

Public Health Assessment for

Augrove

FOR PUBLIC COMMENT

PETITIONED PUBLIC HEALTH ASSESSMENT
KELLY AIR FORCE BASE
(a/k/a EAST KELLY AIR FORCE BASE)
SAN ANTONIO, BEXAR COUNTY, TEXAS
EPA FACILITY ID: TX2571724333
JUNE 1, 2001

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

Comment Period Ends:

AUGUST 22, 2001



PETITIONED PUBLIC HEALTH ASSESSMENT

**KELLY AIR FORCE BASE
(a/k/a EAST KELLY AIR FORCE BASE)**

SAN ANTONIO, BEXAR COUNTY, TEXAS

EPA FACILITY ID: TX2571724333

Prepared by:

Petition Response Section
Exposure Investigations and Consultation Branch
Agency for Toxic Substances and Disease Registry

TABLE OF CONTENTS

Glossary	1
Summary	3
Purpose and Health Issues	4
Site Background	4
Community Health Concerns	4
Demographics	5
Discussion	5
Methods	5
Evaluation Methods	5
Extent of Contamination	5
Groundwater	5
Private Wells	6
Irrigation	6
Surface Soil	7
Soil Gas	7
ATSDR Child Health Initiative	8
Physical Hazards	8
Conclusions	9
Recommendation	9
Public Health Action Plan	10
Preparer of Report	11
References	12
Appendices	14-24

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.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

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.

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment-Public Comment Release 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. This document represents the agency's best efforts, based on currently available information, to fulfill the statutory criteria set out in CERCLA section 104 (i)(6) within a limited time frame. To the extent possible, it presents an assessment of potential risks to human health. Actions authorized by CERCLA section 104 (i)(11), or otherwise authorized by CERCLA, may be undertaken to prevent or mitigate human exposure or risks to human health. In addition, ATSDR will utilize this document to determine if follow-up health actions are appropriate at this time.

This document has previously been provided to EPA and the affected state in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. Where necessary, it has been revised in response to comments or additional relevant information provided by them to ATSDR. This revised document has now been released for a 30-day public comment period. Subsequent to the public comment period, ATSDR will address all public comments and revise or append the document as appropriate. The public health assessment will then be reissued. This will conclude 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.

Agency for Toxic Substances and Disease Registry Jeffrey P. Koplan, M.D., M.P.H., Administrator
Henry Falk, M.D., M.P.H., Assistant Surgeon General
Assistant Administrator

Division of Health Assessment and Consultation Robert C. Williams, P.E., DEE, Director
Sharon Williams-Fleetwood, Ph.D., Deputy Director

Community Involvement Branch Germano. E. Pereira, M.P.A., Chief

Exposure Investigations and Consultation Branch John E. Abraham, Ph.D, Chief

Federal Facilities Assessment Branch Sandra G. Isaacs, Chief

Program Evaluation, Records, and Information Max M. Howie, Jr., M.S., Chief

Superfund Site Assessment Branch Acting Branch Chief

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Please address comments regarding this report to:

Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Attn: Chief, Program Evaluation, Records, and Information Services Branch, E-56
1600 Clifton Road, N.E., Atlanta, Georgia 30333

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

GLOSSARY

Ambient

Surrounding. For example, ambient air is usually outdoor air (as opposed to indoor air).

Carcinogen

A substance that may cause cancer.

Comparison Value

Estimated chemical concentrations in specific environmental media that are not likely to cause adverse health effects considering exposure for a specified duration. The comparison values are calculated from scientific literature available on exposure and health effects. The Agency for Toxic Substances and Disease Registry, Environmental Protection Agency, and many state governments have calculated comparison values to use for health assessments and risk assessments.

Concentration

The amount of a specified substance in a specific medium such as air or water.

Contaminant

Any substance of material that enters a system (the environment, human body, food, etc.) where it is normally not found.

Dose

The amount of a substance to which a person is exposed.

Exposure

Contact with a chemical by swallowing, breathing, or direct contact (with skin or eyes). Exposure may be short term or long term.

Ingestion

The act of swallowing such as when drinking or eating.

Inhalation

The act of breathing. Exposure to a hazardous substance may occur from inhaling contaminants in the air. These contaminants can enter the bloodstream or get into the lungs or both.

Media (Environmental)

Environmental media are the specific parts that make up the environment, such as soil, sediment, water, and air, that could contain contamination.

No Apparent Public Health Hazard

A category applied to sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.

Petitioned Public Health Assessment

A public health assessment conducted at the request of a member of the public. When a petition is received, a team of environmental and health scientists is assigned to gather information to determine, using standard public health criteria, whether there is a reasonable basis for conducting a public health assessment. Once ATSDR confirms that a public health assessment is needed, the process for a petitioned public health assessment is essentially the same as for any other public health assessment.

Public Health Assessment

A document that includes an evaluation of environmental data and information on the release of hazardous substances into the environment in order to assess any current or future impact on public health, develop health advisories or other recommendations to determine if adverse health effects are associated with the environmental contamination.

SUMMARY

The Agency for Toxic Substances and Disease Registry has concluded the levels of contaminants detected at on- and off-site locations associated with East Kelly Air Force Base are not likely to cause adverse health effects. The current site conditions do not pose a public health threat.

Contaminated surface soil at East Kelly was evaluated to determine if chemicals at levels of health concern could migrate off-site via stormwater runoff or wind-blown dust. Soil gas samples were also evaluated to determine if residents near East Kelly are being exposed to the volatile organic compounds that may get into their homes from the contaminated shallow groundwater. The on-site soil contamination does not pose a health threat to residential areas because of the low levels of contaminants detected. A review of volatile organic compounds in soil gas and indoor air modeling suggests that the shallow aquifer contamination does not pose a threat to human health since contaminants are not getting into residences at levels of health concern. There were no private well owners identified near East Kelly using the contaminated shallow groundwater for domestic purposes.

PURPOSE AND HEALTH ISSUES

The East Kelly area is an annex located east of Kelly Air Force Base and has historically been used for aircraft maintenance and hazardous waste storage and transport. Leakage, spillage, and landfilling of these wastes have occurred throughout East Kelly and consequently contaminated the shallow groundwater and soil. The shallow groundwater is contaminated with chlorinated solvents and has migrated east and southeast into the surrounding community. The surface soil at East Kelly has been contaminated primarily with polyaromatic hydrocarbons (PAHs). Community members suspect contaminants in the shallow groundwater are getting into their homes through soil gas and causing adverse health effects. The Agency for Toxic Substances and Disease Registry (ATSDR) was initially petitioned by the late Congressman Frank Tejeda to evaluate the potential public health impact of contaminants released from Kelly Air Force Base and later requested to evaluate East Kelly [1]. ATSDR completed a public health assessment for Kelly Air Force Base in 1999. The purpose of this public health assessment is to identify potential human exposures to substances related to East Kelly activities by evaluating existing on- and off-site environmental data, community health concerns, and to recommend appropriate public health follow-up activities.

Site Background

Kelly Air Force Base was commissioned in 1916 in Bexar County, Texas, approximately seven miles southwest of San Antonio. East Kelly (also called Zone 4) is a storage area comprising about 400 acres along the eastern edge of Kelly Air Force Base. The surrounding community is a mixture of residential, commercial, and light industrial areas (Appendix A, figure 1). In 1982, a restoration program was initiated to investigate and clean up hazardous waste at Kelly Air Force Base. This investigation determined that in addition to groundwater contamination from the main Kelly Air Force Base flowing southeast of East Kelly, leaking industrial waste pipe lines in the northern portion of East Kelly were also sources of environmental contamination. From the 1940s to the mid-1970s, engine repair facilities at East Kelly used a collection system to transport chemical wastes to a central location for disposal. Over the years, this network of underground waste collection pipe lines leaked, contaminating shallow groundwater with waste oils, solvents, and paint thinners [2]. Other wastes stored at East Kelly in the past contained herbicides, metals, PAHs, and volatile organic compounds (VOCs).

COMMUNITY HEALTH CONCERNS

Specific health concerns expressed by community members pertaining to East Kelly are the release of soil gas into nearby homes from contaminated shallow groundwater and the possibility of contaminated soil found on-site reaching their homes by stormwater runoff. Residents are also concerned that contaminants from Kelly Air Force Base are causing a number of illnesses including: cancer, immune system disorders, nervous system disorders, birth defects, liver problems, skin problems, respiratory illnesses, muscular problems, nosebleeds, and headaches. These health concerns were addressed in the Kelly Air Force Base public health assessment which was released in 1999. In this public health assessment, ATSDR evaluates the environmental contamination related to East Kelly to identify any additional impact for these same health concerns.

DEMOGRAPHICS

There are 5,021 people living within a one mile radius of East Kelly (Appendix A, figure 1) [3]. The entire population is Hispanic. Of the total population, 18% are under age 6 and 27% are age 65 years and older. In 1990, there were about 900 females of reproductive age (15-44 years) in the area.

DISCUSSION

A. Methods

Evaluation Methods

The following sections contain an evaluation of the environmental data available for East Kelly. In preparing this evaluation, ATSDR uses established methodologies for determining how people may be exposed to potential contamination related to East Kelly and what harmful effects, if any, may result from such exposure. Exposure pathways (or routes of physical contact with chemicals) that ATSDR evaluates are ingestion, inhalation, and skin contact. ATSDR uses comparison values (CVs), which are screening tools used to evaluate environmental data that are relevant to the exposure pathways. Comparison values are concentrations of contaminants that are considered safe levels of exposure. Chemicals detected below CVs are not likely to represent a health concern; chemicals that are detected above CVs require a more detailed evaluation of site specific exposure conditions. ATSDR also evaluates the public health implications of exposures to combinations of substances that may be present in one or more environmental media to which populations may be exposed. For a complete discussion of these criteria (quality assurance considerations, human exposure pathway analyses, health-based comparison values, and the methods of selecting contaminants above comparison values), refer to Appendix B.

B. Extent of Contamination

Groundwater

East Kelly lies over a shallow aquifer and a deeper, confined aquifer, the Edwards Aquifer. The shallow aquifer is at depths below the surface ranging from approximately 15 to 30 feet. The leaking industrial waste lines at East Kelly contaminated the shallow aquifer with VOCs and PAHs [4]. There is a layer of clay below the shallow aquifer ranging from 50 to 450 feet in thickness. Under the clay layer is about 300 feet of a loose, crumbly rock material called marl and another 500 feet of limestone and shale. The Edwards aquifer is below about 1000 feet of clay, marl, limestone, and shale layers [5]. Most residences near East Kelly receive drinking water from Bexar Metropolitan Water District, a municipality that obtains its water from the Edwards Aquifer. There is one residence near East Kelly that has a private well used for drinking water (discussed in the next section *Private Wells*).

Private Wells

Municipal water has been supplied to residents east of Kelly AFB beginning in the 1950s [6]. Three private well surveys conducted in 1988, 1996, and 1998 (Appendix A, figure 2) identified 22 shallow aquifer private wells within a one mile radius of Kelly AFB [7] [8]. Most of the private wells identified were using groundwater from the shallow aquifer for gardening or lawn care. However, one private well on Quintana Road was identified as a drinking water source in 1988. Four private wells were dry or blocked by debris. Water samples from the remaining 18 usable private wells were collected and analyzed for VOCs, semi-volatile organic compounds (SVOCs), metals, and cyanide. Several contaminants were detected in the private well used for drinking water and were not at levels of health concern [9]. Several contaminants were also detected in some of the private wells *not* used for drinking water [8]. The chemicals detected in private wells are listed below:

Table 1: Chemicals detected in the shallow aquifer private wells in 1988, 1996, and 1998

Chemical	Range of Chemical Concentration (ppb)	Number of Private Wells that Chemicals were Detected above Drinking Water Comparison Values ¹
cis-1,2-Dichloroethene (DCE)	ND-190	1
Tetrachloroethene (PCE)	ND-20	8
Trichloroethene (TCE)	ND-82	7
Chloroform	ND-4.61	3
Lead	ND-64.1	1
Thallium	ND-10.7	1
Vinyl Chloride	ND-10	1

¹ 1997 EPA Region III risk-based concentration for drinking water

ND = Not Detected

ppb = parts per billion

Residents near East Kelly have been notified of the shallow aquifer contamination and have been advised not to use water from their wells for consumption, showering, or cooking. *The contaminants detected in the private well used for drinking water were not at levels of health concern.*

Irrigation

Most of the functioning private shallow aquifer wells were used for irrigating or watering gardens in the past and may still be used for watering lawns and gardens. The contaminants detected in the private wells near East Kelly are mostly VOCs which are not easily taken up in plants and quickly

volatilize during watering [10]. ATSDR evaluated the irrigation exposure pathway by comparing the VOCs levels in groundwater used for watering lawns and gardens with showering using water with the same levels of VOCs [11]. Showering represents a more conservative scenario than outdoor watering; even with this scenario, ATSDR determined the VOCs would evaporate during watering and are not at levels of health concern.

Surface Soil

Nearby residents are concerned that the contaminated surface soil left on-site may migrate into residential areas via stormwater runoff or wind-blown dust. Although ATSDR found no visible evidence that stormwater runoff is affecting the residential areas, the surface soil contamination (less than one foot deep) was evaluated to determine if contaminants are at levels above screening values. Stormwater runoff or wind is not likely to carry contaminated on-site soil that is deeper than one foot to residential areas. Samples of on-site soil were collected during remedial investigations throughout the 1990s to determine the extent of soil contamination [12]. Arsenic was detected in surface soil at a former storage yard (site S-7) at concentrations that exceeded closure guidelines [13]. Kelly AFB removed 1.2 acres of the arsenic contaminated surface soil in 1997 and disposed of it off-site in accordance with TNRCC guidelines to attain closure status. The storage yard is no longer in use and arsenic concentrations are below background levels [14]. In other areas of East Kelly, the four PAHs listed in Table 2 were detected in on-site surface soil at levels above their health-based comparison listed values. Therefore, these PAHs were selected for further evaluation [15]:

Table 2. East Kelly Soil Contaminants Detected above Comparison Values

Chemical	Chemical Type	Estimated Risk	Risk-Based Comparison Value ¹ (mg/kg)	Maximum Concentration (mg/kg)
Benzo(a)pyrene	PAH	9.7E ⁻⁰⁵	0.087	8.13
Dibenzo(a,h)anthracene	PAH	2.74E ⁻⁰⁶	0.087	0.23
Benzo(a)anthracene	PAH	1.01E ⁻⁰⁵	0.87	8.51
Benzo(b)fluoranthene	PAH	1.11E ⁻⁰⁵	0.87	9.35

¹ 1997 EPA Region III risk-based concentration for residential soil

The assumptions of the risk analysis for on-site surface soil are presented in Appendix C. Although the maximum concentrations were detected above health-based comparison values, the levels of these contaminants have not been shown to cause adverse health effects in scientific literature. *The results indicate that incidental ingestion of on-site soil is unlikely to cause adverse health effects.*

Soil Gas

Soil gas consists of vapors within soil space that can potentially get in the air of an enclosed space. The soil gas can come from soil contaminants or groundwater migrating through these soil spaces. Residents living near East Kelly are concerned that vinyl chloride and other VOCs from the

contaminated shallow aquifer are migrating into their homes. Soil gas samples were taken outside of homes that were identified where shallow groundwater contamination is highest, thus having the highest potential for gas migration to indoor air [16]. Five soil gas monitoring wells were installed west and south of East Kelly and three soil gas monitoring wells were installed east of East Kelly (Appendix A, figure 3). Soil gas was collected and analyzed in March 2000. Although vinyl chloride was not detected in the soil gas, several other VOCs were detected. The levels of VOCs detected directly in the soil gas are not expected to cause adverse health effects based on epidemiologic studies, even if they are inhaled directly [17] [18] [19] [20] [21] [22]. However, it is not likely that residents near East Kelly will inhale soil gas directly. ATSDR estimated the indoor air concentration of each VOC detected above screening values in the soil gas using EPA's Johnson and Ettinger model for subsurface vapor intrusion into buildings [23]. The indoor air concentrations of VOCs are estimated to be about 60,000 times lower than the concentrations detected in soil gas directly (Appendix D). *Based on the levels of VOCs in the soil gas and the modeling analysis, no adverse health effects are expected to occur from exposure to the VOCs detected and estimated to be in the indoor air of homes located over contaminated shallow groundwater. Appendix D details the results of the soil gas sampling results and the modeling.*

C. ATSDR Child Health Initiative

Children are at greater risk than adults from certain kinds of exposure to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed for several reasons; children play outside more often than adults, increasing the likelihood they will come into contact with chemicals in the environment. Since they are shorter than adults, they breathe more 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 damage if toxic exposures occur during certain growth stages.

Many children live in neighborhoods surrounding East Kelly. Even though these children do not have access to the site, ATSDR closely reviewed possible exposure situations to children while evaluating this site. *Based on the available sampling and modeling data, ATSDR did not identify any chemical contaminants at levels of health concern to children living near East Kelly.*

D. Physical Hazards

East Kelly is surrounded entirely by a fence and guarded 24 hours a day. Therefore, public access is controlled at this site. ATSDR did not identify any physical hazards to the public during the evaluation of the site and the site visit.

CONCLUSIONS

1. Exposure to the soil at East Kelly is not a public health threat based on the levels of contaminants detected.
2. Several VOCs were detected in the soil gas in residential areas near East Kelly. However, based on soil gas concentrations and EPA's Johnson and Ettinger model, exposure to these contaminants at levels that cause adverse health effects is not likely.

ATSDR uses one of five conclusion categories to summarize our findings of the site. These categories are: 1) Urgent Public Health Hazard, 2) Public Health Hazard, 3) Indeterminate Health Hazard, 4) No Apparent Public Health Hazard, and 5) No Public Health Hazard. A category is selected from site specific conditions such as the degree of public health hazard based on the presence and duration of human exposure, contaminant concentration, the nature of toxic effects associated with site related contaminants, presence of physical hazards, and community health concerns. *Based on these criteria, ATSDR determined that the environmental contamination related to East Kelly presents a No Apparent Public Health Hazard based on levels of contaminants found in the on-site soil, the contaminants detected in the off-site soil gas, and the lack of human exposure to the contaminated shallow groundwater at levels of health concern.*

RECOMMENDATION

Based upon the conclusions and information reviewed, ATSDR makes the following recommendation to TNRCC:

1. Consider monitoring the shallow groundwater to track contaminant migration.

PUBLIC HEALTH ACTION PLAN

The actions described in this section are designed to ensure that this public health assessment identifies public health hazards and provides a plan of action to mitigate and prevent adverse health effects resulting from exposure to hazardous substances in the environment.

Actions Completed

1. ATSDR has evaluated all existing environmental data pertaining to East Kelly as a basis for this public health assessment.
2. ATSDR provided technical assistance to Kelly Air Force Base staff on the soil gas sampling plan.
3. ATSDR presented several community forums for addressing health issues to the Restoration Advisory Board (RAB).
4. ATSDR is developing a translation of this public health assessment in Spanish. The summary will be available to the public.
5. ATSDR is developing a translation of this public health assessment in Spanish. The summary will be available to the public.

Action Planned:

1. ATSDR will review additional environmental data as needed.

Preparer of Report:

Kimberly K. Chapman, MSEH
Environmental Health Scientist
ATSDR/DHAC/EICB/PRS

Reviewers of Report:

Donald Joe, PE
Section Chief
ATSDR/DHAC/EICB/PRS

Contributing Author:

Gregory M. Zarus, MS
Atmospheric Scientist
ATSDR/DHAC/EICB/EI

John E. Abraham, PhD
Branch Chief
ATSDR/DHAC/EICB

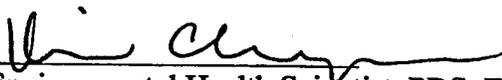
Susan Moore, MS
Section Chief
ATSDR/DHAC/EICB/HC

Technical Assistance:

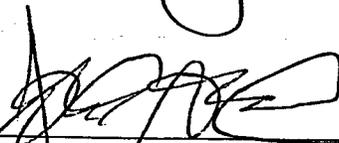
Andrew Dent, MA
GIS Programmer/Analyst
ATSDR/DHAC/PERIS

Review and Approval of this public health assessment for East Kelly.

Concurrence:


Environmental Health Scientist, PRS, EICB, DHAC


Section Chief, PRS, EICB, DHAC


Branch Chief, EICB, DHAC

REFERENCES

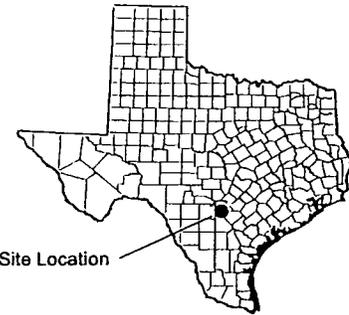
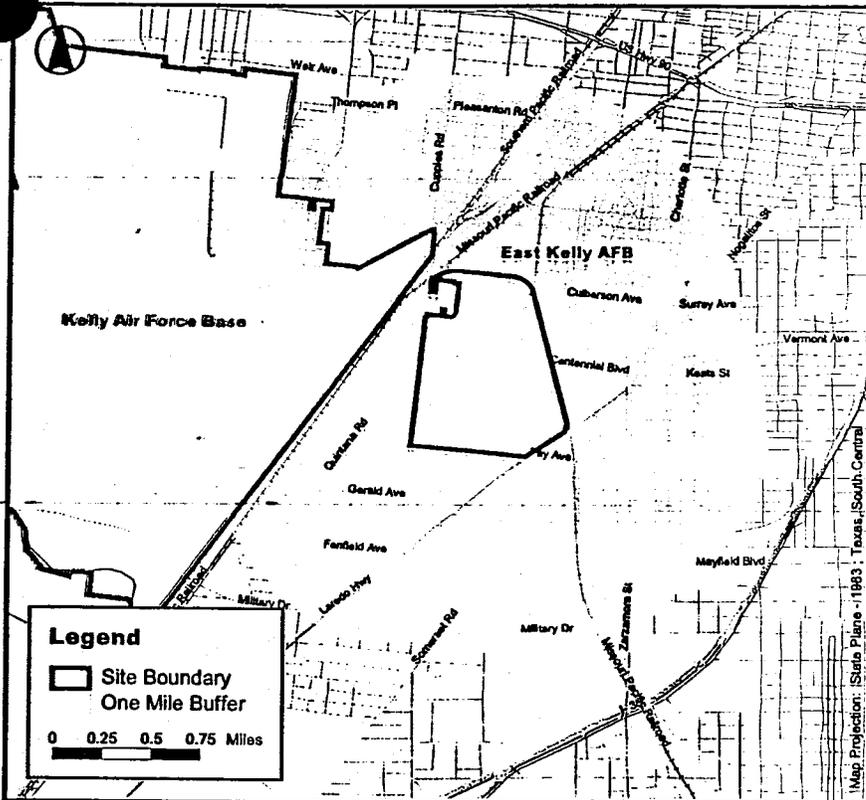
1. Letter from Petitioner to ATSDR. 1996. Atlanta, GA.
2. Kelly Air Force Base. November 1997. Focused Feasibility Study for Site SS051. Contract No. F41650-95-D-2005-5031. San Antonio, TX.
3. United States Bureau of the Census. 1990. *Census of Population and Housing: Summary Tape File 1B*. U.S. Department of Commerce. Washington DC.
4. Kelly Air Force Base. January 1999. Semiannual Compliance Plan Report. Project Documentation CD. San Antonio, TX.
5. Kelly Air Force Base. March 1998. Kelly Facts. Kelly AFB, TX.
6. ATSDR Record of Official Activity. March 14, 2000. Conversation between Kimberly Chapman of ATSDR and Nicholas Rodriquez of Bexar Met regarding date of municipal water line installation. Atlanta, GA.
7. Science Applications International Corporation. October 1998. Kelly AFB/Bexar County, Texas Shallow Aquifer Assessment. Phase III. Technical Report. San Antonio, TX.
8. US Air Force, Installation Restoration Program, Kelly Air Force Base. October 1999. Kelly AFB/Bexar County, Texas Shallow Aquifer Assessment. Phase IV. Master Well Listing. San Antonio, TX.
9. Agency for Toxic Substances and Disease Registry. August 20, 1999. Petitioned Public Health Assessment for Kelly Air Force Base. CERCLIS No. TX2571724333. Atlanta, GA.
10. Agustin, RAC. 1995. Analysis of the Potential for Plant Uptake of Trichloroethylene and an Assessment of the Relative Risk from Different Crop Types. Government Reports Announcements and Index. Issue 01.
11. Agency for Toxic Substances and Disease Registry. May 3, 2000. Health Consultation for Lockwood Solvents in Billings, Montana. Atlanta, GA.
12. Federal Facilities Information Management System. 2000. Soil Contamination: Kelly Air Force Base. Atlanta, GA.
13. U.S. Air Force, Kelly Air Force Base. September 1997. IRP Site SS009 Closure Report. Final. San Antonio, TX.
14. Kelly Air Force Base. November 29, 1999. Web address: Frequently Asked Questions: <http://empub.kelly.af.mil/FAQ>.

APPENDIX A
Site Maps

East Kelly Air Force Base

San Antonio, Texas

INTRODUCTION



Bexar County, Texas

Demographic Statistics Within One Mile of Site*	
Total Population	5021
White	5021
Black	0
American Indian, Eskimo, Aleut	0
Asian or Pacific Islander	0
Other Race	0
Hispanic Origin	5021
Children Aged 6 and Younger	913
Adults Aged 65 and Older	1367
Females Aged 15 - 44	913
Total Housing Units	1825

Demographics Statistics Source: 1990 US Census
*Calculated using an area-proportion spatial analysis technique

Map Source: 1995 TIGER/Line Files

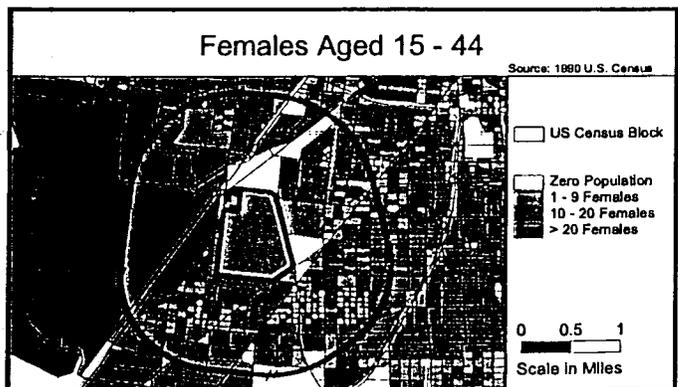
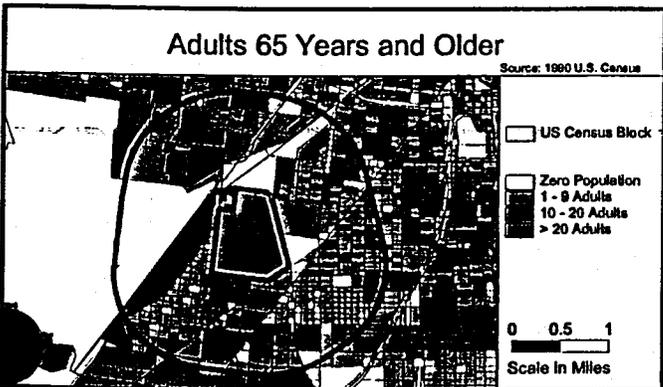
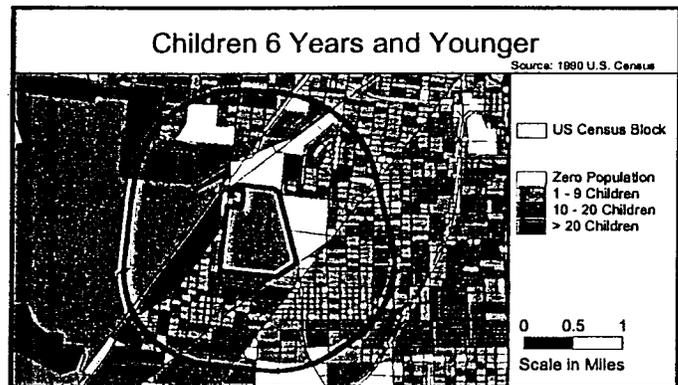
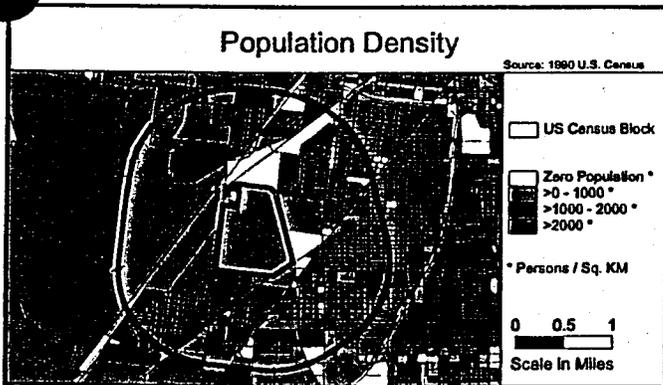
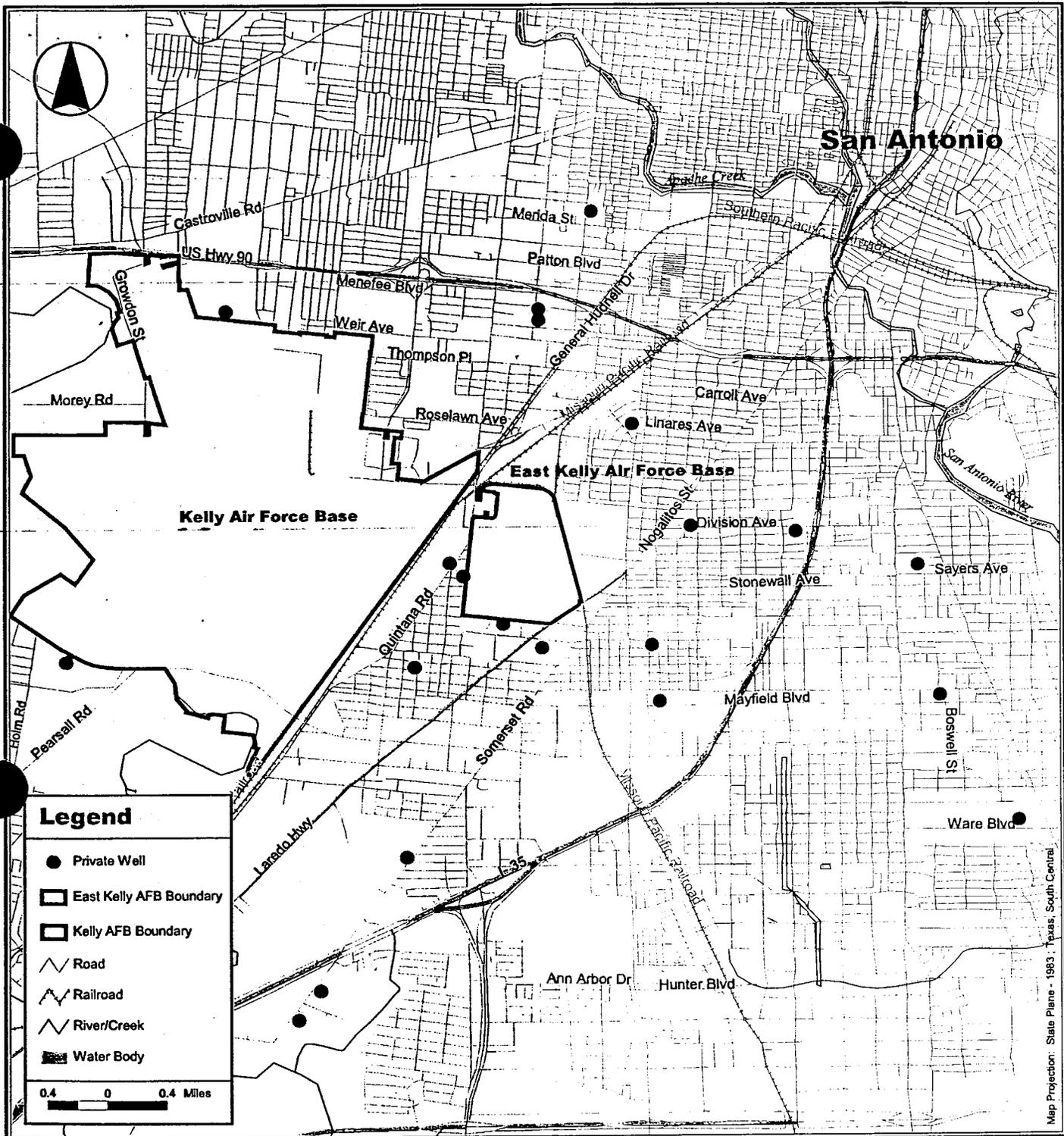
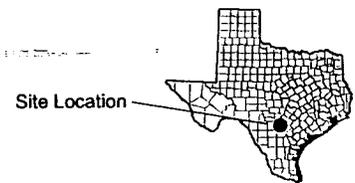


Figure 1



Private Well Locations East Kelly Air Force Base

San Antonio, Texas



Bexar County, Texas

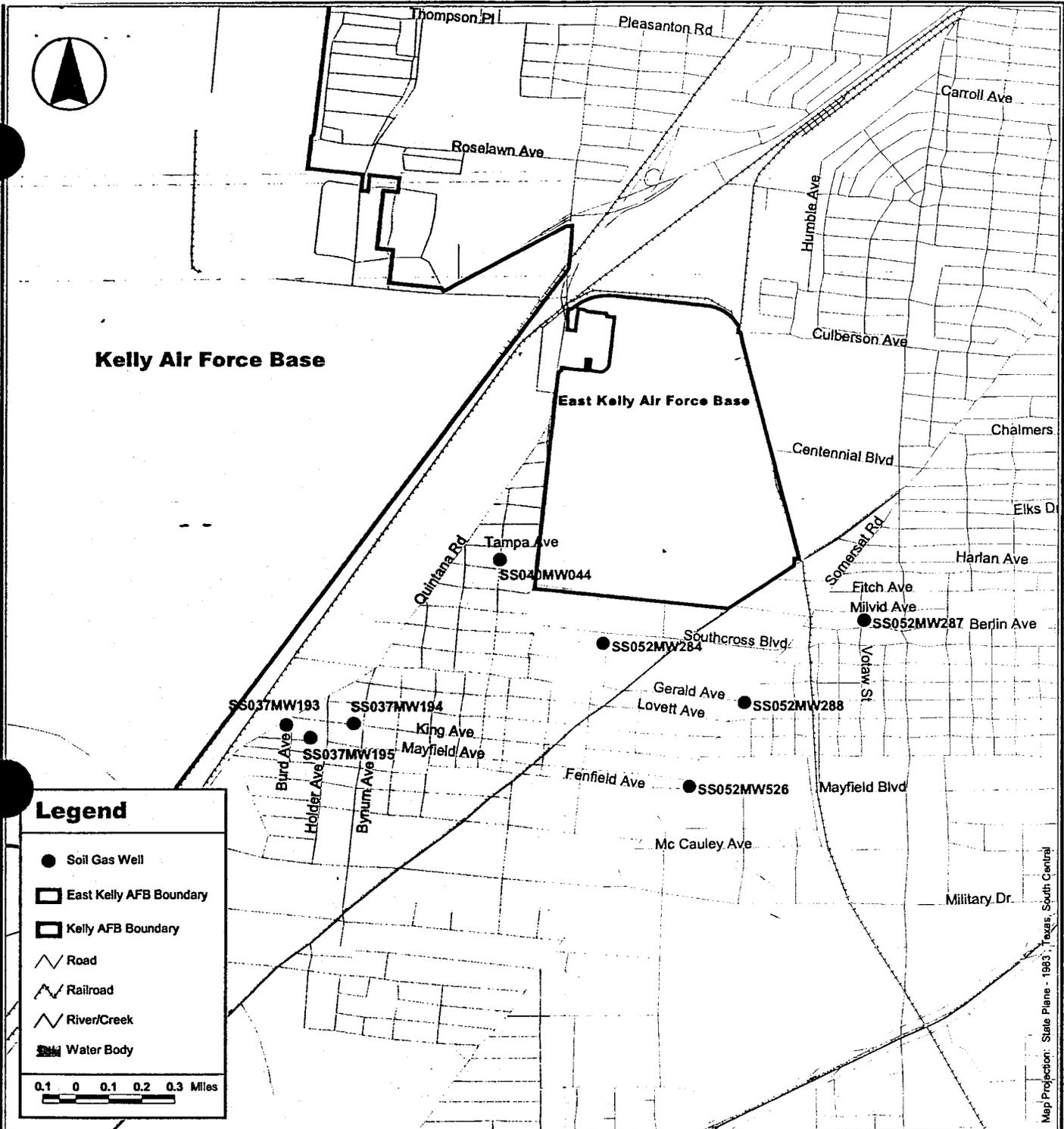
VICINITY MAP

Base Map Source: U.S. Census TIGER/Line files (1995)

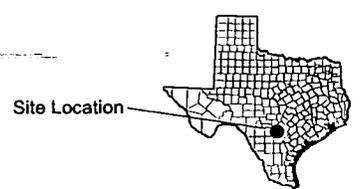


03012000

Figure 2



Soil Gas Well Locations East Kelly Air Force Base San Antonio, Texas



VICINITY MAP

Base Map Source: U.S. Census TIGER/Line files (1995), Soil Gas Well Source: San Antonio Air Logistics Center

Bexar County, Texas



Figure 3

APPENDIX B
Quality Assurance and ATSDR Methodology

Quality Assurance

In preparing this report, ATSDR relied on the information provided in the referenced documents and by contacts with the Texas Natural Resources Conservation Commission, Texas Department of Health, San Antonio Metropolitan Health District, Environmental Protection Agency, United States Geological Survey, community members, and Kelly Air Force Base. ATSDR assumes that adequate quality assurance and control measures were taken during chain-of-custody, laboratory procedures, and data reporting. The validity of the analyses and conclusions drawn in this document are determined by the availability and reliability of the information.

Human Exposure Pathway Evaluation and the use of Comparison Values

ATSDR assesses a site by evaluating the level of exposure in potential or completed exposure pathways. An exposure pathway is the way chemicals may enter a person's body to cause a health effect. It includes all the steps between the release of a chemical and the population exposed: (1) a chemical release source, (2) chemical movement, (3) a place where people can come into contact with the chemical, (4) a route of human exposure, and (5) a population that could be exposed. In this assessment, ATSDR evaluates chemicals in the soil, air, and groundwater that people living in nearby residences may consume or come into contact with.

Data evaluators use comparison values (CVs), which are screening tools used to evaluate environmental data that is relevant to the exposure pathways. Comparison values are concentrations of contaminants that are considered to be safe levels of exposure. Comparison values used in this document include EPA's Region III risk-based concentration. Comparison values are derived from available health guidelines, such as ATSDR's minimal risk levels and EPA's cancer slope factor.

The derivation of a comparison value uses conservative exposure assumptions, resulting in values that are much lower than exposure concentrations observed to cause adverse health effects; thus, insuring the comparison values are protective of public health in essentially all exposure situations. That is, if the concentrations in the exposure medium are less than the CV, the exposures are not of health concern and no further analysis of the pathway is required. However, while concentrations below the comparison value are not expected to lead to any observable health effect, it should not be inferred that a concentration greater than the comparison value will necessarily lead to adverse effects. Depending on site-specific environmental exposure factors (for example, duration of exposure) and activities of people that result in exposure (time spent in area of contamination), exposure to levels above the comparison value may or may not lead to a health effect. Therefore, ATSDR's comparison values are not used to predict the occurrence of adverse health effects.

The comparison values used in this evaluation are defined as follows: The CREG is a concentration at which excess cancer risk is not likely to exceed one case of cancer in a million persons exposed over a lifetime. The CREG is a very conservative CV that is used to estimate cancer risk. Exposure to a concentration equal to or less than the CREG is defined as an insignificant risk and is an acceptable level of exposure over a lifetime. The risk from exposure is not considered as a significant risk unless the exposure concentration is approximately 10 times the

CREG and exposure occurs over several years. The EMEG is a concentration at which daily exposure for a lifetime is unlikely to result in adverse noncancerous effects.

Selecting Contaminants of Concern

Contaminants of concern (COCs) are the site-specific chemical substances that the health assessor selects for further evaluation of potential health effects. Identifying contaminants of concern is a process that requires the assessor to examine contaminant concentrations at the site, the quality of environmental sampling data, and the potential for human exposure. A thorough review of each of these issues is required to accurately select COCs in the site-specific human exposure pathway. The following text describes the selection process.

In the first step of the COC selection process, the maximum contaminant concentrations are compared directly to health comparison values. ATSDR considers site-specific exposure factors to ensure selection of appropriate health comparison values. If the maximum concentration reported for a chemical was less than the health comparison value, ATSDR concluded that exposure to that chemical was not of public health concern; therefore, no further data review was required for that chemical. However, if the maximum concentration was greater than the health comparison value, the chemical was selected for additional data review. In addition, any chemicals detected that did not have relevant health comparison values were also selected for additional data review.

Comparison values have not been developed for some contaminants, and, based on new scientific information other comparison values may be determined to be inappropriate for the specific type of exposure. In those cases, the contaminants are included as contaminants of concern if current scientific information indicates exposure to those contaminants may be of public health concern.

The next step of the process requires a more in-depth review of data for each of the contaminants selected. Factors used in the selection of the COCs included the number of samples with detections above the minimum detection limit, the number of samples with detections above an acute or chronic health comparison value, and the potential for exposure at the monitoring location.

APPENDIX C
Estimated Exposure Dose and Cancer Risk for On-site Soil

Estimated Exposure Dose and Cancer Risk from On-Site Soil

- ATSDR selected an exposure scenario for incidental ingestion of soil at East Kelly as representing the greatest potential exposure to soil and its potential contaminant concentration if migration off-site occurs. Although ingestion of maximum concentrations of chemicals detected may be unlikely, it represents the greatest potential exposure to chemicals in the soil.
- ATSDR screened the maximum contaminant concentrations by comparison to the EPA's 1997 Region III Risk-Based Concentration (RBC) Tables for residential soil. All contaminants that exceeded this comparison value were selected for further evaluation. Maximum concentrations were used to calculate an exposure dose. Risk-based screening levels for carcinogens were based on combined childhood and adult exposure. Risk-based screening levels represent theoretical risks and should not be viewed as predictors of adverse health effects; the actual risk may be zero¹.
- ATSDR assumed the same ingestion rates as recommended for incidental soil ingestion of 200 milligrams (mg)/day for children and 100 mg/day for adults. ATSDR used standard body weights for children (15 kilograms[kg]) and adolescents/adults (70 kg).
- The exposure frequency was assumed to be constant since the scenario is targeting possible residential areas. Durations were assumed for children, 0-6 years and adolescents/adults, 7-30 years.
- The carcinogenic potency slope oral taken from RBC Tables were as follows:

Benzo(a)pyrene:	7.30E+00 risk per mg/kg/day
Dibenzo(a,h)anthracene:	7.30E+00 risk per mg/kg/day
Benzo(a)anthracene:	7.30E-01 risk per mg/kg/day
Benzo(b)fluoranthene:	7.30E-01 risk per mg/kg/day

The results are presented in Table 2.

¹ US Environmental Protection Agency. 1986. Guidelines for Carcenogenic Substances. FR 51:3392-34006.

APPENDIX D
Soil Gas and Estimated Risk

Table 3. East Kelly Soil Gas Sampling Results Compared to RBCs and Estimated Indoor Air Cancer Risk

Chemical	Maximum Soil Gas Concentration µg/m3	RBC µg/m3	Maximum Estimated Indoor Air Concentration ¹ µg/m3	J&E Estimated Cancer Risk ²	ATSDR Estimated Cancer Risk ³
1,1,2-Trichloro-1,1,2-trifluoroethane	275	31,000			
cis-1,2-Dichloroethene	344	87	0.0059	Not classifiable ⁴	Not classifiable ⁴
1,1,1-Trichloroethane	9.3	1000			
1,1-Dichloroethane	20.6	520	/ /		
Benzene	73	0.22	0.00013	4.9E-10	1.08E-08
Ethylbenzene	10.4	1000			
Methylene Chloride	286	38	0.0054	1.9E-8	2.54E-08
Tetrachloroethene (PCE)	14,230	3.1	0.23	5.8E-8	1.34E-06
Toluene	165	420			
Trichloroethene (TCE)	618	1	0.011	7.9E-9	1.89E-07
Xylenes	29.9	310			
1,2,4-Trichlorobenzene	179	210			
Hexachlorobutadiene	265	0.081	0.0037	3.5E-8	8.17E-07
Styrene	8.1	1000			
Vinyl Chloride	ND				

¹ Indoor air concentrations were derived using EPA's Johnson & Ettinger model for subsurface vapor intrusion into buildings

^{2,3} Cancer risks were derived using both EPA's Johnson & Ettinger model and ATSDR's Public Health Assessment Guidance Manual for chemicals detected above RBC

⁴ Not classifiable as to human carcinogenicity based on no data on humans or animals

ppbv = parts per billion volume

µg/m3 = micrograms per cubic meter

RBC = 1997 Risk-based concentration

ND = Not detected

Shading indicates 1997 RBC ambient air comparison value exceedence

APPENDIX E
Exposure Pathway Table

TABLE 1 POTENTIAL EXPOSURE PATHWAY

Pathway Name	Source	Medium	Route Of Exposure	Exposure Elements			Chemicals of Concern	
				Point of Exposure	Receptor Population	Time		
Off-site Soil Gas	Contaminated Shallow Groundwater	Soil Gas	Inhalation	Off-site	Residents	p, c, f	Indoor Activities	VOCs
					1, 1			

Key: p = past; c = current; f = future;