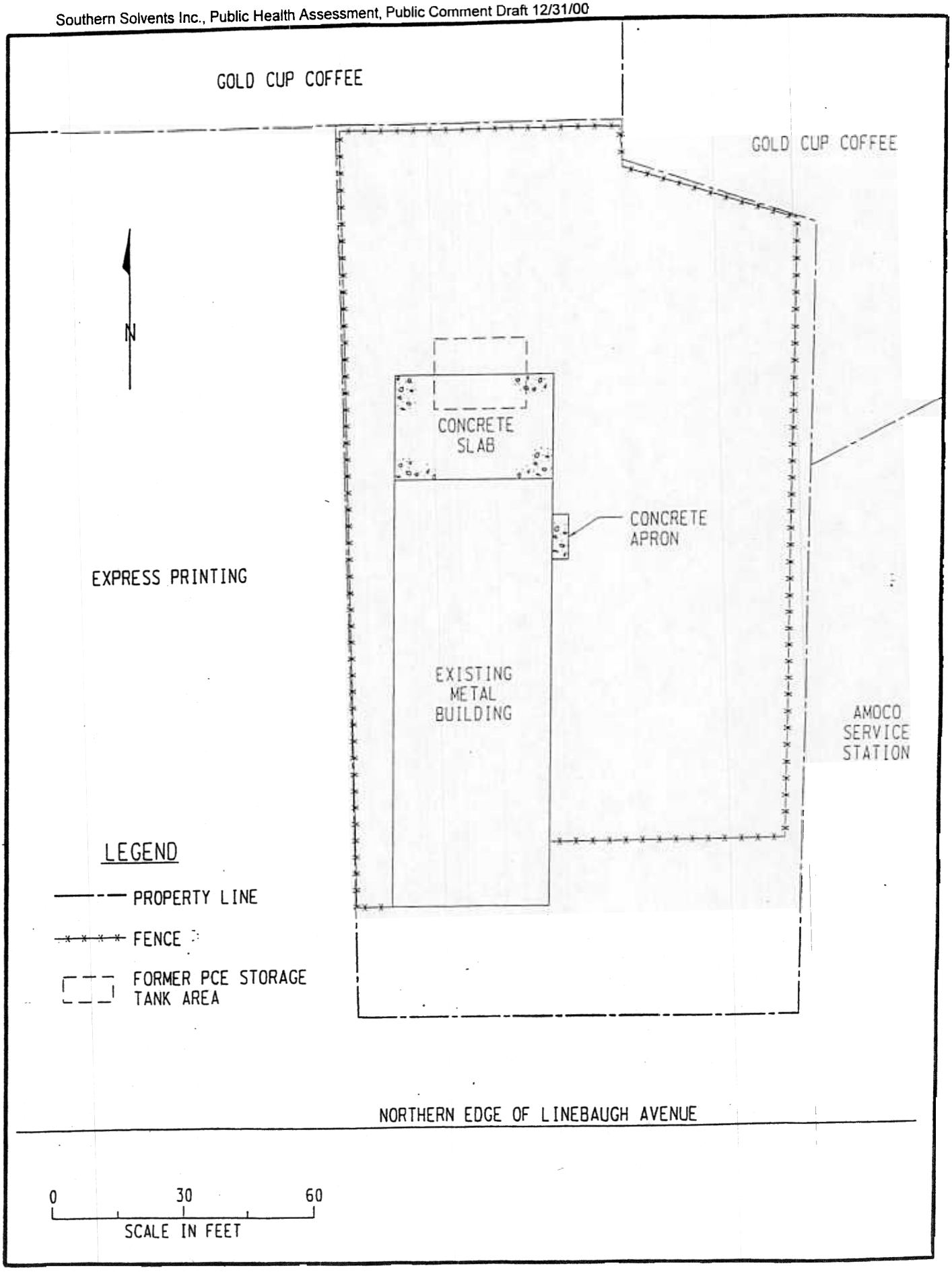


Figure 2. Site layout

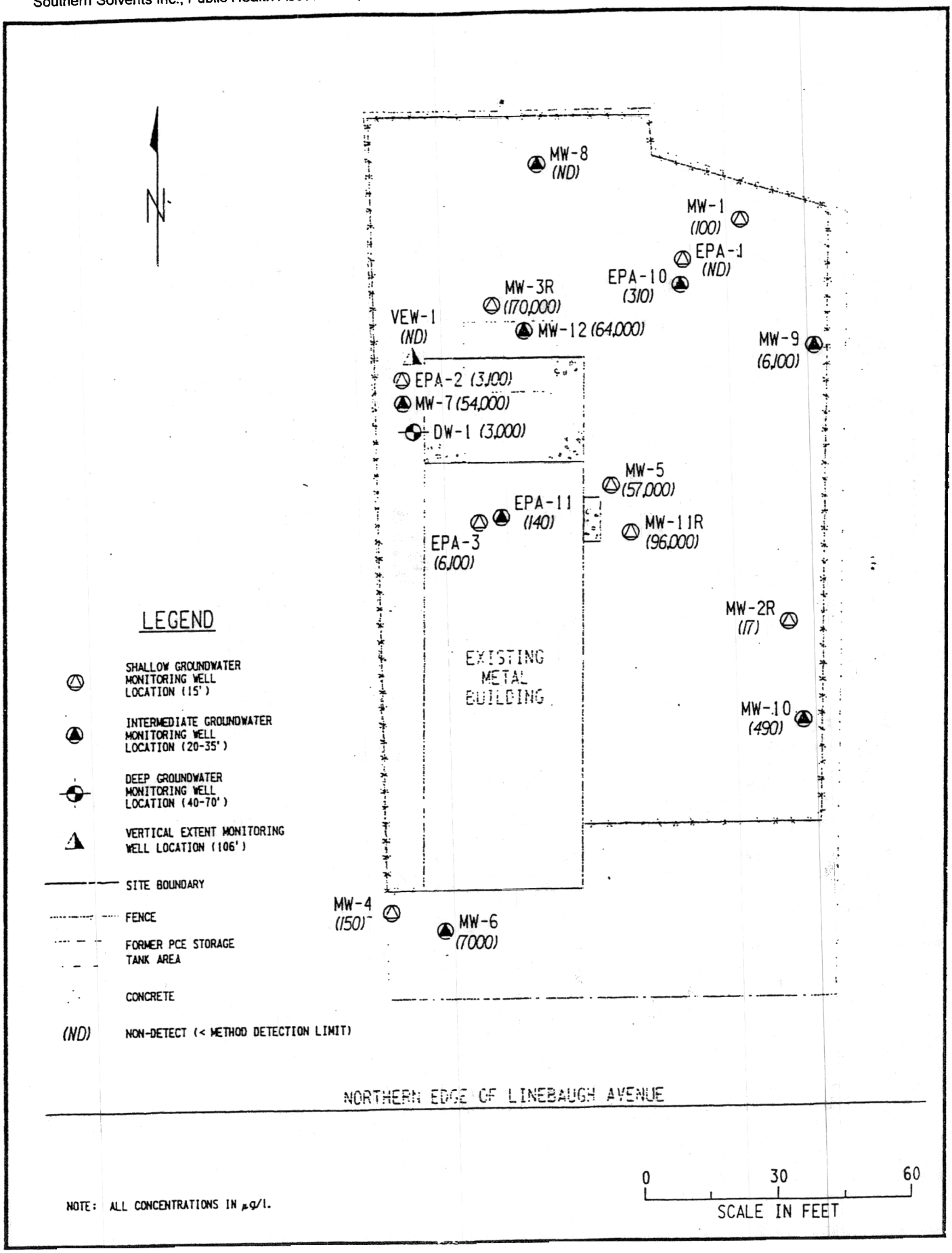


Figure 3. On-site tetrachloroethylene concentrations

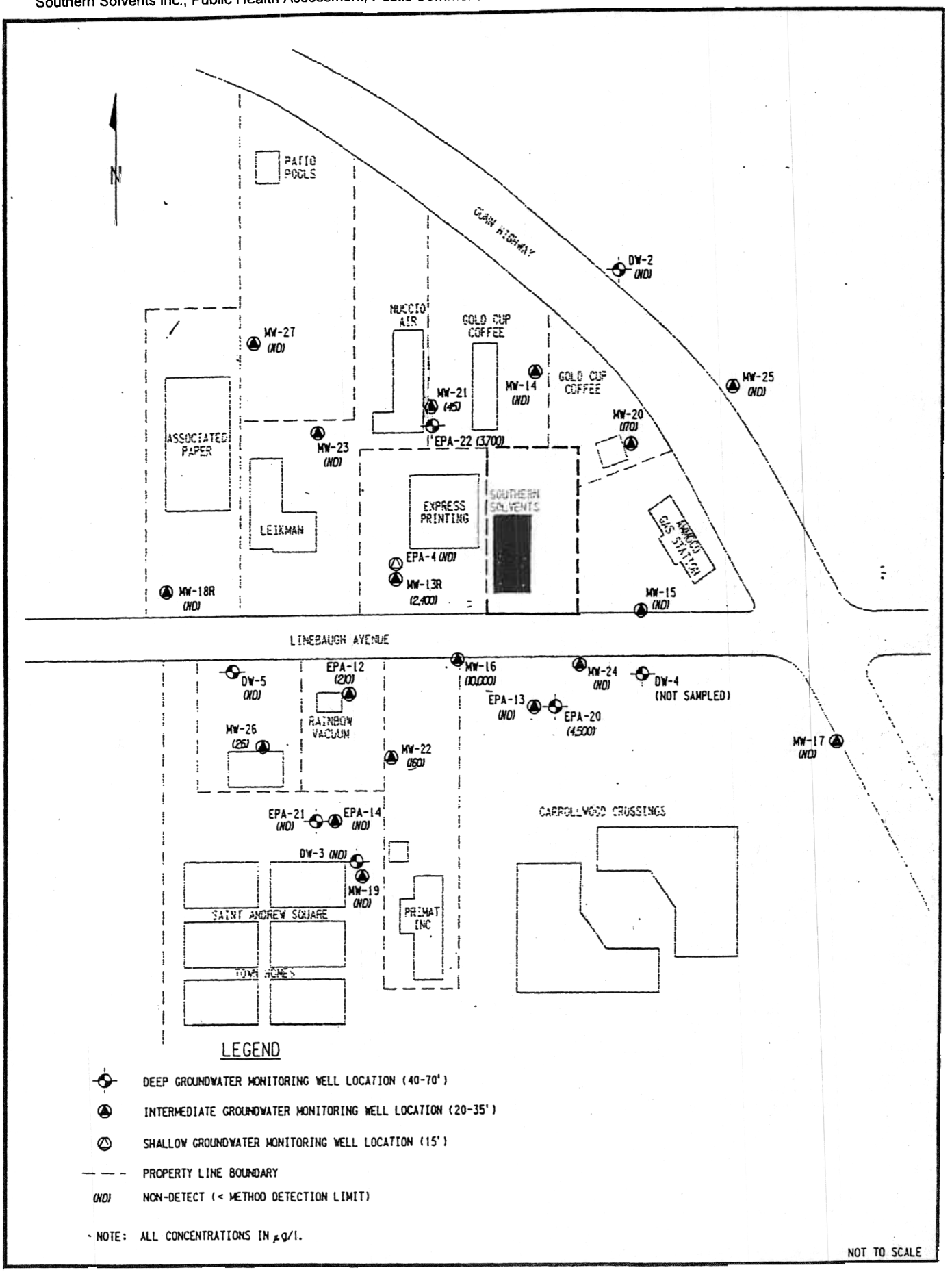


Figure 4. Off-site tetrachloroethylene groundwater concentrations

APPENDIX B. TABLES

Table 1. Total population estimates table

Pathway types	Estimated Total Population Exposed or Potentially Exposed Pathways	Minimum Population	Maximum Population
Potential Pathways On-site	5	0	1-50
Potential Pathways Off-site	9000	0	5001 - 10,000
Total Potential On- and off-site	**9005**	**0**	**5001 - 10,000**
Completed Pathways On-site	0	0	0
Completed Pathways Off-site	0	0	0
Total Completed On- and Off-site	**0**	**0**	**0**
Potential and Completed On-site	5	0	5001 - 10,000
Potential and Completed Off-site	9000	0	5001 - 10,000
Total Potential and Completed On- and Off-site	**9005**		

Table 2. Risks of exposure in surrounding businesses

Business	Directions from Southern Solvents Site[1]	Drinking Water Source[2]	Risk of Exposure to Contaminated Groundwater[3]
Dibbs Plaza	North	Private well	Definite[4]
Morgan Construction	North	Bottled water	Potential[5]
Greenacre Realty	Northwest	Bottled water	Potential
Sheppard Electric	Northwest	Bottled water	Potential
Auto Air	Northwest	Private well	Definite
Patio Pools	Northwest	Bottled water*	Potential
Nuccio Air	Northwest	Bottled water*	Potential
Gold Cup Coffee	Northeast	Bottled water	No[6]
Associated Paper and Supply	West	County water	No
Deaf Service Center	West	County water	No
Leikam	West	County water	Potential
That Florist	West	County water	No
Remax Realty- closed	Southwest	N.A.	Potential
St. Andrews Square- Town homes	Southwest	County water	No
Metaphysical Academy- closed	Southwest	N.A.	Potential
Carrollwood Crossings	South	County water	Potential
Primat Inc.	South	County water	Potential
84 Lumber	Southeast	Bottled water	Potential
Amoco- closed	East	N.A.	No
AAA Diversified Services	on-site	County water	No

[1]- Location relative to the Southern Solvents Inc., site
[2]- Water used here specifically refers to water used for drinking
[3]- Refers to the chance of exposure to contaminated groundwater
[4]- "Definite" risk refers to workers currently consuming groundwater from a private well
[5]- "Potential" risk refers to workers that have functional wells but do not use them for drinking water
[6]- "No" risk refers to residences where a functioning private well is not present
*- functioning private well is still present at business

Table 3. Maximum contaminant concentrations in near-surface soil on-site

Contaminants of Concern	Maximum Concentration[1] (µg/kg)	Sample I.D.	# Greater Than Comparison Value/ Total # of Samples	Comparison Value*	
				(µg/kg)	Source
1,2-Dichloroethylene	N.D.	---	0/11	$10x10^6$ (Ch EMEG)	ATSDR 1999
1,1,1,2-Tetrachloroethane	N.D.	---	0/11	30,000 (CREG)	ATSDR 1999
Tetrachloroethylene	15,000[1]	SB06	1/11	10,000 (CREG)	ATSDR 1999
Trichloroethylene	N.D.	---	0/11	60,000 (CREG)	ATSDR 1999

* Comparison values used to select chemicals for further scrutiny, not for determining the possibility of illness.
µg/kg = micrograms per kilogram of soil
N.D.- Not detected
[1] - Contaminant concentrations taken from Remedial Investigation (Bechtel Engineering, 1998)
Ch-EMEG- Child Environmental Media Evaluation Guide

Table 4. Maximum contaminant concentrations in subsurface soil on-site

Contaminants of Concern	Maximum Concentration[1] (µg/kg)	Sample I.D. (Depth- ft)	# Greater Than Comparison Value/ Total # of Samples	Comparison Value*	
				(µg/kg)	Source
1,2-Dichloroethylene	81	SB01 (14)	0/46	$20x10^6$ (Ch EMEG)	ATSDR 1999
1,1,1,2-Tetrachloroethane	N.D.	---	0/46	30,000 (CREG)	ATSDR 1999
Tetrachloroethylene	$50x10^6$	SB03 (32)	14/46	10,000 (CREG)	ATSDR 1999
Trichloroethylene	200	SS14 (8)	0/46	60,000 (CREG)	ATSDR 1999

* Comparison values used to select chemicals for further scrutiny, not for determining the possibility of illness.
µg/kg = micrograms per kilogram of soil
[1]- Contaminant concentrations taken from Remedial Investigation (Bechtel Engineering, 1998)
Ch-EMEG- Child Environmental Media Evaluation Guide

Table 5. Maximum contaminant concentrations in on-site groundwater (all depths)

Contaminants of Concern	Maximum Concentration[1] (µg/L)	Sample I.D.	# Greater Than Comparison Value/ Total # of Samples	Comparison Value*	
				(µg/L)	Source
1,2-Dichloroethylene	510	DW-1	3/18	70 (LTHA)	ATSDR 1999
1,1,1,2-Tetrachloroethane	600JN	MW-3R	2/18	2 (CREG)	ATSDR 1999
Tetrachloroethylene	170,000	MW-3R	16/18	0.7 (CREG)	ATSDR 1999
Trichloroethylene	1,500	DW-1	5/18	3 (CREG)	ATSDR 1999

µg/L = micrograms per liter

* Comparison values used to select chemicals for further scrutiny, not for determining the possibility of illness.

[1]- Contaminant concentrations taken from Remedial Investigation (Bechtel Engineering, 1998)

J- Estimated value

– Presumptive evidence of presence of material

Table 6. Maximum contaminant concentrations in off-site groundwater (all depths)

Contaminants of Concern	Maximum Concentration[1] (µg/L)	Well I.D.	# Greater Than Comparison Value/# of Samples	Comparison Value*	
				(µg/L)	Source
1,2- Dichloroethylene	340J	EPA-22	1/26	70 (LTHA)	ATSDR 1999
1,1,1,2-Tetrachloroethane	N.D.	---	0/26	2 (CREG)	ATSDR 1999
Tetrachloroethylene	10,000	MW-16	10/26	0.7 (CREG)	ATSDR 1999
Trichloroethylene	1,900	EPA-22	2/26	3 (CREG)	ATSDR 1999

µg/L = micrograms per liter

[1]- Contaminant concentrations taken from Remedial Investigation (Bechtel Engineering, 1998)

J- Estimated value

Table 7. Completed exposure pathway

Pathway Name	Exposure Pathway Elements					Time
	Source	Environmental/ Exposure Media	Point of Exposure	Route of Exposure	Exposed Population and land use	
On-site Groundwater	Contaminated On-Site Soil	Groundwater	On-site wells/ Tap water	Ingestion	Workers at on-site businesses	1985-1988

Worker health and safety is the jurisdiction of the federal Occupational Safety and Health Administration and the National Institute for Occupational Safety and Health.

Table 8. Potential exposure pathways

Pathway Name	Exposure Pathway Elements					Time
	Source	Environmental/ Exposure Media	Point of Exposure	Route of Exposure	Exposed Population and land use	
On-site Groundwater	Contaminated On-Site Soil	Groundwater	On-site wells/ Tap water	Ingestion, skin absorption and inhalation	On-site residents	Future
Off-site Groundwater	Contaminated On-Site Soil	Groundwater	Off-site wells/ Tap water	Ingestion, skin absorption and inhalation	Off-site residents	Future

Table 9. Calculated dose (mg/kg/day) from residential use of on-site groundwater

Contaminant of Concern (maximum concentration)	Oral MRL (mg/kg/day)	Groundwater-Ingestion (mg/kg/day)		Groundwater-Dermal (mg/kg/day)		Inhalation MRL (mg/m^3)	Groundwater-Inhalation (mg/m^3)	
		Child	Adult	Child	Adult		Child	Adult
1,2-Dichloroethylene (0.51 mg/L)	0.2	0.03	0.01	0.003	0.002	0.9	**5**	**5**
1,1,1,2 Tetrachloroethane (0.6 mg/L)	0.04	0.04	0.02	0.00006	0.00004	2.8	N.S.	N.S.
Tetrachloroethylene (170 mg/L)	0.05	**11**	**5**	5	3	0.27	**1700**	**1700**
Trichloroethylene (1.5 mg/L)	0.2	0.1	0.04	0.01	0.007	0.55	**15**	**15**

Scenario Time frame: Future
Land Use Conditions: Residential
Exposure Point: On-site tap water
Receptor Population: Residents

These doses were calculated using Risk Assistant software and accepted values for groundwater consumption, shower inhalation exposure and dermal exposure parameters (EPA, 1991). Bold text indicates an estimated dose exceeds the appropriate MRL.

N.D.- Not detected
N.A.- Not applicable
N.S.- Not significant

The above doses were calculated using the following values:

Adult body weight-	70 kg	Child body weight-	15 kg
Adult water consumption-	2 liters/day	Child water consumption-	1 liter/day
Adult shower time-	0.2 hours	Child shower time-	0.2 hours
Adult skin surface area-	$23{,}000cm^2$	Child skin surface area-	$7{,}200cm^2$

Table 10. Calculated dose (mg/kg/day) from residential use of off-site groundwater

Contaminant of Concern (maximum concentration)	Oral MRL (mg/kg/day)	Groundwater-Ingestion (mg/kg/day)		Groundwater-Dermal (mg/kg/day)		Inhalation MRL (mg/m^3)	Groundwater-Inhalation (mg/m^3)	
		Child	Adult	Child	Adult		Child	Adult
1,2-Dichloroethylene (0.34 mg/L)	0.2	0.023	0.01	0.002	0.00002	0.9	**3**	**3**
1,1,1,2 Tetrachloroethane (N.D.)	0.04	N.A.	N.A.	N.A.	N.A.	2.8	N.A.	N.A.
Tetrachloroethylene (10 mg/L)	0.05	**0.67**	**0.29**	0.3	0.2	0.27	**100**	**100**
Trichloroethylene (1.9 mg/L)	0.2	0.13	0.05	0.01	0.009	0.55	**19**	**19**

Scenario Time frame: Future
Land Use Conditions: Residential
Exposure Point: Off-site tap water
Receptor Population: Residents

These doses were calculated using Risk Assistant software and accepted values for groundwater consumption, shower inhalation exposure and dermal exposure parameters (EPA, 1991). Bold text indicates an estimated dose exceeds the appropriate MRL.

N.D.- Not detected
N.A.- Not applicable
N.S.- Not significant

The above doses were calculated using the following values:

Adult body weight-	70 kg	Child body weight-	15 kg
Adult water consumption-	2 liters/day	Child water consumption-	1 liter/day
Adult shower time-	0.2 hours	Child shower time-	0.2 hours
Adult skin surface area-	23,000cm^2	Child skin surface area-	7,200cm^2

Table 11. Summary of health effects, current or potential, associated with Southern Solvents Inc.

Contaminant of Concern	Potential Future Public Health Hazard	
	Child	Adult
1,2-Dichloroethylene	No	No
1,1,1,2 Tetrachloroethane	No	No
Tetrachloroethylene	Yes (Potential)- Developmental effects that may be apparent at adulthood from consumption of contaminated water as a child.	Yes (Potential)- Irritation of the eyes, dizziness and loss of coordination from vapors in the shower.
Trichloroethylene	No	No

The potential health effects were summarized under a future on-site residential use scenario because this scenario resulted in the greatest potential health threat.

Potential - refers to the fact that under this exposure scenario there is not a complete exposure pathway but the completion of the pathway is possible.

APPENDIX C. RISK OF ILLNESS, DOSE RESPONSE/THRESHOLD, AND UNCERTAINTY IN PUBLIC HEALTH ASSESSMENTS

Risk of Illness

In this health assessment, the risk of illness is the chance that exposure to a hazardous contaminant is associated with a harmful health effect or illness. The risk of illness is not a measure of cause and effect; only an in-depth health study can identify a cause and effect relationship. Instead, we use the risk of illness to decide if a follow-up health study is needed and to identify possible associations.

The greater the exposure to a hazardous contaminant (dose), the greater the risk of illness. The amount of a substance required to harm a person's health (toxicity) also determines the risk of illness. Exposure to a hazardous contaminant above a minimum level increases everyone's risk of illness. Only in unusual circumstances, however, do many people become ill.

Information from human studies provides the strongest evidence that exposure to a hazardous contaminant is related to a particular illness. Some of this evidence comes from doctors reporting an unusual incidence of a specific illness in exposed individuals. More formal studies compare illnesses in people with different levels of exposure. However, human information is very limited for most hazardous contaminants, and scientists must frequently depend upon data from animal studies. Hazardous contaminants associated with harmful health effects in humans are often associated with harmful health effects in other animal species. There are limits, however, in only relying on animal studies. For example, scientists have found some hazardous contaminants are associated with cancer in animals, but lack evidence of a similar association in humans. In addition, humans and animals have differing abilities to protect themselves against low levels of contaminants, and most animal studies test only the possible health effects of high exposure levels. Consequently, the possible effects on humans of low-level exposure to hazardous contaminants are uncertain when information is derived solely from animal experiments.

Dose Response/Thresholds

The focus of toxicological studies in humans or animals is identification of the relationship between exposure to different doses of a specific contaminant and the chance of having a health effect from each exposure level. This dose-response relationship provides a mathematical formula or graph that we use to estimate a person's risk of illness. The actual shape of the dose-response curve requires scientific knowledge of how a hazardous substance affects different cells in the human body. There is one important difference between the dose-response curves used to estimate the risk of non-cancer illnesses and those used to estimate the risk of cancer: the existence of a threshold dose. A threshold dose is the highest exposure dose at which there is no risk of a non-cancer illness. The dose-response curves for non-cancer illnesses include a threshold dose that is greater than zero. Scientists include a threshold dose in these models because the human body can

adjust to varying amounts of cell damage without illness. The threshold dose differs for different contaminants and different exposure routes, and we estimate it from information gathered in human and animal studies. In contrast, the dose-response curves used to estimate the risk of cancer assume there is no threshold dose (or, the cancer threshold dose is zero). This assumes a single contaminant molecule may be sufficient to cause a clinical case of cancer. This assumption is very conservative, and many scientists believe a threshold dose greater than zero also exists for the development of cancer.

Uncertainty

All risk assessments, to varying degrees, require the use of assumptions, judgements, and incomplete data. These contribute to the uncertainty of the final risk estimates. Some more important sources of uncertainty in this public health assessment include environmental sampling and analysis, exposure parameter estimates, use of modeled data, and present toxicological knowledge. These uncertainties may cause risk to be overestimated or underestimated to a different extent. Because of the uncertainties described below, this public health assessment does not represent an absolute estimate of risk to persons exposed to chemicals at or near Southern Solvents Inc.

Environmental chemistry analysis errors can arise from random errors in the sampling and analytical processes, resulting in either an over- or under-estimation of risk. We can control these errors to some extent by increasing the number of samples collected and analyzed and by sampling the same locations over several different periods. The above actions tend to minimize uncertainty contributed from random sampling errors.

There are two areas of uncertainty related to exposure parameter estimates. The first is the exposure-point concentration estimate. The second is the estimate of the total chemical exposures. In this assessment, we used maximum detected concentrations as the exposure point concentration. We believe using the maximum measured value to be appropriate because we cannot be certain of the peak contaminant concentrations, and we cannot statistically predict peak values. Nevertheless, this assumption introduces uncertainty into the risk assessment that may over- or underestimate the actual risk of illness. When selecting parameter values to estimate exposure dose, we used default assumptions and values within the ranges recommended by ATSDR or EPA. These default assumptions and values are conservative (health protective) and may contribute to the overestimation of risk of illness. Similarly, we assumed the maximum exposure period occurred regularly for each selected pathway. Both assumptions are likely to contribute to the overestimation of risk of illness.

There are also data gaps and uncertainties in the design, extrapolation, and interpretation of toxicological experimental studies. Data gaps contribute uncertainty because information is either not available or is addressed qualitatively. Moreover, the available information on the interaction among chemicals found at the site, when present, is qualitative (that is, a description instead of a number) and we cannot apply a mathematical formula to estimate the dose. These data gaps may tend to underestimate the actual risk of illness. In addition, there are great uncertainties in extrapolating from high-to-low doses, and from animal-to-

human populations. Extrapolating from animals to humans is uncertain because of the differences in the uptake, metabolism, distribution, and body organ susceptibility between different species. Human populations are also variable because of differences in genetic constitution, diet, home and occupational environment, activity patterns, and other factors. These uncertainties can result in an over- or underestimation of risk of illness. Finally, there are great uncertainties in extrapolating from high to low doses, and controversy in interpreting these results. Because the models used to estimate dose-response relationships in experimental studies are conservative, they tend to overestimate the risk. Techniques used to derive acceptable exposure levels account for such variables by using safety factors. Currently, there is much debate in the scientific community about how much we overestimate the actual risks and what the risk estimates really mean.

APPENDIX D. ATSDR PLAIN LANGUAGE GLOSSARY OF ENVIRONMENTAL HEALTH TERMS REVISED -15 DEC 99

Absorption: How a chemical enters a person's blood after the chemical has been swallowed, has come into contact with the skin, or has been breathed in.

Acute Exposure: Contact with a chemical that happens once or only for a limited period of time. ATSDR defines acute exposures as those that might last up to 14 days.

Additive Effect: A response to a chemical mixture, or combination of substances, that might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

Adverse Health Effect: A change in body function or the structures of cells that can lead to disease or health problems.

Antagonistic Effect: A response to a mixture of chemicals or combination of substances that is **less** than might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

ATSDR: The **A**gency for **T**oxic **S**ubstances and **D**isease **R**egistry. ATSDR is a federal health agency in Atlanta, Georgia that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

Background Level: An average or expected amount of a chemical in a specific environment. Or, amounts of chemicals that occur naturally in a specific environment.

Biota: Used in public health, things that humans would eat – including animals, fish and plants.

CAP: See **C**ommunity **A**ssistance **P**anel.

Cancer: A group of diseases which occur when cells in the body become abnormal and grow, or multiply, out of control

Carcinogen: Any substance shown to cause tumors or cancer in experimental studies.

CERCLA: See **C**omprehensive **E**nvironmental **R**esponse, **C**ompensation, and **L**iability **A**ct.

Chronic Exposure: A contact with a substance or chemical that happens over a long period of time. ATSDR considers exposures of more than one year to be *chronic.*

Completed Exposure Pathway: See **Exposure Pathway**.

Community Assistance Panel (CAP): A group of people from the community and health and environmental agencies who work together on issues and problems at hazardous waste sites.

Comparison Value: (CVs) Concentrations or the amount of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Comparison values are used by health assessors to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): **CERCLA** was put into place in 1980. It is also known as **Superfund**. This act concerns releases of hazardous substances into the environment, and the cleanup of these substances and hazardous waste sites. ATSDR was created by this act and is responsible for looking into the health issues related to hazardous waste sites.

Concern: A belief or worry that chemicals in the environment might cause harm to people.

Concentration: How much or the amount of a substance present in a certain amount of soil, water, air, or food.

Contaminant: See **Environmental Contaminant.**

Delayed Health Effect: A disease or injury that happens as a result of exposures that may have occurred far in the past.

Dermal Contact: A chemical getting onto your skin. (see **Route of Exposure**).

Dose: The amount of a substance to which a person may be exposed, usually on a daily basis. Dose is often explained as "amount of substance(s) per body weight per day".

Dose / Response: The relationship between the amount of exposure (dose) and the change in body function or health that result.

Duration: The amount of time (days, months, years) that a person is exposed to a chemical.

Environmental Contaminant: A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than that found in **Background Level**, or what would be expected.

Environmental Media: Usually refers to the air, water, and soil in which chemicals of interest are found. Sometimes refers to the plants and animals that are eaten by humans. **Environmental Media** is the second part of an **Exposure Pathway**.

Environmental Protection Agency (EPA): The federal agency that develops and enforces environmental laws to protect the environment and the public's health.

Epidemiology: The study of the different factors that determine how often, in how many people, and in which people will disease occur.

Exposure: Coming into contact with a chemical substance.(For the three ways people can come in contact with substances, see **Route of Exposure**.)

Exposure Assessment: The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

Exposure Pathway: A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical.

ATSDR defines an exposure pathway as having 5 parts:

1. Source of Contamination
2. Environmental Media and Transport Mechanism,
3. Point of Exposure,
4. Route of Exposure, and
5. Receptor Population.

When all 5 parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these 5 terms is defined in this Glossary.

Frequency: How often a person is exposed to a chemical over time; for example, every day, once a week, twice a month.

Hazardous Waste: Substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.

Health Effect: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

Indeterminate Public Health Hazard: The category is used in Public Health Assessment documents for sites where important information is lacking (missing or has not yet been gathered) about site-related chemical exposures.

Ingestion: Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (See **Route of Exposure**).

Inhalation: Breathing. It is a way a chemical can enter your body (See **Route of Exposure**).

LOAEL: **L**owest **O**bserved **A**dverse **E**ffect **L**evel. The lowest dose of a chemical in a study, or group of studies, that has caused harmful health effects in people or animals.

Malignancy: See **Cancer**.

MRL: **M**inimal **R**isk **L**evel. An estimate of daily human exposure – by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.

NPL: The **N**ational **P**riorities **L**ist. (Which is part of **Superfund**.) A list kept by the U.S. Environmental Protection Agency (EPA) of the most serious, uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or is being looked at to see if people can be exposed to chemicals from the site.

NOAEL: **N**o **O**bserved **A**dverse **E**ffect **L**evel. The highest dose of a chemical in a study, or group of studies, that did not cause harmful health effects in people or animals.

No Apparent Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where exposure to site-related chemicals may have occurred in the past or is still occurring but the exposures are not at levels expected to cause adverse health effects.

No Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where there is evidence of an absence of exposure to site-related chemicals.

PHA: **P**ublic **H**ealth **A**ssessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.

Plume: A line or column of air or water containing chemicals moving from the source to areas further away. A plume can be a column or clouds of smoke from a chimney or contaminated underground water sources or contaminated surface water (such as lakes, ponds and streams).

Point of Exposure: The place where someone can come into contact with a contaminated environmental medium (air, water, food or soil). For examples: the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, the location where fruits or vegetables are grown in contaminated soil, or the backyard area where someone might breathe contaminated air.

Population: A group of people living in a certain area; or the number of people in a certain area.

PRP: **P**otentially **R**esponsible **P**arty. A company, government or person that is responsible for causing the pollution at a hazardous waste site. PRP's are expected to help pay for the clean up of a site.

Public Health Assessment(s): See **PHA**.

Public Health Hazard: The category is used in PHAs for sites that have certain physical

features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.

Public Health Hazard Criteria: PHA categories given to a site which tell whether people could be harmed by conditions present at the site. Each are defined in the Glossary. The categories are:

Urgent Public Health Hazard
Public Health Hazard
Indeterminate Public Health Hazard
No Apparent Public Health Hazard
No Public Health Hazard

Receptor Population: People who live or work in the path of one or more chemicals, and who could come into contact with them (See **Exposure Pathway**).

Reference Dose (RfD): An estimate, with safety factors (see **safety factor**) built in, of the daily, life-time exposure of human populations to a possible hazard that is not likely to cause harm to the person.

Route of Exposure: The way a chemical can get into a person's body. There are three exposure routes:

- breathing (also called inhalation),
- eating or drinking (also called ingestion), and
- or getting something on the skin (also called dermal contact).

Safety Factor: Also called **Uncertainty Factor**. When scientists don't have enough information to decide if an exposure will cause harm to people, they use "safety factors" and formulas in place of the information that is not known. These factors and formulas can help determine the amount of a chemical that is not likely to cause harm to people.

SARA: The **S**uperfund **A**mendments and **R**eauthorization **A**ct in 1986 amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from chemical exposures at hazardous waste sites.

Sample Size: The number of people that are needed for a health study.

Sample: A small number of people chosen from a larger population (See **Population**).

Source (of Contamination): The place where a chemical comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an **Exposure Pathway**.

Special Populations: People who may be more sensitive to chemical exposures because of certain factors such as age, a disease they already have, occupation, sex, or certain behaviors (like cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Statistics: A branch of the math process of collecting, looking at, and summarizing data or information.

Superfund Site: See **NPL.**

Survey: A way to collect information or data from a group of people (**population**). Surveys can be done by phone, mail, or in person. ATSDR cannot do surveys of more than nine people without approval from the U.S. Department of Health and Human Services.
Synergistic effect: A health effect from an exposure to more than one chemical, where one of the chemicals worsens the effect of another chemical. The combined effect of the chemicals acting together are greater than the effects of the chemicals acting by themselves.

Toxic: Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.

Toxicology: The study of the harmful effects of chemicals on humans or animals.

Tumor: Abnormal growth of tissue or cells that have formed a lump or mass.

Uncertainty Factor: See **Safety Factor**.

Urgent Public Health Hazard: This category is used in ATSDR's Public Health Assessment documents for sites that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects and require quick intervention to stop people from being exposed.

CERTIFICATION

This Southern Solvents Inc., Site Public Health Assessment was prepared by the Florida Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health assessment was begun.

Debra Gable
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Division of Health Assessment and Consultation (DHAC)
ATSDR

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

Richard Gillig
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