

Health Consultation

PANOLA COUNTY ROAD 329

BETHANY, PANOLA COUNTY, TEXAS

EPA FACILITY ID: TXN000606631

AUGUST 7, 2007

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
1-800-CDC-INFO

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

HEALTH CONSULTATION

PANOLA COUNTY ROAD 329

BETHANY, PANOLA COUNTY, TEXAS

EPA FACILITY ID: TXN000606631

Prepared By:

Texas Department of State Health Services
Epidemiology & Disease Surveillance Unit
Health Assessment & Toxicology Group
Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Table of Contents

Summary and Statement of Issues	1
Background	1
Community Health Concerns	2
Discussion	2
Methods	2
Child Health Considerations	5
Conclusions	5
Recommendations.....	6
Public Health Action Plan.....	6
Authors, Technical Advisors.....	7
Certification	8
References.....	9
Table	10
Figures	12

Summary and Statement of Issues

In December 2006, the United States Environmental Protection Agency (EPA) Region 6 office requested Texas Department of State Health Services (DSHS) attendance at a meeting for the community affected by the groundwater contamination at the County Road (CR) 329 Plume site, located near Bethany, Panola County, Texas. During the meeting, the plans for a Preliminary Assessment and Site Investigation (PA/SI) were discussed with the community, in addition to plans for the community to obtain an alternative source of drinking water. At the request of EPA Region 6 personnel, DSHS reviewed data collected in February 2007 from domestic drinking water sources potentially affected by the groundwater contamination along CR 329 [1, 2].

Background

Site Description and History

The Panola County CR 329 groundwater site is located in Panola County, Texas, a predominantly rural area with a history of oil and gas production and exploration. According to the 2007 Preliminary Assessment report review of topographic maps, 11 oil and gas wells are located within a half-mile radius of the site, which includes seven residential properties and a church [3]. The status of all 11 oil and gas wells is unknown. The former BES Mitchell-2, a salt water disposal well for oilfield wastes, is located on CR 329 approximately 1/8-mile northeast of the residences. This location previously included a tank farm, truck loading and unloading rack, a truck washout pit, and a fresh water well with storage tank and pump house. The injection well was permitted to inject brine between 1,080 and 1,110 feet below grade. Based on the permit, the groundwater is protected to 250 feet at this well [3].

In October 2002, a resident filed a complaint with Basic Energy Services (BES), requesting that BES terminate use of the injection well and provide bottled water to the residents [4]. Water samples have been collected from the domestic supplies, which include shallow, private wells and open springs, periodically since 2002.

In December 2002, residents contacted the EPA to express concerns about the effects of the nearby injection well on their drinking water quality [5]. At the request of the Texas Commission on Environmental Quality (TCEQ), the EPA began providing bottled water to the residents in October 2005. The bottled water was provided as a temporary solution because TCEQ indicated that the drinking water provided by the private wells and springs posed a potential for “imminent and substantial endangerment” [5]. During the December 19, 2006 EPA meeting, alternative water sources, including extending a water line from the local public water system were discussed [1]. Because regulatory standards dictate that EPA can only provide bottled water for one year; alternative water sources were determined to be available; and contaminant levels did not regularly exceed the Safe Drinking Water Act standards, EPA determined that they could no longer provide bottled water [5]. However, since that time, data from the recent PA/SI did show some levels of contamination above the Safe Drinking Water Act standards. As of this report, bottled water is still being provided.

A data summary figure, prepared by the EPA Underground Inject Control (UIC) group and provided to DSHS by the Railroad Commission of Texas (RRC), is included in this report as Figure 1 [4].

Community Health Concerns

During the community meeting on June 14, 2007, Richard Franklin, EPA On-Scene Coordinator (OSC) asked DSHS staff to be prepared to answer health questions about using the water to irrigate vegetable gardens. No questions about health concerns, including using the water for irrigation, were raised by the residents [6].

Discussion

In February 2007, water samples were collected from domestic wells (DW-01 through DW-06) and natural springs (SP-01 through SP-02) located at residential properties along CR 329, as well as monitoring wells (MW-01 through MW-13) located around the nearby injection well (Figure 2). Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides, polychlorinated biphenyls (PCBs), radiation, and qualitative coliform [7]. These data were reviewed to determine the potential for adverse health effects from drinking the water from the domestic sources. The domestic wells and springs have been previously used and may still potentially be used as a source of drinking water. The monitoring wells are used for observation purposes only, and the data were not evaluated with respect to human exposure.

Methods

To assess the potential health risks that may be associated with the contaminants found on the site, we compared contaminant concentrations with their media specific health assessment comparison (HAC) values for non-cancer and cancer endpoints. These values are guidelines that specify levels of chemicals in specific environmental media (soil, air, and water) that are considered safe for human contact with respect to identified human endpoints. Non-cancer screening values are generally based on ATSDR's minimal risk levels (MRLs)¹ and EPA's reference doses (RfDs)². Both are based on the assumption that there is an identifiable exposure threshold (both for the individual and for populations) below which there are no observable adverse effects. Thus, MRLs and RfDs are estimates of daily exposures to contaminants that are unlikely to cause adverse non-cancer health effects even if exposure occurs for a lifetime. The HAC values used to evaluate cancer: the cancer risk evaluation guides (CREGs)³, are based on

¹ An MRL is a contaminant specific exposure dose below those which might cause adverse health effects in the people most sensitive to such chemical-induced effects. MRLs generally are based on the most sensitive chemical-induced end point considered to be of relevance to humans.

² An RfD is an estimate (with a level of uncertainty from 10 to 1000 times below the level of harmful effects) of a daily exposure to the human population (including sensitive groups) that is likely to be without appreciable risk of deleterious effects during a lifetime.

³ A CREG is the concentration of a chemical in specific media (air, water or soil) corresponding to an excess estimated lifetime cancer risk of one in one million (1 in 1,000,000) persons exposed for a lifetime.

EPA's chemical-specific cancer slope factors (CSFs)⁴ and an estimated excess lifetime risk of developing cancer of one in one million persons exposed for a lifetime. The environmental media evaluation guides (EMEGs) are used as a screening tool to compare site specific soil, water, and/or air concentrations. The EMEGs are derived from the chemical's toxicity and default exposure criteria.

Exceeding either a non-cancer or a cancer screening value does not necessarily mean that the contaminant will cause harm; rather it suggests that potential exposure to the contaminant warrants further consideration.

VOCs

No VOCs were detected above their respective screening values. Based on this information, there is no apparent public health hazard associated with the VOCs in the drinking water sources.

SVOCs

The method detection limit (MDL) for several parameters (2,4,6-trichlorophenol, 3,3'-dichlorobenzidine, bis[2-chloroethyl]ether, benzo[a]pyrene, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, and N-nitrosodi-n-propylamine) were above one or more screening value. None of these contaminants were detected above their respective MDL. However, because the MDL is above the screening values, DSHS cannot state with certainty that the water is completely safe.

Because the MDLs are above HAC values in many cases, there is an indeterminate public health hazard associated with the SVOCs in the drinking water sources.

Metals

After an initial data review, DSHS and EPA Region 6 staff determined that the MDL for several metals exceeded their respective MCL [8, 9]. Arsenic, beryllium, cadmium, and thallium were re-analyzed by the laboratory in May 2007 using lower detection limits [10]. The May data were used to supplement the February data, and all metals were compared to their respective screening values.

Barium, beryllium, cadmium, and nickel were at concentrations above their MCLs and/or HAC values in the sample collected at SP-02. Exposure doses were estimated for each metal, using default parameters, including an intake rate of 2 L/day for adults and 1 L/day for children, an exposure factor of 1, bioavailability of 100%, and an adult weight of 70 kg (154 pounds) and a child weight of 16 kg (35 pounds). Exposure doses were compared to MRLs and RfDs. The estimated exposure doses for barium, beryllium and nickel were below the health guidelines. Based on this information, these metals pose no apparent public health hazard.

⁴ A CSF is the upper 95th percentile confidence limit of the slope of the dose-response curve and is expressed in unit of measure of (mg/kg-day)⁻¹.

The estimated exposure dose for cadmium in adults (0.00028 mg/kg/day) and children (0.00061 mg/kg/day), based on an average of the February sample data and any re-analysis, exceeded the ATSDR chronic oral MRL of 0.0002 mg/kg/day. This MRL was established based on a No Observed Adverse Effect Level (0.0021 mg/kg/day) at which no health effects are seen and is based on a study of kidney function in humans. A factor of 10 has been incorporated to allow for human variability. Although the estimated exposure doses exceed the MRL, they are not above levels at which health effects have been observed in humans [11]. Therefore, there is no apparent public health risk from cadmium exposure.

The lead concentration was slightly elevated above the action level of 15 µg/L in spring sample SP-01. The action level is intended to evaluate public water supply systems. If 10% of homes in a public water supply system have lead levels above the action level, then a preventative action, such as decreasing the corrosivity of the water is required. The action level does not apply to private systems.

There were no significant increases in blood lead levels when blood lead levels were calculated using the lead concentration from SP-01 and standard slope factors for children (0.03 µg lead/dL blood per µg lead/L water), adult females (0.03 µg lead/dL blood per µg lead/L water), and adult males (0.06 µg lead/dL blood per µg pb/L water). The Centers for Disease Control and Prevention (CDC) has determined that a child's blood lead level above 10 µg lead/dL blood is considered elevated [12]. Based on the estimated increase in blood lead levels, the lead in water at SP-01 should not result in adverse health effects for children or adults.

Pesticides/PCBs

Heptachlor and heptachlor epoxide concentrations do not exceed the non-cancer screening values; therefore, we do not anticipate non-cancer health effects. However, the MDL for these pesticides exceeded the Cancer Risk Evaluation Guide (CREG) and potential for cancer effect cannot be determined.

The MDLs for toxaphene and Aroclors 1016 and 1254 are above their respective screening values. The possible health effects of toxaphene and these Aroclors are indeterminate.

Dieldrin was detected in duplicate samples collected from DW-06 at concentrations above the CREG value. None of the dieldrin concentrations exceeded the non-cancer HAC values. The excess lifetime cancer risk due to dieldrin exposure was calculated using default intake rates and body weight. The concentration of dieldrin identified in this well will contribute no increased risk of cancer (3.57×10^{-6}) [or less than one additional cancer in 280,000 people exposed].

Radionuclides

MCLs and HAC values are identical for radioactive parameters. None of the drinking water wells exceeded either the MCL or the HAC values. However, spring SP-02 exceeded acceptable concentrations of radiation for gross alpha and beta radiation, and radium-226 and radium-228. Spring SP-01 was sampled twice. Of the two samples, one exceeded the MCL for gross beta

radiation, while the other did not. There are no health guideline values to compare estimated exposure to daily intake because the elements associated with the radiation were not identified.

On May 10, 2007, DSHS and ATSDR staff spoke with Paul Charp, Ph.D., senior health physicist with ATSDR. Dr. Charp indicated that although he would like to see better data, including speciation of the alpha and beta radionuclides, he does not think that exposure to the radionuclides at levels identified in the spring would result in adverse health effects over a lifetime [13].

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.

Exposure doses and increases in blood lead levels were estimated using default parameters for children to consider potential adverse health effects.

Conclusions

The limited data available from the RRC indicate that the contaminant concentrations in the drinking water sources fluctuate. There are no data available for review prior to 2002. Because no data are available to evaluate the potential for adverse health effects prior to 2002, the contaminants in the drinking water posed an **indeterminate public health hazard** in the past.

Based on a review of the February 2007 sampling event data (which included the initial analysis and subsequent analysis with lower MDLs for metals) parameters for which the MDL is greater than available screening values, including some SVOCs, pesticides, and PCBs, pose an **indeterminate public health hazard**. Those analytes that were detected above the MDL or were estimated, including VOCs, metals, and radionuclides, pose **no apparent public health hazard**.

Because the contaminants in the water have fluctuated since sampling began and the current data indicate an indeterminate public health hazard for certain classes of contaminants, the drinking water poses an **indeterminate public health hazard** in the future.

Recommendations

Because the future exposure to drinking water poses an **indeterminate public health hazard**, obtaining an alternative water source would be most protective of public health.

Public Health Action Plan

During the June 14, 2007 community meeting, EPA committed to funding a water line from the Panola Bethany Water Supply Corporation to CR 329. Individual residents will be responsible for their own connection to the main line. Completion of the water line is anticipated by Fall 2007.

Authors, Technical Advisors

Michelle N. Bost, MS, CHMM
Environmental Specialist
DSHS Health Assessment & Toxicology Program

Tina Walker, EMT-I
Information Specialist
DSHS, Environmental & Injury Epidemiology & Toxicology Branch

Susan Prosperie, MS, RS
Manager
DSHS Exposure Assessment & Surveillance Group

John Villanacci, PhD, NREMT-I
Principal Investigator/Director
DSHS Environmental & Injury Epidemiology and Toxicology Branch

Jennifer Lyke
Regional Representative
ATSDR Region 6 - Dallas, Texas

George Pettigrew, PE
Senior Regional Representative
ATSDR Region 6 - Dallas, Texas

Jeffrey Kellam
Environmental Health Scientist
Division of Health Assessment and Consultation
Superfund and Program Assessment Branch
ATSDR - Atlanta, Georgia

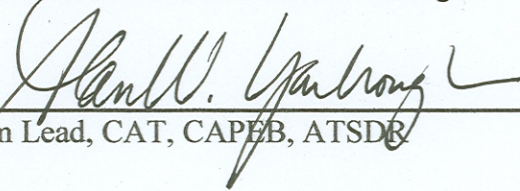
Certification

This public health consultation for the CR 329 Groundwater Plume site located in Bethany, Panola County, Texas was prepared by the Texas Department of State Health Services (DSHS) under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) in accordance with approved methodologies and procedures existing at the time this health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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



Team Lead, CAT, CAPEB, ATSDR

References

1. United States Environmental Protection Agency. Community Meeting, Church of the Living God. December 19, 2006.
2. Texas Department of State Health Services. Record of Communication. Email requesting Health Consult from Jon Rinehart, Site Assessment Manager. United States Environmental Protection Agency. May 31, 2007.
3. Weston Solutions, Inc. Preliminary Assessment Report for Panola County CR 329 Plume, County Road 329, Bethany, Panola County, Texas. February 2007.
4. Texas Department of State Health Services. Record of Communication. Email with attached files from Peter G. Pope, PG, Natural Resource Specialist, Railroad Commission of Texas. December 13, 2006.
5. United States Environmental Protection Agency. Letter to Reverend David Hudson. November 28, 2006.
6. United States Environmental Protection Agency. Community Meeting, Church of the Living God. July 14, 2007.
7. Texas Department of State Health Services. Record of Communication. Email from Jennifer Lyke, Regional Representative, Agency for Toxic Substances and Disease Registry, indicating that data tables prepared by Weston Solutions, Inc. were available for download at the ftp site. May 1, 2007.
8. Texas Department of State Health Services. Record of Communication. Phone conversation with Jon Rinehart, Site Assessment Manager, Richard Franklin, On-Scene Coordinator, and Brenda Cook, Superfund, United States Environmental Protection Agency. May 4, 2007.
9. Texas Department of State Health Services. Record of Communication. Email to Jon Rinehart, Site Assessment Manager, United States Environmental Protection Agency. May 4, 2007.
10. Texas Department of State Health Services. Record of Communication. Email from Jennifer Lyke, Regional Representative, Agency for Toxic Substances and Disease Registry, indicating that metals re-analysis data tables prepared by Weston Solutions, Inc. were available for download at the ftp site. May 24, 2007.
11. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Cadmium. ATSDR. July 1999.
12. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead. ATSDR. September 2005.
13. Texas Department of State Health Services. Record of Communication. Phone conversation with Paul Charp, PhD, Health Physicist, Agency for Toxic Substances and Disease Registry. May 10, 2007.

Table

Table 1: Estimated Exposure Doses for Maximum Contaminant Concentrations Identified Along CR 329

Estimated Barium Exposure Doses for SP-02			
ATSDR Chronic Oral MRL:	0.6	mg/kg/day	
	adults	children	
Dose=C*CF*IR*EF/BW (mg/kg/day)	0.22371	0.48938	
C=contaminant concentration (mg/L)	7.83	7.83	
IR=intake rate of water (L/day)	2	1	
AF=bioavailability factor (% , assumed 100% or 1)	1	1	
EF=exposure factor (unitless)	1	1	
BW=body weight (kg)	70	16	

Estimated Beryllium Exposure Doses for SP-02			
ATSDR Chronic Oral MRL:	0.002	mg/kg/day	
	adults	children	
Dose=C*CF*IR*EF/BW (mg/kg/day)	0.00019	0.00041	
C=contaminant concentration (mg/L)	0.0066	0.0066	
IR=intake rate of water (L/day)	2	1	
AF=bioavailability factor (% , assumed 100% or 1)	1	1	
EF=exposure factor (unitless)	1	1	
BW=body weight (kg)	70	16	

Estimated Cadmium Exposure Doses for SP-02			
ATSDR Chronic Oral MRL:	0.0002	mg/kg/day	
	adults	children	
Dose=C*CF*IR*EF/BW (mg/kg/day)	0.00028	0.00061	
C=contaminant concentration (mg/L)*	0.0097	0.0097	
IR=intake rate of water (L/day)	2	1	
AF=bioavailability factor (% , assumed 100% or 1)	1	1	
EF=exposure factor (unitless)	1	1	
BW=body weight (kg)	70	16	

* based on an average of analytical events

Estimated Nickel Exposure Doses for SP-02			
EPA Chronic Oral RfD:	0.02	mg/kg/day	
	adults	children	
Dose=C*CF*IR*EF/BW (mg/kg/day)	0.00686	0.01500	
C=contaminant concentration (mg/L)	0.240	0.240	
IR=intake rate of water (L/day)	2	1	
AF=bioavailability factor (% , assumed 100% or 1)	1	1	
EF=exposure factor (unitless)	1	1	
BW=body weight (kg)	70	16	

Figures

ATSDR Health Consultation
Panola County CR 329 Plume

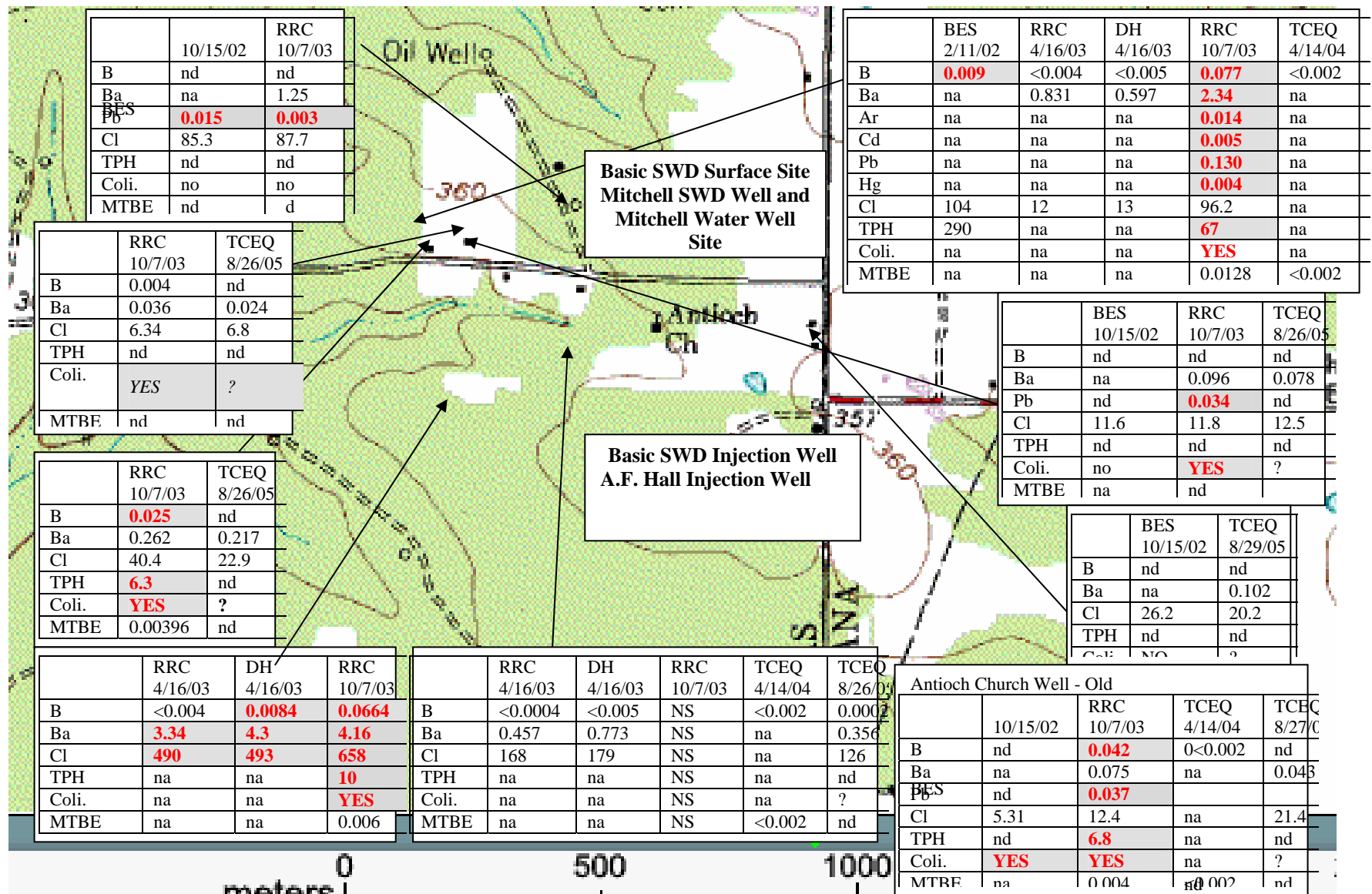


Figure 1. Summary of Water Sampling Results - (units = mg/L)

Notes:

Bold values indicate an exceedance of the MCL. na = not analyzed; nd = not detected; ns = water not sampled.

B=benzene; Cl=chloride; TPH=total petroleum hydrocarbons (C6-C36); MTBE=tert-butylmethylether; Coli=fecal coliform; Ar = arsenic; Cd= cadmium; Pb = lead; Hg = mercury; BES=Basic Energy Services; DH= David Hudson; RRC= wells were sampled by RRC district on 4/16/03 and by RRC contracted engineering firm on 10/7/03; TCEQ = TCEQ sampled water wells on 4/14/04.

Figure 2. Site Map

