Health Consultation

SCHLAGE LOCK COMPANY

ASSESSMENT OF TETRACHLORETHYLENE CONTAMINATION ON DRINKING WATER QUALITY

WIDEFIELD WATER AND SANITATION DISTRICT

1988 – 2005

SECURITY, COLORADO

EPA FACILITY ID: COD082657420

FEBRUARY 3, 2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR 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 which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR
or
Visit our Home Page at: http://www.atsdr.cdc.gov

HEALTH CONSULTATION

SCHLAGE LOCK COMPANY

ASSESSMENT OF TETRACHLORETHYLENE CONTAMINATION ON DRINKING WATER QUALITY

WIDEFIELD WATER AND SANITATION DISTRICT

1988 – 2005

SECURITY, COLORADO

EPA FACILITY ID: COD082657420

The Colorado Department of Public Health and Environment
Under cooperative agreement with the
Agency for Toxic Substances and Disease Registry

Table of Contents

Foreword ii
Summary and Statement of Issues 1
Background 1
Tetrachloroethylene 1
Site History 1
Widefield Water and Sanitation District (WWSD) 2
Demographics 3
Community Health Concerns 3
Discussion 3
Data Used 3
Evaluation Process 4
Municipal Water Data 4
Toxicological Evaluation 6
Child Health Considerations 7
Conclusions 7
Recommendations 7
Public Health Action Plan 8
References 10
Table 1: WWSD Well Data Summary 1988-2005 (Concentration in parts per billion) 11
Table 2: WWSD Maximum Well Data (when wells were in use) 12
Figure 1. Area Water Districts surrounding the Schlage Lock facility 13
Figure 2. Residential Parcel locations within Widefield Water and Sanitation District 14
Figure 3. WWSD Well Data (prior to treatment) 15
Appendix A. ATSDR's Public Health Hazard Categories 16
Certification 17

Foreword

The Colorado Department of Public Health and Environment (CDPHE) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the US Department of Health and Human Services and is the principal federal public health agency responsible for the health issues related to hazardous waste. This health consultation was prepared in accordance with the methodologies and guidelines developed by ATSDR.

The purpose of this health consultation is to identify and prevent harmful health effects resulting from exposure to hazardous substances in the environment. Health consultations focus on health issues associated with specific exposures so that the state or local department of public health can respond quickly to requests from concerned citizens or agencies regarding health information on hazardous substances. The state or local department of public health evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health. The findings in this report are relevant to conditions at the site during the time of this health consultation and should not necessarily be relied upon if site conditions or land use changes in the future.

For additional information or questions regarding the CDPHE or the contents of this health consultation, please call the health assessor who prepared this document:

Thomas Simmons

Environmental Health Studies Program

Colorado Department of Public Health and Environment

4300 Cherry Creek Drive South

Denver Colorado, 80246-1530

(303) 692-2961

FAX (303) 782-0904

Summary and Statement of Issues

In late 1987, Schlage Lock Company's manufacturing facility, located in Security, Colorado, discovered that the groundwater beneath the facility was contaminated with the chemical tetrachloroethylene, or perchloroethylene (PCE). Schlage had been utilizing the solvent for metal cleaning and degreasing operations since 1977. The contaminated groundwater beneath the facility migrated into the Widefield Aquifer, a major source of drinking water for the surrounding community. PCE was discovered in the first drinking water well in 1991 and a water quality investigation ensued. At the request of a concerned citizen and the Colorado Department of Public Health and Environment's (CDPHE) Hazardous Waste and Waste Management Division, the Department's Environmental Health Services Program (EHS) is conducting an evaluation of the cancer incidence and drinking water quality in the area impacted by the PCE plume. The purpose of this evaluation is to identify any prior, existing, or potential health impacts from exposure to PCE contaminated groundwater in the Widefield Aquifer.

A health consultation will be performed on each of the three public water supply systems that draw water from the Widefield Aquifer including Fountain, Security, and Widefield municipal water districts. Private residential wells, for which data is available, will also be addressed in a separate health consultation. In addition, a cancer incidence study, an evaluation of exposure to PCE by consuming fish from Willow Springs Ponds, and an indoor air quality consultation will be performed. This particular health consultation has been constructed for the Widefield Water and Sanitation District. The investigation of Widefield Water and Sanitation District's municipal water supply, upon which this health consultation is based, is classified as no apparent public health hazard.

Background

Tetrachloroethylene

Tetrachloroethylene is a relatively simple organic solvent, which is primarily used as a chemical intermediate in chemical production. It is also known by the names perchlorethylene (PCE), perc, or ethylene tetrachloride and will be referred to as simply PCE throughout the remainder of this document. Other common uses of PCE are in the dry-cleaning and textile production industries, where PCE serves as a cleaner or degreaser. Individuals may be exposed to PCE in a variety of ways including household chemicals, dry-cleaned clothes, occupational exposures, or environmental contaminated media. The main health outcome of concern due to PCE exposure is cancer. At the current time, PCE is classified as a Class B (potentially carcinogenic) carcinogen by the Environmental Protection Agency (EPA). However, this designation is currently under review.

Site History

Schlage Lock Company (Schlage), located at 3899 Hancock Expressway, Security, Colorado, began operations manufacturing door locks and related hardware in August 1977. From late 1977 until mid 1992, Schlage used PCE as a metal cleaner and degreaser. In mid-July 1987, Schlage discovered PCE contamination in subsurface soil on their property during excavation for plant expansion. A preliminary investigation, conducted in 1987, revealed that the PCE had leached down to groundwater beneath the site. It was later found that the contaminant had migrated into the Widefield Aquifer, the primary source of drinking water for the surrounding communities.

The plume of PCE-contaminated groundwater currently extends from the Schlage Lock facility in a west-southwest direction below the Little Johnson Reservoir, then turns and migrates south-southeast as it intersects with the Widefield Aquifer, just south of Bradley Road. The contaminant plume then travels within the Widefield Aquifer towards the Willow Springs Ponds, which is the distal extent of the PCE plume. The shape of the contaminant plume is constrained by paleo-channels in bedrock and channel deposits in the Widefield Aquifer. The overall length of the plume is approximately four and a half miles.

Following the identification of subsurface PCE contamination, a variety of remedial measures have taken place to remove and control the migration of PCE through the environment. Soil Vapor Extraction (SVE) systems were installed in two source areas at the Schlage facility in 1989 and in a third source area in 2000. In 1990, Schlage installed an on-site groundwater recovery and treatment system to treat PCE-contaminated groundwater and in 1992, they began operation of an additional system between their property and the former Little Johnson Reservoir. The treated water is discharged under a permit to the Security Water and Sanitation District sanitary sewer.

The level of PCE in the Widefield Aquifer appears to be decreasing. In 1999, maximum concentrations of PCE within the plume were over 1,000 μg/l in the vicinity of Little Johnson Reservoir, less than 100 μg/l south of Bradley Road, and less than 50 μg/l south of Fountaine Boulevard. Maximum PCE concentrations detected during the 2nd quarter of 2004 were below 800 μg/l in the vicinity of Little Johnson Reservoir, less than 50 μg/l south of Bradley Road, and less than 10 μg/l south of Fountaine Boulevard. An upgraded groundwater remediation system, described as the Bradley Road/Little Johnson Reservoir Groundwater Recovery, Treatment and Injection System, has been operating since 1999. The system is designed to halt any further movement of contaminated groundwater from the source areas into the Widefield aquifer.

Willow Springs Ponds, which are located at the distal extent of the plume, have also been found to be contaminated with PCE. In 1997, the El Paso County Parks Department closed the Willow Springs Ponds to all fishing pending further fish testing and analysis. Results of the fish analysis will be discussed in a future document.

Widefield Water and Sanitation District (WWSD)

Widefield Water and Sanitation District (WWSD) is one of three municipal water suppliers that have been affected by PCE contamination in the Widefield Aquifer. Figure 2 is a map of municipal water suppliers surrounding the Schlage facility. WWSD was formed in May 1996 after all assets were purchased from the former municipal water supplier, Widefield Homes Water District. WWSD serves approximately 18,000 consumers with raw water gathered from three major sources: Widefield Aquifer, Jimmy Hand Creek Aquifer, and Pueblo Reservoir. The Widefield Aquifer is the only water source that has been affected by PCE contamination to date. Twelve of the 17 WWSD groundwater wells are located in the Widefield Aquifer. The only WWSD wells that are not located in the Widefield Aquifer are wells JHW 1-5, which are located in the Jimmy Hand Creek Aquifer. Water is drawn from the groundwater wells, supplemented with water from Pueblo Reservoir, and then distributed to consumers.

In June of 1990, Widefield Homes submitted samples for a routine analysis of trihalomethanes (byproducts of chlorination) and discovered low levels of PCE in Boosters 1, 2, and 3. The three boosters are located in different areas of the water system and are used to "push", or boost water throughout the system. At this time, the concentration of PCE in the boosters was well below the drinking water regulation of 5 parts per billion (ppb or μg/l). This initial discovery of PCE in the water system led to increased sampling and monitoring. PCE was first identified in two drinking water wells (W-1, W-2) in 1991 and the concentration continued to increase in following years. In the past, there were three main locations of PCE contamination within the WWSD system, wells W-1, W-2, and C-1. Figure 3 is a plot of PCE concentration in wells W-1, W-2, and C-1 over time. In more recent years, other wells within the WWSD system were also found to contain low levels of PCE. Typically, the contaminated wells were taken offline before the level of PCE exceeded the maximum contaminant level (MCL) of 5 ppb. A complete discussion of well usage and contamination levels will follow in the "Municipal Well Data" subsection of this document.

Demographics

WWSD serves over 18,000 customers with approximately 5900 water taps. The median age of the population is slightly lower than the national average at 33.6 years of age. Approximately 6.9% of the population is under the age of 5 and 9.2% is over the age of 65. Although, the number of children is slightly higher than the national average, no special demographic considerations exist. Steady population growth is expected during the period of 2000-2010 (Census 2000). Figure 2 is a depiction of residential parcel locations within the WWSD. This figure shows that the majority of the population resides within the central-south eastern portion of the district. Wells in Widefield Aquifer are also located in the same region, indicating that a substantial portion of the district is potentially affected by contamination of the aquifer.

Community Health Concerns

Community health concerns have been solicited and documented in the "Community Involvement and Health Issues Communication Plan" (CDPHE 2004). The primary health concern within the community from exposure to PCE is cancer. Cancer incidence will specifically be addressed in a future document. The intent of this health consultation is to evaluate any potential adverse health effect, including cancer, from drinking WWSD municipal water.

Discussion

Data Used

A variety of data sources were utilized in this assessment of PCE contamination within the WWSD water system. This includes water quality data, historical information, as well as anecdotal evidence regarding water use patterns. All available water quality data for the years of 1988 through the first quarter 2005 was reviewed for this evaluation. Sampling data was gathered from three major sources: the Colorado Department of Public Health and Environment's (CDPHE) Water Quality Control Division, quarterly sampling records provided by Schlage Lock's Environmental Contractors, and sampling data from WWSD. Historical data including regulatory activities, installation of water treatment units, and usage patterns, was

primarily gathered from CDPHE's Hazardous Waste and Waste Management Division's Records Center. Operational and other pertinent information was provided through personal communication with WWSD Senior Manager, Larry Bishop I.

The data set compiled for this assessment combined all available data on the WWSD water system. The only data that was excluded from this assessment is data sheets that were compiled by Wheeler and Associates Ltd. No laboratory deliverables were available on this data set. In addition, the data set could generally not be corroborated or verified with other data, which had laboratory deliverables available. Therefore, this data set was omitted from the assessment.

Evaluation Process

Water quality data from all sources was compiled and analyzed for this assessment. Summary statistics for WWSD well data are available in table 1. This table only includes well data from which there is some evidence of PCE contamination. Table 2 lists the maximum PCE concentration in WWSD wells while the wells were in use.

The water quality data is screened against health-conservative environmental guidelines, under which no adverse health effects are expected. In this case, the most stringent Comparison Value (CV), or screening guideline, is 5 parts per billion (ppb) for PCE. This value is equivalent to the MCL (drinking water regulation). If a sample exceeds the screening guideline, it is examined in greater detail to determine the probability of exposure. Exceeding the CV at this point is not necessarily deemed a health risk. It only means that the pathway must be investigated in greater detail. If the exposure scenario is defined and credible, exposure doses are calculated and compared to health-based guidelines to determine if a potential health hazard exists.

It should also be noted that the conclusions made in this health consultation are solely based on the combined, available data. When data gaps exist, it is difficult to reach a valid conclusion. In this situation, the available information is reviewed in detail and the most appropriate public health hazard classification is assigned. Additional information on ATSDR's public health hazard categories can be found in Appendix A.

Municipal Water Data

The water quality data indicates that the first reliable evidence of PCE contamination within the Widefield water system occurred in June of 1990 in Boosters 1, 2, and 3. The levels of PCE at this time were below the MCL, with the maximum reported concentration of 1.431 ppb. Booster samples were taken again in August 1990 and were found to have either trace amounts of PCE (0.5-1 ppb) or were below the detection level of the analytical method. Later in January 1991, PCE was identified in two drinking water wells (W-1 and W-2) again at a level below the MCL, but approaching 2 ppb. The samples were confirmed and the Colorado Department of Health classified the water system as vulnerable to PCE contamination. In the State of Colorado, water systems vulnerable to PCE contamination must do quarterly sampling for a period of 3 years. In 1996, Schlage took the lead in sampling and was developing quarterly reports of all activity within the Widefield Aquifer.

The increased monitoring of wells W-1 and W-2 showed that the level of PCE within the wells continued to rise in the following months, but remained below the MCL of 5 ppb. In May 1992, the concentration of PCE in well W-2 reached 4.7 ppb and both wells were shut down. The wells remained offline until a granular activated charcoal (GAC) filtration unit could be installed in January 1996. Wells W-1 and W-2 were then returned to service. Since that time, the wells and the GAC treatment units have been continually monitored to ensure that PCE is successfully removed from the water prior to distribution. At times, the wells were taken offline until service could be performed to restore proper operation. However, there is no evidence to suggest that water consumers were delivered water above the MCL from wells W-1 and W-2.

In June of 1992, PCE contamination was also found in well C-1 at a concentration of 2 ppb. The PCE concentration of this well continued to increase in the following months and was shut down before it reached the MCL in December 1993. Well C-1 remained out of service until an air stripper treatment unit was installed in December 1995. After the installation of the treatment unit, the efficiency of the air stripper was tested and the well was returned to service. Sampling from this well both before and after treatment has been available since 1996. This well was also taken offline at times for service and there is no evidence to suggest exposures over the MCL of 5 ppb. Well C-1 data is denoted as C1B and C1A in table1 indicating the samples taken before (C1B) and after (C1A) treatment with the air stripper unit.

PCE in well C-3 was initially documented in May of 1993 at 1 ppb. However, 10 samples that were collected through November 1994 were either not detected or were below the detection level of the analytical method. As such, no other samples were taken until August of 1997. Again, PCE was not detected in the well. A data gap on this well exists from August 1997-September 2000 when the PCE concentration was reported at 5.9 ppb in a composite sample of well C-3 and well JHW-1. Well JHW-1 is located in a separate, unaffected aquifer and has never shown PCE contamination (with the exception of this sample) throughout the time period analyzed in this health consultation. Therefore, the actual concentration of PCE in well C-3 was most likely higher than 5.9 ppb because of dilution from the JHW-1 water. The well was immediately taken offline after the discovery of contamination. However, it is possible that some exposure to PCE occurred at a level over the MCL in the time period of August 1997 through September 2000.

Well C-3 has been monitored regularly since September 2000. Levels of PCE in this well continued to fluctuate in the following years with a maximum reported concentration of 7.6 ppb during 2000-2005. During this time, the well was removed from service on each occasion before the concentration of PCE reached the MCL. No treatment unit is currently installed on well C-3.

Three other Widefield wells have also shown evidence of PCE contamination, wells C-2, W-5, and W-6. Well C-2 surpassed the MCL in December 1993 at 5.3 ppb. However, this well has not been used in the distribution system since 1985. Well W-5 exceeded the MCL in 2001, but it is not connected to the distribution system. And well W-6 has been out of service since 1980 (Bishop 2005). No other WWSD water sources have been shown to contain PCE at levels of concern.

Toxicological Evaluation

The lowest observed adverse effect level of PCE from experimental animal data is 5mg/kg/day for an acute exposure time (14 days or less). The cancer effect level in mice was reported at 386 mg/kg/day for chronic exposure. CDPHE's Environmental Epidemiology Section has adopted (from EPA Region 9 PRG) an interim oral cancer slope factor of 0.54 /mg/kg/day, which represents the excess cancer risk on the 1 in 1,000,000 scale. In addition, an oral reference dose of 0.01 mg/kg/day has been established by the EPA and ATSDR's minimal risk level for non-carcinogenic effects is 0.05 mg/kg/day.

In comparison to these values, an adult exposure dose of 0.0001 mg/kg/day is expected from daily consumption of drinking water with a concentration of 5 ppb. The children's estimated drinking water dose from daily consumption of water containing 5 ppb PCE is 0.0005 mg/kg/day. These estimations are based on consumption of 2 L of water per day for the average weight adult or child over a lifetime. Under the same conditions, a concentration of 100 ppb PCE is required for the estimated drinking water dose of children to equal the most conservative health based guideline (for non-carcinogenic effects) of 0.01 mg/kg/day (EPA Rfd). For adults, the concentration must be increased to 350 ppb PCE under the same assumptions. PCE concentrations of this magnitude have never been reported in any WWSD wells either before or after treatment. The highest concentration of PCE ever reported within the WWSD was 64 ppb (well W-1, Jan. 1994). However, this well was out of service from May of 1992 through January 1996.

The cancer risk estimation, using the interim oral cancer slope factor and the aforementioned estimated exposure dose, initially seems to indicate an unacceptable cancer risk. However, the estimated exposure dose from above is based upon a lifetime (70+ years) of drinking water at the maximum contaminant level of 5 ppb PCE. When the estimated exposure dose is adjusted to a more reasonable length of time (20 years), the cancer risk falls within an acceptable range. The 20 year estimated exposure doses are equal to 0.00004 mg/kg/day for adults and 0.00009 mg/kg/day for children. The corresponding increase in cancer risk is 20 cases/ 1,000,000 individuals and 50 cases/1,000,000 individuals, respectively. Twenty years of exposure would account for a duration of exposure from the first indication of PCE contamination in the WWSD water system (June 1990) to 5 years into the future. In addition, the concentration used in this calculation remained at 5 ppb of PCE. It is possible that some exposures over a concentration of 5 ppb have occurred in the water system. However, these exposures would be counteracted by years of exposure when PCE was undetectable in the water system. Assuming a concentration of 5 ppb PCE for the dose calculation is conservative and at this level, the cancer risk is within an acceptable range.

Based on these findings, WWSD consumers have not been exposed to PCE at a level of significant concern in regards to adverse health effects. With the exception of well C-3 in September 2000, all wells that were identified as having PCE contamination were taken out of service before the concentration exceeded the MCL of 5 ppb. Treatment units were then installed and the wells were returned to service. No adverse health effects are expected from drinking water exposures to less than 5 ppb. In the case of well C-3, a 3 year data gap exists that makes it

impossible to determine the concentration of PCE during this time. However, it is highly unlikely that the concentration of PCE during this time reached a level of significant concern in terms of adverse health effects. Furthermore, WWSD supplements their well water with water from the unaffected Pueblo Reservoir. On average, this occurs at a 50/50 ratio (50% well water/ 50% Pueblo water). Therefore, the levels of *exposure* to PCE from the aforementioned wells are actually lower than the concentration within the individual wells due to dilution.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

The data in this assessment of the Widefield Water and Sanitation District does not indicate any increased risk of adverse health effects for children.

Conclusions

Individuals who consume water from the Widefield Water and Sanitation District have been exposed to low levels of tetrachloroethylene (PCE) from 1990-present. This level of PCE exposure is not likely to cause any increased risk of adverse health effects. Prior to 1990, there is no evidence to suggest that well concentrations exceeded the Maximum Contaminant Level (MCL) for PCE of 5 ppb. Since January of 1991, the concentration of PCE within the WWSD system has been continually monitored. In one instance (well C-3, Sept. 2000), the MCL was exceeded, but it is unlikely that the concentration reached a level of significant concern. In addition, well water is diluted by the addition of surface water from the Pueblo Reservoir.

PCE concentration within the Widefield Aquifer is not expected to increase in the future due to the remedial activities currently underway. Therefore, PCE contamination within the WWSD water system had been classified as no apparent public health hazard for past, current, and future exposures. Please see Appendix A for additional information on ATSDR Public Health Hazard Categories.

Recommendations

Based on these conclusions, the Colorado Department of Public Health and Environment's Environmental Health Studies Program (EHS) suggests the following recommendations:

- Continue quarterly monitoring of groundwater from WWSD wells to ensure that the municipal drinking water supply complies with state drinking water standards. In

particular, well C-3 should be monitored on a regular basis and a treatment unit should be installed if the levels of PCE continue to increase.

- The EHS program will review any additional environmental sampling data for municipal water wells as data becomes available at the request of local officials and Security-Widefield residents.

- Continue regulatory oversight of the PCE plume by the CDPHE Hazardous Materials Waste Management Division until the plume has been removed or remedied.

- WWSD consumers, who are concerned with low level exposure to PCE below the regulatory standards, should consider installing home GAC filtration units. GAC filters come in variety of sizes from tap units to whole house units. A complete list of NSF-approved PCE filtration units can be obtained at http://www.nsf.org/business/search_listings/index.asp.

Public Health Action Plan

The public health action plan describes the actions designed to mitigate or prevent adverse human health effects that might result from exposure to hazardous substances associated with site contamination. EHS commits to do the following public health actions related to the Widefield Water and Sanitation District municipal water supply:

- Review any additional environmental sampling data for the WWSD municipal water supply as data becomes available at the request of local officials and Security-Widefield residents.
- Evaluate environmental sampling data for other municipal water supplies affected by the PCE groundwater plume and publish the evaluations in future health consultations.
- Evaluate environmental sampling data for private residential wells affected by the PCE groundwater plume and publish the evaluation in a future health consultation.
- Evaluate environmental sampling data and fish data for the Willow Springs ponds in a future health consultation.
- Evaluate cancer incidence data in a future health consultation to address community concerns about cancer.
- Evaluate the available indoor air data and publish the outcome in a future health consultation.

Preparers of Report:

Thomas Simmons
Physical Scientist
Environmental Health Studies
Colorado Dept. of Public Health and Environment
Phone: 303-692-2961
Fax: 303-782-0904

Margaret Schonbeck
Physical Scientist Research Scientist
Program Manager, Environmental Health Studies/Colorado Responds to Children with Special Needs (CRCSN)
Colorado Dept. of Public Health and Environment
Phone: 303-692-2636
Fax: 303-782-0904

ATSDR Designated Reviewer:

Jennifer Freed
Technical Project Officer
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

References

Agency for Toxic Substances and Disease Registry. ATSDR public health assessment guidance manual. Atlanta: US Department of Health and Human Services; Updated Jan. 2005. Accessible at: http://www.atsdr.cdc.gov/HAC/PHAManual/toc.html

Agency for Toxic Substances and Disease Registry. Toxicological profile for Tetrachloroethylene. Atlanta: US Department of Health and Human Services; September 1997. Accessible at: http://www.atsdr.cdc.gov/toxprofiles/tp18.html

Agency for Toxic Substances and Disease Registry. Drinking water comparison values. Atlanta: US Department of Health and Human Services; 2005.

Bishop, Larry Sr. Widefield Water and Sanitation District Manager. Personal Interview; June 20, 2005.

Bishop, Larry Sr. Widefield Water and Sanitation District Manager. Email communication; August 9, 2005.

Bishop, Larry Sr. Widefield Water and Sanitation District Manager. Email communication; October 10, 2005.

Colorado Dept. of Public Health and Environment, Water Quality Control Division. Water Quality data 1988-2004.

Colorado Dept. of Public Health and Environment, Environmental Health Studies Program. "Health Issues Communication Plan, Security-Widefield Site" (June 2004).

Environmental Consulting Strategies. Schlage Lock Quarterly and Annual Summaries; 2000-2005.

Treadwell and Rollo, Inc. Schlage Lock Quarterly and Annual Summaries; 1996-2000.

U.S. Census Bureau. Summary Statistics of Widefield-Security, Colorado; 2000. Accessible at: http://factfinder.census.gov/servlet/SAFFFacts?_event=&geo_id=16000US0868847&_geoContext=01000US%7C04000US08%7C16000US0868847&_street=&_county=Widefield&_cityTown=Widefield&_state=04000US08&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=160

U.S. Environmental Protection Agency. Integrated Risk Information System, Tetrachloroethylene. Last updated 1988. Accessible at: http://www.epa.gov/iris/subst/0106.htm

Table 1: WWSD Well Data Summary 1988-2005 (Concentration in parts per billion)

Sampling Year	W-1	W2	GAC1P3	GAC2P3	W3	W5	W6	C1B	C1A	C2	C3	C36	E2	B1	B2	B3
1988 Max	BDL	BDL			BDL			BDL			BDL	BDL	1.94			
1988 Min	BDL	BDL			BDL			BDL			BDL	BDL	1.94			
1988 Mean	BDL	BDL			BDL			BDL			BDL	BDL	1.94			
1988 (n)	***2***	***2***			***1***			***1***			***1***	***1***	***1***			
1989 Max								BDL								
1989 Min								BDL								
1989 Mean								BDL								
1989 (n)								***1***								
1990 Max														1.378	1.38	1.431
1990 Min														0.75	BDL	BDL
1990 Mean														1.06	0.82	0.84
1990 (n)														***2***	***2***	***2***
1991 Max	2.96	2.7			2.87									3.33	1.32	1.34
1991 Min	BDL	BDL			2.87									1.29	BDL	BDL
1991 Mean	1.32	1.29			2.87									2.31	0.8	0.8
1991 (n)	***4***	***4***			***1***									***2***	***2***	***2***
1992 Max	7.6	7			BDL			2		2.6	BDL	BDL				
1992 Min	2.4	3.71			BDL			0.826 J		1	BDL	BDL				
1992 Mean	4.7	6			BDL			1.35		1.8	BDL	BDL				
1992 (n)	***5***	***6***			***1***			***3***		***4***	***1***	***1***				
1993 Max	9.7	17.6			BDL			5.13		5.3	1	BDL	BDL			
1993 Min	0.8 JX	6.4			BDL			0.13 J		2.3	0.2 J	BDL	BDL			
1993 Mean	6.3	12.5			BDL			1.81		3.7	0.6	BDL	BDL			
1993 (n)	***9***	***7***			***5***			***7***		***6***	***2***	***4***	***5***			
1994 Max	64	36.5			0.3			6.3		6.3	0.3	BDL	BDL			
1994 Min	BDL	BDL			0.1 J			BDL		BDL	BDL	BDL	0.1 J			
1994 Mean	21	21.1			BDL			2.6		3.9	BDL	BDL	BDL			
1994 (n)	***9***	***10***			***9***			***5***		***6***	***9***	***7***	***8***			
1995 Max	29	48.3			BDL		BDL	BDL		15.3		BDL	BDL			
1995 Min	9.9	19			BDL		BDL	BDL		15.3		BDL	BDL			
1995 Mean	16	33			BDL		BDL	BDL		15.3		BDL	BDL			
1995 (n)	***7***	***8***			***8***		***1***	***1***		***1***		***5***	***8***			
1996 Max	28	39	BDL	BDL	BDL			8.1	1.9				BDL			
1996 Min	16	22	BDL	BDL	BDL			6.3	1.68				BDL			
1996 Mean	22	31	BDL	BDL	BDL			7.2	1.79				BDL			
1996 (n)	***11***	***10***	***8***	***7***	***5***			***2***	***2***				***1***			
1997 Max	30.4	40.1	BDL	BDL	BDL			17.4	3.9	12	BDL	BDL	BDL			
1997 Min	15.3	25.3	BDL	BDL	BDL			2.3	3.79	9.5	BDL	BDL	BDL			
1997 Mean	22.9	30.7	BDL	BDL	BDL			11.9	3.85	10.8	BDL	BDL	BDL			
1997 (n)	***13***	***17***	***6***	***5***	***2***			***4***	***2***	***2***	***1***	***1***	***1***			
1998 Max	24	39						17.4	6.32							
1998 Min	17.7	15.9						9.6	0.71							
1998 Mean	21	24						13.2	3.03							
1998 (n)	***9***	***6***						***6***	***6***							
1999 Max	28.8	29.9	BDL	BDL				15	3.4							
1999 Min	19.7	21.1	BDL	BDL				11	1.63							
1999 Mean	24.1	24.4	BDL	BDL				12.7	2.7							
1999 (n)	***12***	***10***	***4***	***4***				***11***	***15***							
2000 Max	30	34	BDL	BDL	0.63	2	14	13	2.7	15	7.6	BDL	0.74			
2000 Min	17.5	21	BDL	BDL	BDL	BDL	14	6.2	0.63	15	5.9	BDL	0.74			
2000 Mean	23	28	BDL	BDL	BDL	0.83	14	9.3	1.55	15	6.8	BDL	0.74			
2000 (n)	***3***	***8***	***10***	***8***	***4***	***3***	***1***	***9***	***12***	***1***	***2***	***1***	***1***			
2001 Max	30	26	8.5	4.5	0.63	5.4		12	2.5	15	4.2	0.5	BDL			
2001 Min	20	14	BDL	BDL	BDL	0.5		6.7	0.87	15	1.4	BDL	BDL			
2001 Mean	24	20	0.9	0.7	0.43	2.1		9.1	1.6	15	2.4	0.4	BDL			
2001 (n)	***12***	***12***	***15***	***13***		***4***		***10***	***18***	***1***	***7***	***2***	***1***			
2002 Max	20	15	BDL	BDL		1		9.1	1.8							
2002 Min	14	4.1	BDL	BDL		0.5		2.5	BDL							
2002 Mean	17	9.5	BDL	BDL		0.8		5.1	0.9							
2002 (n)	***12***	***12***	***14***	***14***		***2***		***8***	***8***							
2003 Max	16	14	BDL	BDL	BDL			5.5	1.1	12	2.3	1				
2003 Min	4.8	7.4	BDL	BDL	BDL			3.5	BDL	8.2	0.96	1				
2003 Mean	10.5	10.8	BDL	BDL	BDL			4.5	0.8	10.4	1.6	1				
2003 (n)	***12***	***11***	***14***	***14***	***3***			***11***	***20***	***3***	***2***	***1***				
2004 Max	13	13	1	BDL				6	0.73		2.3					
2004 Min	5.4	8.3	BDL	BDL				3.8	BDL		2.3					
2004 Mean	9.3	10.7	0.4	BDL				4.8	0.59		2.3					
2004 (n)	***12***	***9***	***4***	***4***				***11***	***11***		***1***					
2005 Max*	6.6	11	BDL	BDL				5.9	2.1		1.6					
2005 Min*	5.8	8.9	BDL	BDL				4.3	0.86 J		1.3					
2005 Mean*	6.3	10.3	BDL	BDL				5.3	1.4		1.4					
2005 (n)*	***3***	***11***	***3***	***3***				***3***	***3***		***3***					

Table 1 (cont.)

GAC 1 or 2, P3: Granular activated charcoal filter 1 or 2, sampling port 3. GAC units are installed on wells W-1 and W-2
C1B and C1A: Well C-1 before air stripper (C1B) and Well C-1 after treatment with air stripper (C1A)
BDL: Below Detection Level of the Analytical Method. BDL is numerically equivalent to 0.25 ppb where necessary
PCE concentrations above the Maximum Contaminant Level (5 ppb)
GAC 1 and 2, Port 4 data utilized. Sampling data from port 3 unavailable

Table 2: WWSD Maximum Well Data (when wells were in use)

WWSD well	Maximum PCE Concentration **
W1	3.3
W2	4.7
W3	2.87
W4	BDL
W5	Irrigation
W6	NIS
W7	BDL
W8	BDL
W9	BDL
C1	3.9
C2	NIS
C3	5.9*
C36	1
E2	BDL
JHW1	5.9*
JHW2	BDL
JHW3	BDL
JHW4	BDL
JHW5	BDL
B1	1.378
B2	1.38
B3	1.431

Concentration reported in parts per billion (ppb)

BDL: Below the Detection Level of the analytical method

NIS: Well not in service during the time period analyzed in this assessment

* Composite Sample of well C-3 and well JHW1. All other samples of well JHW1 taken during the time period of this assessment were BDL.

** Maximum PCE concentration while wells were actually in use.

Figure 1. Area Water Districts surrounding the Schlage Lock facility

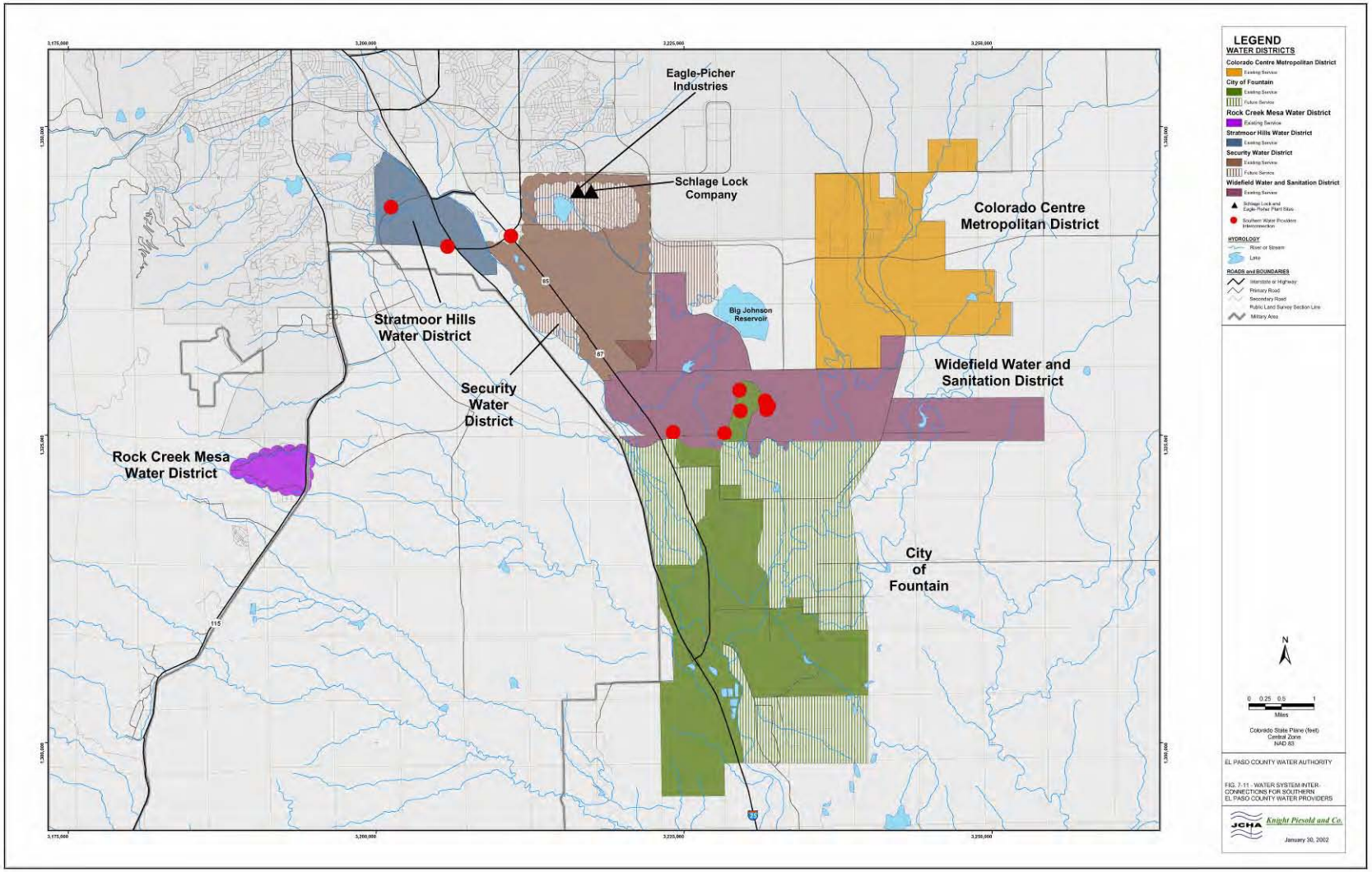


Figure 2. Residential Parcel locations within Widefield Water and Sanitation District

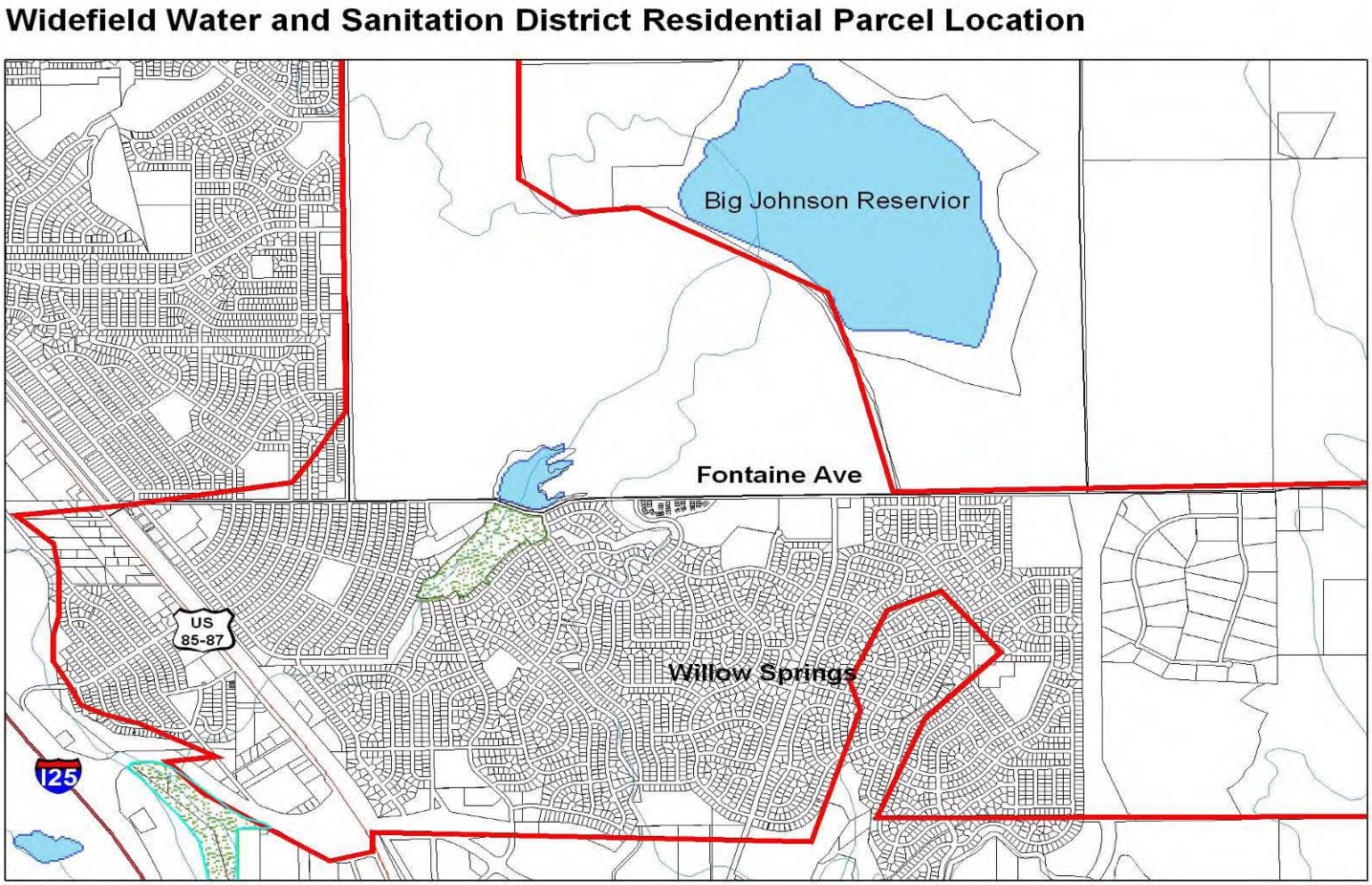
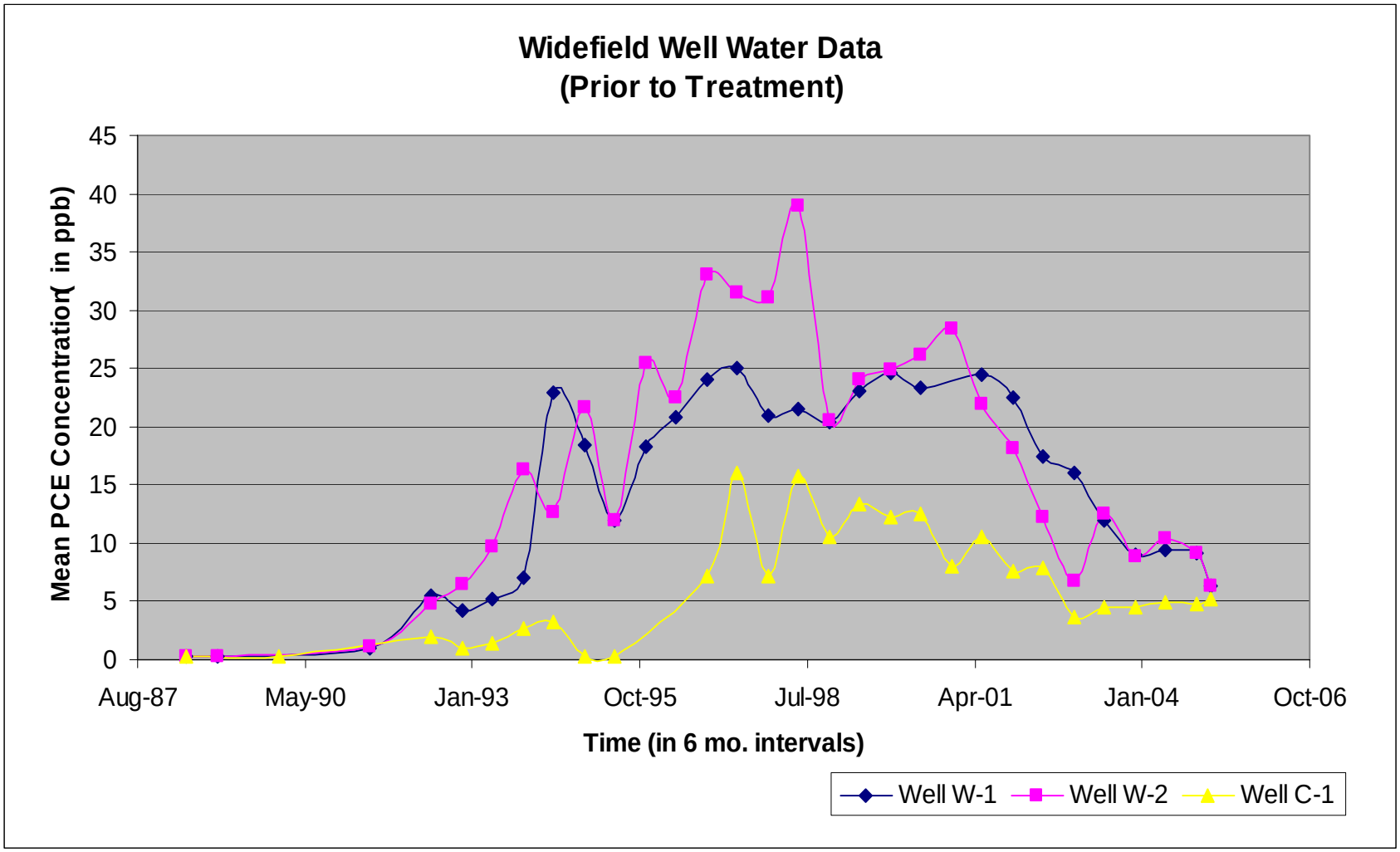


Figure 3. WWSD Well Data (prior to treatment)



Mean PCE concentration in wells W-1, W-2, and C-1 (1988-2005)

Appendix A. ATSDR's Public Health Hazard Categories

Category / Definition	Data Sufficiency	Criteria
A. Urgent Public Health Hazard This category is used for sites where short-term exposures (< 1 yr) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.	This determination represents a professional judgment based on critical data which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.	Evaluation of available relevant information* indicates that site-specific conditions or likely exposures have had, are having, or are likely to have in the future, an adverse impact on human health that requires immediate action or intervention. Such site-specific conditions or exposures may include the presence of serious physical or safety hazards.
B. Public Health Hazard This category is used for sites that pose a public health hazard due to the existence of long-term exposures (> 1 yr) to hazardous substance or conditions that could result in adverse health effects.	This determination represents a professional judgment based on critical data which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.	**Evaluation of available relevant information* suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants (including radionuclides) have had, are having, or are likely to have in the future, an adverse impact on human health that requires one or more public health interventions. Such site-specific exposures may include the presence of serious physical or safety hazards.**
C. Indeterminate Public Health Hazard **This category is used for sites in which "*critical*" data are *insufficient* with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.**	This determination represents a professional judgment that critical data are missing and ATSDR has judged the data are insufficient to support a decision. This does not necessarily imply all data are incomplete; but that some additional data are required to support a decision.	**The health assessor must determine, using professional judgment, the "criticality" of such data and the likelihood that the data can be obtained and will be obtained in a timely manner. Where some data are available, even limited data, the health assessor is encouraged to the extent possible to select other hazard categories and to support their decision with clear narrative that explains the limits of the data and the rationale for the decision.**
D. No Apparent Public Health Hazard This category is used for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.	This determination represents a professional judgment based on critical data which ATSDR considers sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.	Evaluation of available relevant information* indicates that, under site-specific conditions of exposure, exposures to site-specific contaminants in the past, present, or future are not likely to result in any adverse impact on human health.
E: No Public Health Hazard **This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.**	**Sufficient evidence indicates that no human exposures to contaminated media have occurred, none are now occurring, and none are likely to occur in the future**	

**Such as environmental and demographic data; health outcome data; exposure data; community health concerns information; toxicologic, medical, and epidemiologic data; monitoring and management plans.*

Certification

This health consultation was prepared by the Colorado Department of Public Health and Environment under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures existing at the time the health consultation was performed. Editorial review was completed by the Cooperative Agreement partner.

Jennifer A. Freed
Technical Project Officer
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.

Alan Yarbrough
Team Leader,
SPAB, DHAC, ATSDR