KELLY AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 3292

KELLY AIR FORCE BASE TECHNICAL REVIEW SUBCOMMITTEE
MEETING AGENDA
Tuesday, 9 February 1999, 6:30 P.M.

Garni Hall, Room 217, St. Mary's University

Topic	Time	Presenter
I. Introduction Agenda Review and Handouts	6:30 - 6:35	Dr Lene'
II. Site S-1 Natural Attenuation Study Report	6:35 – 7:00	Parsons (KAFB)
III. Site MP -- Slurry Wall Update	7:00 - 7:20	KAFB
IV. Document Reviews: a) Zone 4 Decision Document b) Site S-1 Focused Feasibility Study	7:20 - 7:50	KAFB
V. Break	7:50 - 8:00	All
VI. Administrative a) TRS Mission Statement: Review and Discuss b) BCT Update c) Spill Summary Report d) Documents to TRS/RAB. e) Location/Time of Next TRS Meeting	8:00 - 8:30	Dr Lene'
VII. Adjournment	8:30	All

MEETING MINUTES
KELLY AFB TECHNICAL REVIEW SUBCOMMITTEE (TRS)
TO THE RESTORATION ADVISORY BOARD (RAB)
9 FEB 99, ST. MARY'S UNIVERSITY

I. Introduction

The TRS Meeting began at 1840 hours. Attachment 1 is the attendance. Documents delivered to the TRS are specified in atch 2.

II. Presentation: Site S-1 Natural Attenuation Study Report

A presentation was given by Mr. Todd Herrington from Parsons Engineering regarding research work performed on site S-1. Researchers, including Dr Jim Spain from the Air Force Research Lab, have collected data from the site and conclude that natural attenuation of chlorobenzene is occurring in the groundwater on and off base. Presentation slides are at atch 3.

III. Site MP Slurry Wall Update

Ms Rhonda Hampton provided an update on the status of the construction project at site MP, the location of a former metal plating shop. Photos of a similar slurry wall project were shown to the TRS and details and schedule for the MP construction were provided.

IV. Document Reviews:

a) Zone 4 Decision Document -- moved to 9 March 99 agenda

b) Site S-1 Focussed Feasibility Study

Mr. Ed Shorey, project manager from CH2M Hill gave an overview of site S-1 including history (with aerial photos), results from investigation, and results of the focussed feasibility study. The selected interim action for the soil at site s-1 is excavation coupled with soil vapor extraction.

Mr. George Rice provided comments on the document following Mr. Shorey's presentation and provided the following remarks regarding the report:

- The report (and all future reports) should reference the source of any input parameters used in making calculations so that the reader knows the basis for these parameters.

- The calculation of a soil preliminary remediation goal (PRG) was too high resulting in an estimated soil volume too low. Mr. Rice's calculations yielded almost twice the soil volume using independently derived (but of known origin) parameters in the PRG calculation.

Major de Venoge asked Mr. Rice for a copy of his comments so that they could be addressed.

V. Administrative

a) TRS Mission Statement: On hold until 9 Mar 99.

b) BCT Update: Major de Venoge provided an update of the BRAC Cleanup Team meeting held the same day (9 Feb). Key items discussed at the BCT were presented at the TRS. Minutes from the BCT will also be sent out as agreed to earlier at the RAB. The BCT is still reviewing the request for handouts from the BCT to go to the RAB.

c) Spill Summary Report: There were no reportable spills for the month of January. The report is at atch 4.

d) Documents to the TRS/RAB: Atch 2. A copy of the BRAC Process Training book was also provided to the TRS.

e) Next TRS: 9 Mar 99, 6:30pm, St. Mary's, Garni Science Hall

VI. Adjournment

The TRS adjourned at approximately 9pm.

Attachments:
1. Attendance
2. Documents list
3. Presentation on S-1 Natural Attenuation Study Report
4. Spill Summary Report

#33S
MINUTAS DE LA JUNTA

SUBCOMITÉ DE REVISIÓN TÉCNICA (TRS, POR SUS SIGLAS EN INGLÉS) DE LA BASE DE LA FUERZA AÉREA KELLY

PARA LA JUNTA ASESORA DE RESTAURACIÓN DE KELLY (RAB, POR SUS SIGLAS EN INGLÉS)
9 de febrero de 1999, Universidad de St. Mary's

I. Introducción

La junta del TRS se inició a las 18:40. El Documento Adjunto # 1 es el informe de asistencia. Los documentos entregados al TRS se especifican en el Documento Adjunto # 2.

II. Presentación: Reporte del Estudio de Atenuación Natural del Sitio S-1

A. El Sr. Todd Herrington de Parsons Engeneering hizo una presentación sobre el trabajo de investigación realizado en el Sitio S-1. Los investigadores, incluyendo al Dr. Jim Spain del Laboratorio de Investigación de la Fuerza Aérea, han recolectado información del sitio y han concluido que en el agua subterránea de la base y fuera de la base se está llevando a cabo una atenuación natural del clorobenceno. El Informe es el Documento Adjunto # 3.

III. Actualización de la Pared de Lechada del Sitio MP

La Srta. Rhonda Hampton hizo una presentación de los avances del proyecto de construcción en el Sitio MP, el lugar donde anteriormente existía un taller de platinado de metal. Se mostraron al TRS fotografías de un proyecto de pared de lechada similar y se proporcionaron los detalles y la programación para la construcción del MP.

IV. Revisión de Documentos:

a) Documento de Decisión de la Zona 4 – se transfirió a la orden del día del 9 de marzo de 1999.

b) Estudio de Factibilidad Enfocado del Sitio S-1

El Sr. Ed Shorey, Gerente de proyectos de CH2M Hill, hizo una presentación general del Sitio S-1 con sus antecedentes (y fotografías aéreas). Incluyo los resultados de la investigación y los resultados del Estudio de Factibilidad Enfocado. La actividad interina seleccionada para el suelo del Sitio S-1 es excavación junto con extracción de vapores del suelo.

El Sr. Rice hizo comentarios sobre los documentos después de la presentación del Sr. Shorey y expresó lo siguiente el informe:

- El informe (y todos los informes futuros) deben hacer referencia a la fuente de cualquier parámetro que se haya usado al hacer los cálculos para que el lector sepa en qué se basan esos parámetros.

- El cálculo del objetivo de corrección preliminar del suelo (PRG, por sus siglas en inglés) era muy alto lo cual daba por resultado un volumen estimado muy bajo del suelo. Los cálculos del Sr. Rice produjeron casi el doble del volumen del suelo usando parámetros con un derivado independiente (pero de origen conocido) en el cálculo del PRG.

El Mayor de Venoge le pidió al Sr. Rice una copia de sus comentarios para que se pudieran hablar de ellos.

III. Puntos administrativos:

a) Misión del TRS: Queda pendiente hasta el 9 de marzo de 1999.

b) Actualización del Equipo de Limpieza BRAC (BCT por sus siglas en inglés): El Mayor Tom de Venoge proporcionó información sobre los avances de la junta del BCT que se llevó a cabo en esta misma fecha (9 de febrero de 1999). Los puntos más importantes que se trataron en el BCT se presentaron ante el TRS. También se enviarán las minutas del BCT como se acordó previamente en el RAB.

c) Informe del Resumen de Derrames: No hubo derrames reportables en el mes de enero de 1999. El Informe es el Documento Adjunto # 4.

d) Documentos que se entregaron al TRS /RAB: Documento Adjunto # 2. También se le entregó al TRS una copia del libro de Capacitación del Proceso del BRAC.

e) Siguiente Junta del TRS: La siguiente junta del TRS será a las 6:30 p.m. del día 9 de marzo de 1999 en el Garni Science Hall, de la Universidad de St. Mary.

IV. Cierre de la Sesión:

Se cerró la junta del TRS aproximadamente a las 9 p.m.

Documentos Adjuntos:
1. Lista de Asistencia
2. Lista de Documentos
3. Presentación del Informe del Estudio de Atenuación Natural del Sitio S-1
4. Informe del Resumen de Derrames

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SAN ANTONIO AIR LOGISTICS CENTER (AFMC)
KELLY AIR FORCE BASE, TEXAS

9 FEB 1999

MEMORANDUM FOR REMEDIAL ACTION BOARD/TECHNICAL REVIEW SUBCOMMITTEE (RAB/TRS)

FROM: SA-ALC/EMC
307 Tinker Drive, Bldg 306
Kelly AFB, TX 78241-5917

SUBJECT: Monthly Spill Report for January 1999

There have been no reportable quantity spills for the month of January. One otherwise notable spill occurred on 06 January 1999. A Citrus based cleaner from an unknown source entered an industrial area storm drain, which leads to Outfall 003. The discharge reached the Outfall 003 basin and the tributary leading to Leon Creek, but did not migrate off Air Force property. The discharge was controlled within the tributary and corrective measures were taken to recover the contaminated water. Localized high concentrations of this product may cause adverse effects to aquatic life. Several small fish in the affected area were killed. The incident was reported to the Texas Natural Resource Conservation Commission (TNRCC), Local Emergency Planning Committee (LEPC), and Air Force Headquarters. Representative from the Texas Parks and Wildlife and the TRNCC responded to investigate the incident. Inspection of the impacted area and the Leon Creek concluded appropriate corrective measures in mitigation of the release, and concluded no impact to the State waterway. Should you have any further questions or require additional information, please contact Mr Jerry Pantoja at (210) 925-3100 ext 310 or e-mail jpantoja@emgate1.kelly.af.mil.

CHARLES R. WILLIAMS, P.E.
Chief, Environmental Compliance Division

ATCH 4

Monitored Natural Attenuation For Chlorinated Benzenes In Groundwater At Site S-1, Kelly AFB

R. Todd Herrington
Parsons Engineering Science, Inc.
Denver, Colorado

Erica Becvar
Applied Research Associates, Inc.
Tyndall AFB, Florida

Dr. Jim Spain
Air Force Research Laboratory
Tyndall AFB, Florida

Dr. Jim Gossett
Cornell University
Ithaca, New York

Compounds With Potential For Natural Attenuation

- Hydrocarbons
- Acetone
- Methylethyl Ketone
- Chlorobenzene
- Dichlorobenzenes
- 1,2,4-Trichlorobenzene
- 1,2,4,5-Tetrachlorobenzene
- Chlorophenols
- Pentachlorophenol
- Methylene Chloride
- 1,2-Dichloroethane
- Perchloroethylene
- Trichloroethylene
- Dichloroethylene
- 1,2-Dibromoethane
- Vinyl Chloride
- Polychlorinated Biphenyls
- Nitrobenzene
- Nitrotoluenes
- Dinitrotoluenes
- 1,3-Dinitrobenzene
- Nitrophenols
- 2,4-Dinitrophenol
- Picric Acid
- Nitrobenzoic Acids
- Nitroglycerin
- Pesticides
- Aniline

Source: (Spain, 1997; Bioremediaton Journal, Vol. 1:1)

EPA Definition- Monitored Natural Attenuation

The Term Monitored Natural Attenuation Refers to The Reliance on Natural Attenuation Processes (Within the Context of a Carefully Controlled and Monitored Site Cleanup Approach) to Achieve Site-specific Remedial Objectives Within a Time Frame That Is Reasonable Compared to Other Methods

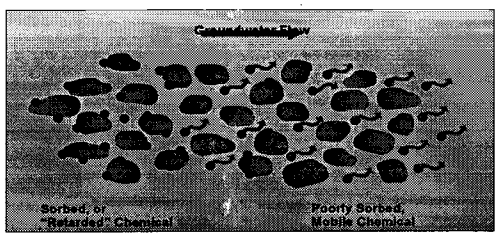
EPA Definition- Natural Attenuation Processes

A Variety of Physical, Chemical, or Biological Processes that, Under Favorable Conditions, Act Without Human Intervention to Reduce the Mass, Toxicity, Mobility, Volume, or Concentration of Contaminants in Soil or Groundwater

Three Lines of Evidence Used to Document Natural Attenuation

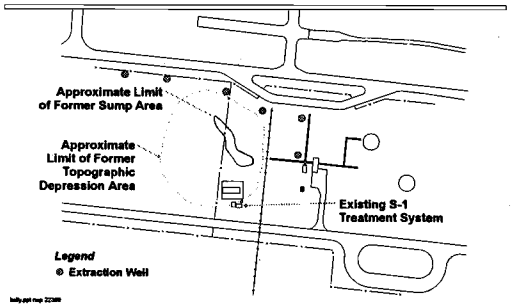
1. Documented Loss of Contaminants at the Field Scale
2. Contaminant and Geochemical Analytical Data
3. Microcosm Studies

Chemical Retardation and Dispersion

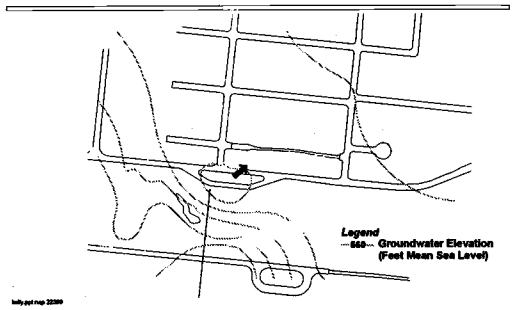


ATCH 3

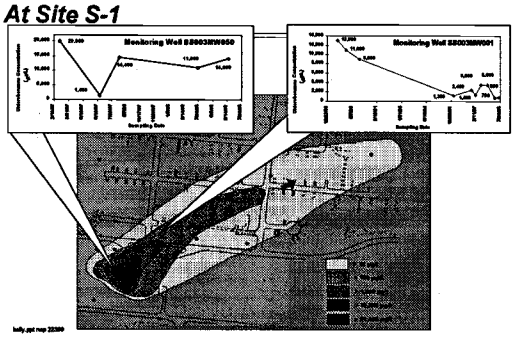
Site S-1 Layout



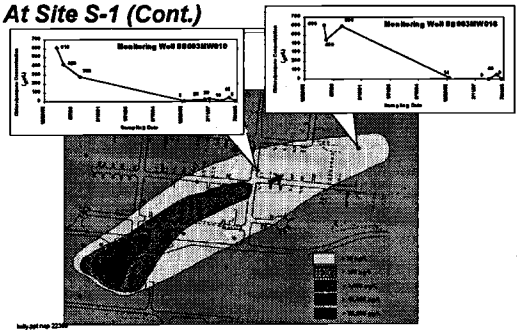
Groundwater Table



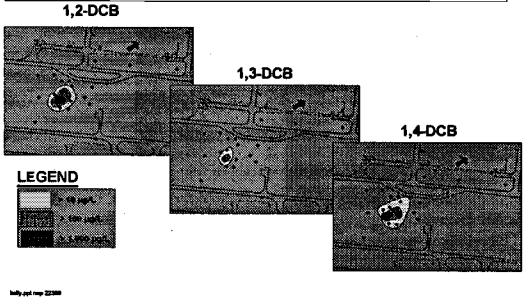
Historical Groundwater Chlorobenzene Trends At Site S-1



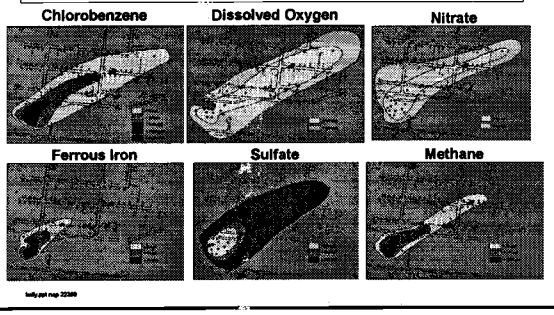
Historical Groundwater Chlorobenzene Trends At Site S-1 (Cont.)



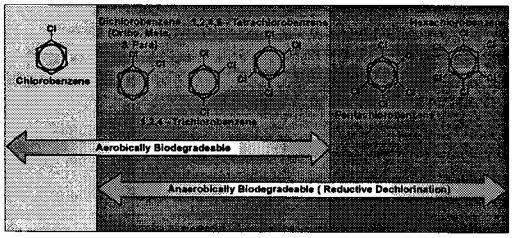
Dichlorobenzenes In Groundwater At Site S-1, March 1998



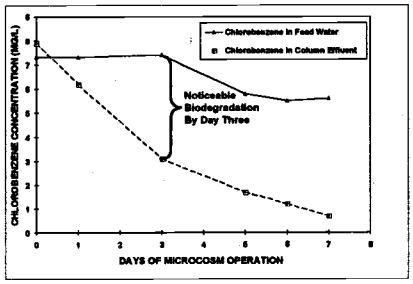
Geochemical Trends At Site S-1 March 1998



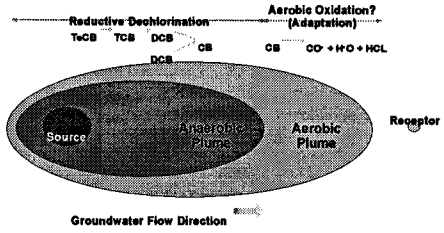
Susceptability of Chlorinated Benzenes to Biodegradation



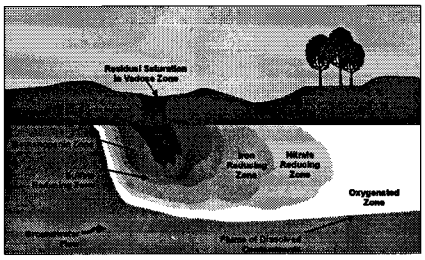
Microcosm Study Results (Laboratory)



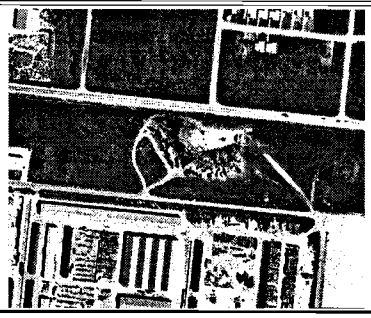
Conceptual Model of Chlorinated Plume Behavior Under the Effects of Biodegradation



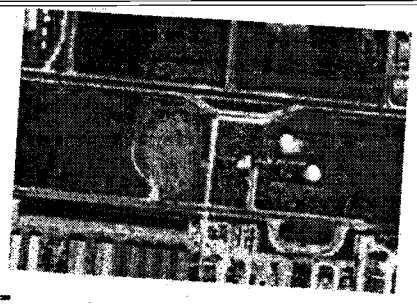
Conceptualization of Electron Acceptor Zones in the Subsurface



Site S-1 (1966)

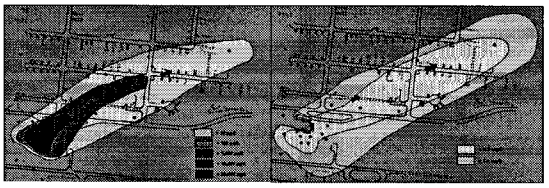


Site S-1 (1972)



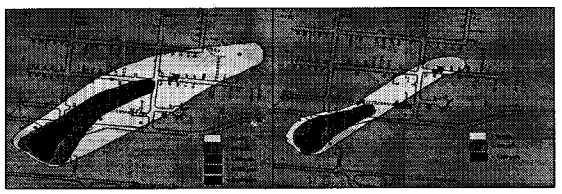
Chlorobenzene Versus Dissolved Oxygen March 1998

Chlorobenzene in Groundwater | Dissolved Oxygen in Groundwater



Chlorobenzene Versus Methane March 1998

Chlorobenzene in Groundwater | Methane in Groundwater

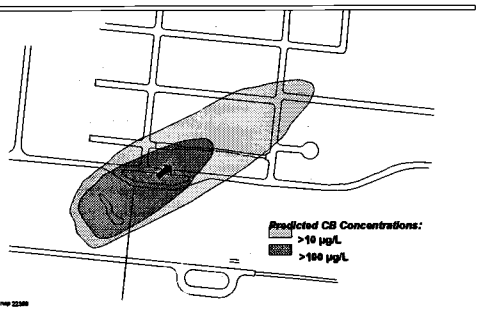


Summary of CB Half Lives at Site S-1

- CB half life on base ~ 36 to 48 days
- DCB half life on base ~ 10 to 151 days

- CB half life off base ~ 315 to 877 days
- DCB half life off base ~ Not Applicable

Groundwater Model - 2009



Proposed Long-Term Monitoring Plan For Site S-1

- 9 long-term monitoring wells within, upgradient, crossgradient, and downgradient from the current CB plume.
- 3 point-of-compliance monitoring wells northeast of CB plume toe.
- Annual LTM and POC sampling until 2009; biennial sampling until 2019.

Predicted Trends For DCB and CB Contamination at Site S-1

- Natural attenuation has halted plume expansion at Site S-1; however, CB concentrations above the Federal MCL of 100 µg/L will persist near the base boundary;
- Currently, ~2.7 acres of the off base CB plume exceeds the Federal MCL for CB of 100 µg/L, and will drop to 1.2 acres by 2009; and
- DCB concentrations attenuated prior to off base migration.

Predicted Trends For DCB and CB Contamination at Site S-1 (Continued)

- The CB plume may attenuate faster than predicted and fall below the Federal MCL of 100 µg/L sooner for the following reasons:
  - attenuation by aerobic biodegradation becomes more important as carbon loading lessens;
  - actual source weathering rates exceed assumed geometric weathering rates of 3 percent per year.

Conclusion

- Documented biodegradation of chlorinated benzenes supports the application of MNA; and
- Behavior of chlorinated benzenes in groundwater is similar to chlorinated ethene behavior:
  - Reductive Dechlorination most important for multi-chlorinated benzenes; and
  - Aerobic Biodegradation of CB limited by rate of oxygen supply to aquifer.

Executive Summary

Introduction

Kelly Air Force Base (AFB) makes continuing efforts to identify and clean up environmental contamination at the base caused during 80 years of continuous operation. This report details the remedial investigation of the area on Kelly AFB referenced as Zone 5. The investigation was conducted pursuant to Kelly AFB's Installation Restoration Program (IRP) and the requirements of the Order issued by the Texas Natural Resource Conservation Commission (TNRCC) in May 1989.

Description of the Remedial Investigation Process

To comply with federal environmental laws, the Department of Defense (DoD) developed the IRP to study, design solutions, clean up, and monitor environmental contamination caused by past waste management practices. The Air Force must comply with regulations written by the U.S. Environmental Protection Agency (EPA). According to these regulations, the main goal of a remedial investigation is to evaluate whether the release of chemicals from past waste management practices resulted in contamination that poses a current or potential threat to human health or the environment. Other goals of this IRP investigation include:

- Identifying the nature of the contaminants, source areas, and the vertical and horizontal extent of the contamination
- Providing enough information so that the next phase of work, the feasibility study, can evaluate and select cleanup methods

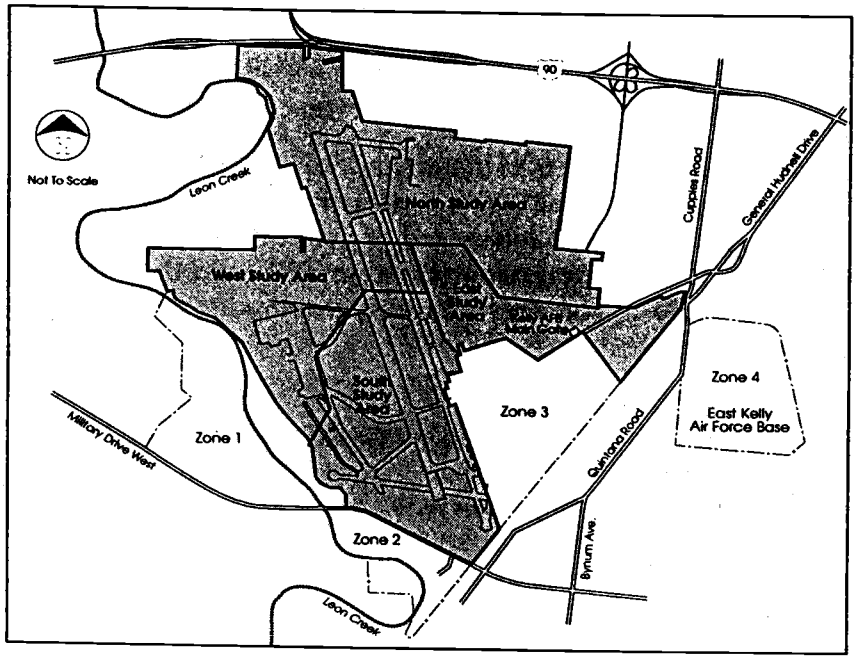
Description of Zone 5

When the IRP began in the early 1980s, Kelly AFB's Environmental Management staff identified 52 suspected or potential releases of chemicals to the ground. The base was then divided into five zones to group the IRP sites into manageable areas and to efficiently conduct investigations and clean up the environment.

Because Zone 5 covers more than half the base area, it was divided into four study areas (Exhibit ES.1). Zone 5 includes the runways, taxiways, and associated operations; warehouse areas; base housing; base administration; and aircraft maintenance areas. There are also several IRP sites that handled the following chemicals and products:

- Aircraft fuels
- Solvents (industrial chemicals used for removing grease and oils from aircraft parts)
- Diesel fuel for emergency generators
- Vehicle gasoline

EXHIBIT ES.1
Kelly AFB Zone 5 Study Areas
Kelly AFB, IRP Zone 5 RI Report, 1999



The facilities and activities that once handled chemicals and products at Kelly AFB have since relocated around the base. Zone 5 includes many areas that were used during and after World War II.

Remedial Investigation Approach

The remedial investigation of Zone 5 included studying all 2,600 acres, beginning with a screening analysis. The screening analysis provided a thorough and efficient investigation by taking an unbiased look at the whole area without focusing on suspected releases only. The screening analysis revealed previously unknown areas that had possible soil and/or groundwater contamination.

After the screening analysis, soil borings and monitoring wells were drilled to collect samples of soil and groundwater. These samples were then analyzed in a laboratory using a broad range of tests to measure the amounts of chemicals present. Tests were also conducted on the wells to describe how fast groundwater moves and the direction that contaminants might move in the future.

The data were reviewed to evaluate whether chemicals in soil and groundwater might cause human health or ecological problems.

Findings

The testing found that some areas in Zone 5 have groundwater impacted by chemicals. The most frequently detected chemicals were degreasing solvents. The next most common were the components of jet fuel that dissolve in groundwater. Contamination in soils is mostly in previously identified areas. Most of the source areas at Zone 5 were identified before the start of the remedial investigation.

Most of the groundwater containing dissolved chemicals is within the boundaries of Kelly AFB; however, groundwater from the northeastern part of Zone 5 exits the base property and travels beneath the North Kelly Gardens and Jamar Village neighborhoods. Exhibits ES.2 and ES.3 show where dissolved chemicals are present in shallow groundwater above federal and state drinking water standards.

North Side of Zone 5

Chemicals associated with solvents and some fuels have been detected in groundwater in the north part of the Zone 5 and have moved off base to the north and east. Cleanup has already begun at the previously identified Site S-1 and the 1500 Area. Site S-1 is a former waste oil storage facility used from the 1960s to 1973 in the old Defense Property Disposal Office (DPDO) building. Materials reportedly disposed on this site include spent solvents, transformers, and scrap metal. In September 1991, 1,000 gallons of JP-4 jet fuel were reportedly spilled in the 1500 Area. A previously unknown source area may be present near Building P1533 and adjacent storage yard area.

South Side of Zone 5

Sources in the flight line area are primarily at the southern half of the runway. These sources include maintenance operations southeast of Zone 5 (in Zone 3) and old maintenance areas that existed during World War II. Dissolved solvents are present in groundwater near the middle of the runway and south of the runway.

West Side of Zone 5

Areas of affected groundwater on the west side of Zone 5 are within base boundaries. The west side of the flight line is occupied by the Texas Air National Guard (TANG) and the 433rd C-5 Wing of the Air Force Reserve. The one known site in the west side of Zone 5, known as the 1100 Area, was where jet fuel was spilled in 1988. The 1100 Area has been extensively studied, and soil and groundwater cleanup have been started. Degreasing solvents detected in the groundwater at the 1100 Area are believed to be from old aircraft maintenance facilities along Billy Mitchell Road.

Affected groundwater was also detected around one of the buildings in the TANG area. Some soil contamination was found in soils near Westover Road.

East Side of Zone 5

Solvent and fuel contamination in groundwater near the flight line are associated with storage areas. These areas of affected groundwater are confined to the base boundaries and should not move off base in the future. Some cleanup has already taken place at some of the areas,

including removing underground storage tanks (USTs) and some contaminated soil at previously identified Sites S-5 and S-10.

Low concentrations of solvents were detected in groundwater near the east property boundary and rail yard. Also, fuel contamination was found at the CE Motor Pool (B38) located near the east property boundary.

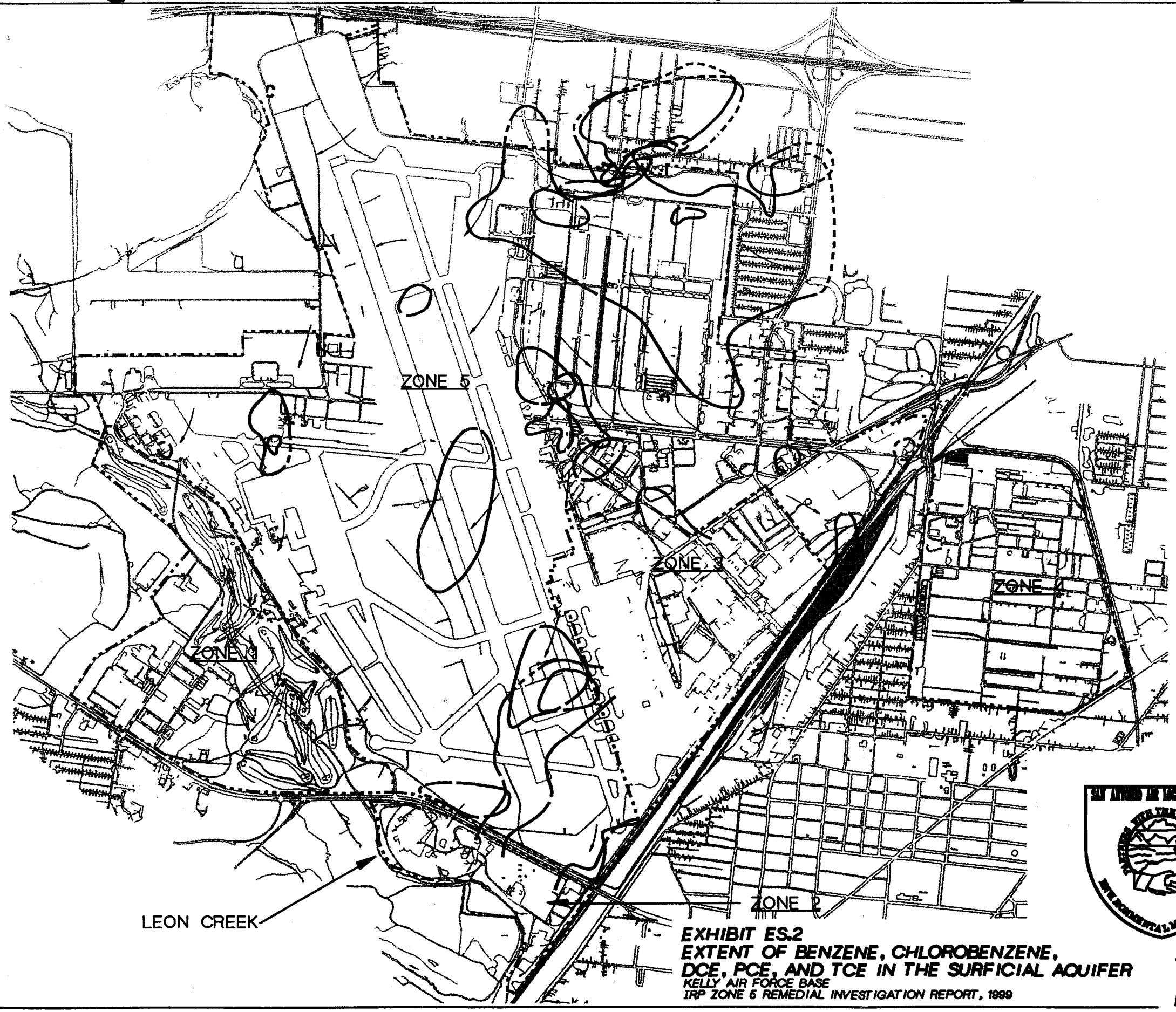
Conclusions

The most important part of the remedial investigation is to evaluate the potential impact of the contamination on human health and the environment. The following conclusions were made regarding potential human health and environmental impacts:

- **Human health.** There is no risk to human health from contamination found in the groundwater as long as the water is not used for drinking or bathing. For the most part, soils do not pose a potential health risk to humans except in a few isolated locations.
- **Environment.** Most of Zone 5 does not have any ecological risks from the chemical contamination. However, the western part of Zone 5 has a few areas near Westover Road with high enough concentrations of chemicals to pose a threat to birds that frequent the area. Another location near Westover Road has contamination in groundwater that could reach Leon Creek within 10 years using conservative assumptions. However, it has not been detected in the creek at a nearby, downstream sampling station.

Future Plans for Cleanup

The areas that show potential risk to human health or the environment will be addressed by a feasibility study, which will examine cleanup options, recommend solutions, and begin setting priorities for cleanup.



N

1000 0 1000 2000
SCALE IN FEET

LEGEND

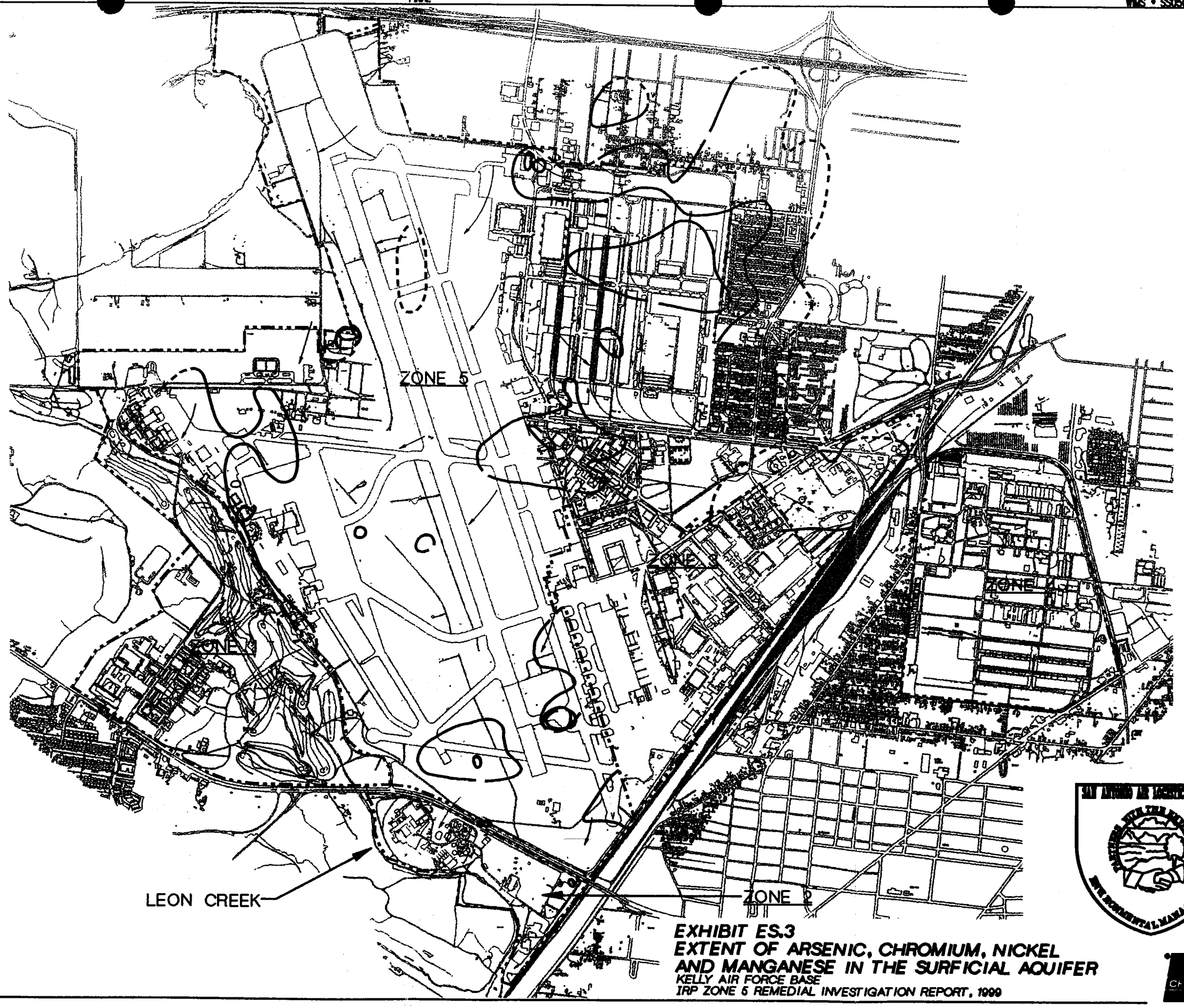
- TCE ISOCONCENTRATION (5 µg/L).
- PCE ISOCONCENTRATION (5 µg/L).
- DCE ISOCONCENTRATION (70 µg/L).
- BENZENE ISOCONCENTRATION (5 µg/L).
- CHLOROBENZENE ISOCONCENTRATION (100 µg/L).
- GROUNDWATER FLOW DIRECTION
- STUDY AREA BOUNDARY

NOTES

1. PLUME EXTENT GENERATED FROM AND INTERPOLATED BETWEEN SAMPLE LOCATIONS.
2. ALL SAMPLES COLLECTED MAY, JUNE, AND NOVEMBER 1995.
3. ISOCONCENTRATIONS DASHED WHERE INFERRED.
4. CONTOURS DRAWN AT THE MCL.
5. DCE PRESENTED AS TOTAL 1,2 DCE MCL REPRESENTS CIS-1,2-DCE

EXHIBIT ES.2
EXTENT OF BENZENE, CHLOROBENZENE, DCE, PCE, AND TCE IN THE SURFICIAL AQUIFER
KELLY AIR FORCE BASE
IRP ZONE 5 REMEDIAL INVESTIGATION REPORT, 1999

SAN/KELLY/ZONE5RI-0199/GSRIC060.DLV 12000 01/19/99



LEGEND

- ARSENIC ISOCONCENTRATION (50 µg/L).
- CHROMIUM ISOCONCENTRATION (100 µg/L).
- NICKEL ISOCONCENTRATION (100 µg/L).
- MANGANESE ISOCONCENTRATION (50 µg/L).
- GROUNDWATER FLOW DIRECTION
- STUDY AREA BOUNDARY

NOTES

1. PLUME EXTENT GENERATED FROM AND INTERPOLATED BETWEEN SAMPLE LOCATIONS.
2. ALL SAMPLES COLLECTED MAY, JUNE, AND NOVEMBER 1996.
3. ISOCONCENTRATIONS DASHED WHERE INFERRED.
4. CONTOURS DRAWN AT THE MCL.
5. DCE PRESENTED AS TOTAL 1,2 DCE MCL REPRESENTS CIS-1,2-DCE

EXHIBIT ES.3
EXTENT OF ARSENIC, CHROMIUM, NICKEL AND MANGANESE IN THE SURFICIAL AQUIFER
KELLY AIR FORCE BASE
IRP ZONE 5 REMEDIAL INVESTIGATION REPORT, 1999

SAN/KELLY/ZONE5RI-0199/05RIC061.DLV 1:6000 01/15/99

Kelly Air Force Base
IRP Zone 5

Site S-1 Soil Focused Feasibility Study

Presented to:
Technical Review Subcommittee
San Antonio, Texas
February 9, 1999

Introduction

- Interim action for soil contamination at Site S-1.
- Recommended Alternative (s) from this FFS have been brought forward to design and implementation.

Site S-1 Description and Background

- Former intermediate waste storage area
- Wastes stored included solvents, carbon cleaning compounds, and petroleum, oil, and lubricants
- Wastes stored from the 1960s until 1973 in a depression referred to as "sump" area

Nature and Extent of Contamination

- Primary contaminant is chlorobenzene (CB)
- Greatest concentrations in soil found at depths below 14 feet (original depth of sump)
- Free-phase oil occurs at depths ranging from 18 to 24 feet bgs within former sump
- CB more widespread near water table through transport in the groundwater or LNAPL oil layer
- Water table fluctuation spread LNAPL and CB within the "smear" zone

Summary of Risk Assessment

- **No unacceptable risks for ingestion or dermal contact with soil or inhalation of particulates and VOCs under industrial maintenance or construction-worker exposure scenarios**
- **Unacceptable risks exist if groundwater below and down gradient of the site is used as drinking water supply**
- **Soil contaminants are leaching to groundwater, causing continued exceedences of MCLs and Texas MSCs.**

Remedial Objectives

- To minimize the leaching of contaminants at concentrations sufficient to cause exceedance of MCLs or Texas MSCs
- Three Contaminants of Concern:
  - CB (Preliminary Remediation Goal (PRG) = 16.7 ppm)
  - 1,2-DCB (PRG = 106 ppm)
  - 1,4-DCB (PRG = 10 ppm)

Remedial Alternatives
Sump Area

- No Further Action
- Natural Attenuation and Capping
- Soil Vapor Extraction (SVE)
- Excavation and Off-Site Disposal
- Ex-Situ Biological Treatment

Remedial Alternatives
Smear Zone

- No Further Action
- Natural Attenuation and Capping
- Soil Vapor Extraction (SVE)
- Dual-Phase Groundwater Recovery and SVE

Recommended Alternatives

- Sump Area:

  Excavation and Off-Site Disposal - $601,000

- Smear Zone:

  Dual-Phase Groundwater Recovery and SVE - $756,000

Alternatives Evaluation

Excavation and Off-Site Disposal - Sump Area

- Removal of soil eliminates risk of gw exceedences
- Readily implementable and more reliable than ex situ biological remediation
- Minimizes need for institutional controls
- Requires air monitoring during implementation
- More effective than SVE because of oily layers and clayey soil

Alternatives Evaluation

Dual-Phase GW Recovery and SVE - Smear Zone

- Physically remove contaminants through volatilization and enhanced aerobic degradation
- Lowers water table to increase CB stripping and degradation over SVE alone
- Estimated 5 year implementation period
- Operation would be integrated with existing interim gw treatment system

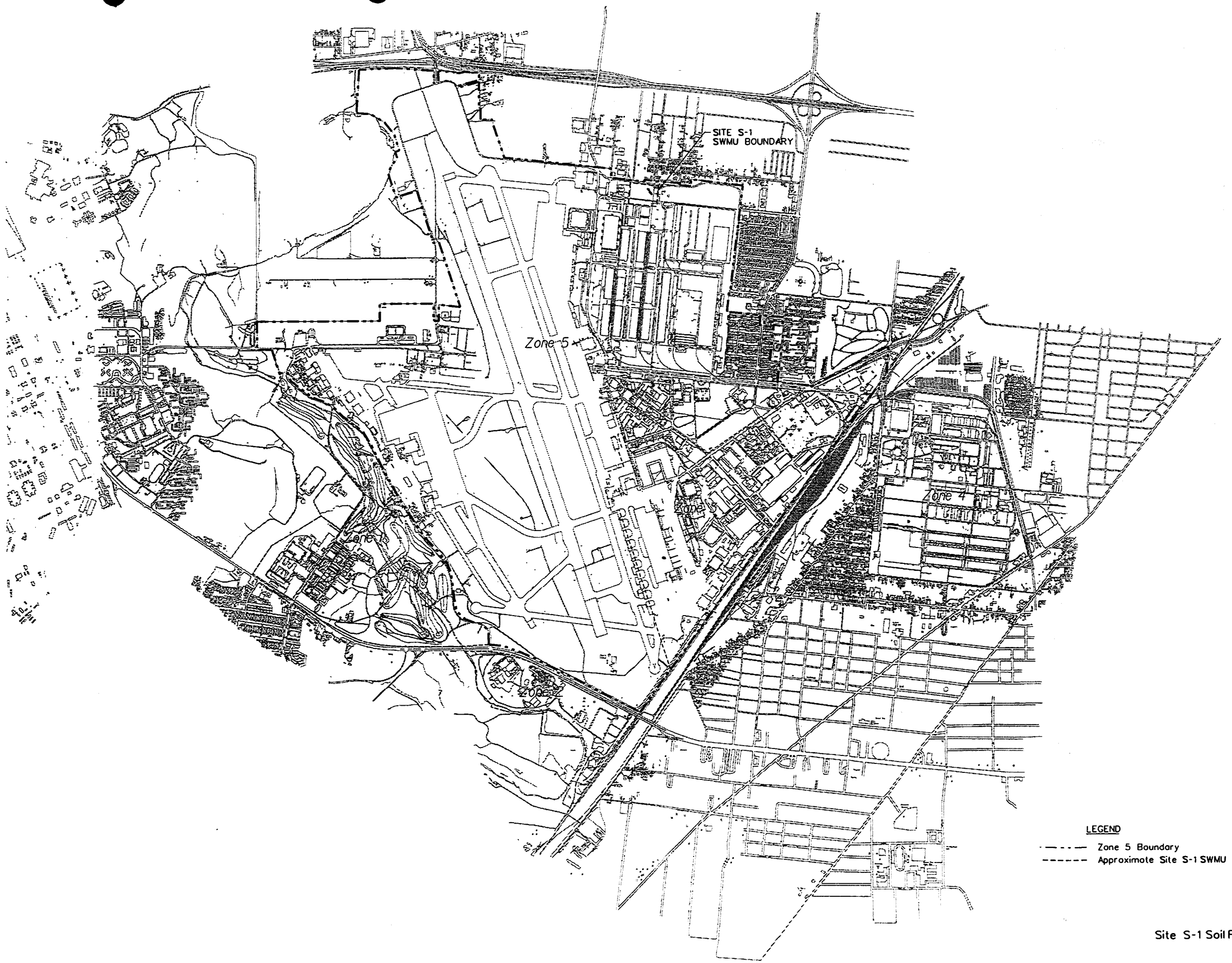


FIGURE 1-1
Zone 5 Vicinity Map
Kelly Air Force Base
Site S-1 Soil Focused Feasibility Study-1998

CH2MHILL

/111494/soilbore/1494_01.dlv 05-OCT-1998

SS306 MW006 SS307 HP020 HP022 HP023 SS311 MW007 SS312
SS289 HP017 HP018 SS292 SS293 SS294 SS295
GROWDON DRIVE
SS274 SS275 SS276 SS277 SS278 SS279 SS280
RW112 SITE S-1 SWMU BOUNDARY RW113 SB207 SB198 SB217
RW202 RW114 SB045 SB205
SS250 SS251 SB208 SS252 SS253 RW115 SS254 SS256 SS257
SB216 SS255 SB204
Dieldrin | 1-3 | 0.091
TW049 SB203 MW050
SB044 SS236 SS237 HA092 SB197 SS238 SB046 SB213 SB210 TW051 SB199 SB057 MW053 SS239 SB214 SB215 SS240 RW116 SB201 SS241
Chlorobenzene | 16-18 | 190
Chlorobenzene | 16-18 | 28
1,2-Dichlorobenzene | 16-18 | 1790
1,4-Dichlorobenzene | 16-18 | 237
TW052 SB212 SB048 SB209 SB058
Benzo(a)pyrene | 0-2 | 0.87
1,4-Dichlorobenzene | 18-21 | 30
Benzene | 0-1 | 0.8J
1,2-Dichlorobenzene | 16-20 | 230
1,4-Dichlorobenzene | 16-20 | 38
1593 1592
SB055 SB211 SB200 SB054 SS216 HA086 HA091 SS217 SS218 SS219 SS220 SS221
1,2-Dichlorobenzene | 17-22 | 1200
1,4-Dichlorobenzene | 17-22 | 120
Benzo(a)pyrene | 0-1 | 0.39
Benzo(a)pyrene | 0-1 | 1.3
POL TANK

N
0 25 50 75
Scale In Feet

LEGEND
SAMPLE DEPTH (Ft. bgs)
CONCENTRATION
CONTAMINANT
RECOVERY WELL
SOIL BORING
SURFICIAL SOIL SAMPLE
MONITORING WELL
HAND AUGER SHALLOW BORING
TEMPORARY WELL
FORMER SUMP BOUNDARY
SWMU BOUNDARY PRESENTED IN 1994 SITE S-1 RI

NOTES:
1. CONCENTRATIONS IN mg/Kg (ppm).
2. BORINGS WITHOUT SAMPLE DATA ARE SHOWN IN LIGHT TYPE.
3. ONLY CONTAMINANTS EXCEEDING PRG'S ARE SHOWN

AREA EXCEEDING PRG'S
J-ESTIMATED CONCENTRATION

SAN ANTONIO AIR LOGISTICS CENTER
PARTNERS WITH THE ENVIRONMENT
ENVIRONMENTAL MANAGEMENT

FIGURE 2-1
Areas Exceeding PRG's
for Unsaturated Zone (0-20')
Kelly Air Force Base
Site S-1 Soil Focused Feasibility Study-1998

CH2MHILL

SS306 MW006 SS307 HP020 HP022 HP023 SS311 MW007 SS312
SS289 HP017 HP018 GROWDON DRIVE SS292 SS293 SS294 SS295
SS274 SS275 SS276 SS277 SS278 SS279 SS280
RW112 SITE S-1 SWMU BOUNDARY RW113 SB198 SB207 SB217
RW202 RW114 SB205 SB045
SS250 SS251 SS252 SS253 SS254 SS255 SS256 SS257
SB208 TW049 SB203 MW050 SB204 SB216
SB044 SS236 SS237 SB046 SB213 SB210 TW051 SB214 SB215
HA092 SB197 SS238 SB057 MW053 SS239 SS240 SB201 RW116
SB059 SB212 TW052 SB048 SB209 SB058 SB055 SS241
SB211 SB200 SB051 SS216 HA086 HA091 SS217 SS218 SS219 SS220 SS221
1592 1593

Chlorobenzene	24-26	7.8
Chlorobenzene	26-28	29
Benzene	26-28	0.324
Chlorobenzene	28-31	44.4
2,6 Dinotrotoluene	26-28	0.118
Vinyl Chloride	17-22	0.076
Benzene	17-22	0.3
Chlorobenzene	22-24	31
Chlorobenzene	24-26	88
Chlorobenzene	23-25	49
Chlorobenzene	24-26	7.2
Chlorobenzene	24-26	2.9
Chlorobenzene	22-24	49
Chlorobenzene	24-26	34

CHLOROBENZENE = 1 mg/kg

POL TANK

N

0 25 50 75
Scale In Feet

LEGEND — SAMPLE DEPTH (Ft. bgs) / CONCENTRATION

CONTAMINANT

- RECOVERY WELL
- SOIL BORING
- SURFICIAL SOIL SAMPLE
- MONITORING WELL
- HAND AUGER SHALLOW BORING
- TEMPORARY WELL
- FORMER SUMP BOUNDARY
- SWMU BOUNDARY PRESENTED IN 1994 SITE S-1 RI

NOTES:
1. CONCENTRATIONS IN mg/Kg (ppm).
2. BORINGS WITHOUT SAMPLE DATA ARE SHOWN IN LIGHT TYPE.
3. ONLY CONTAMINANTS EXCEEDING PRG'S ARE SHOWN

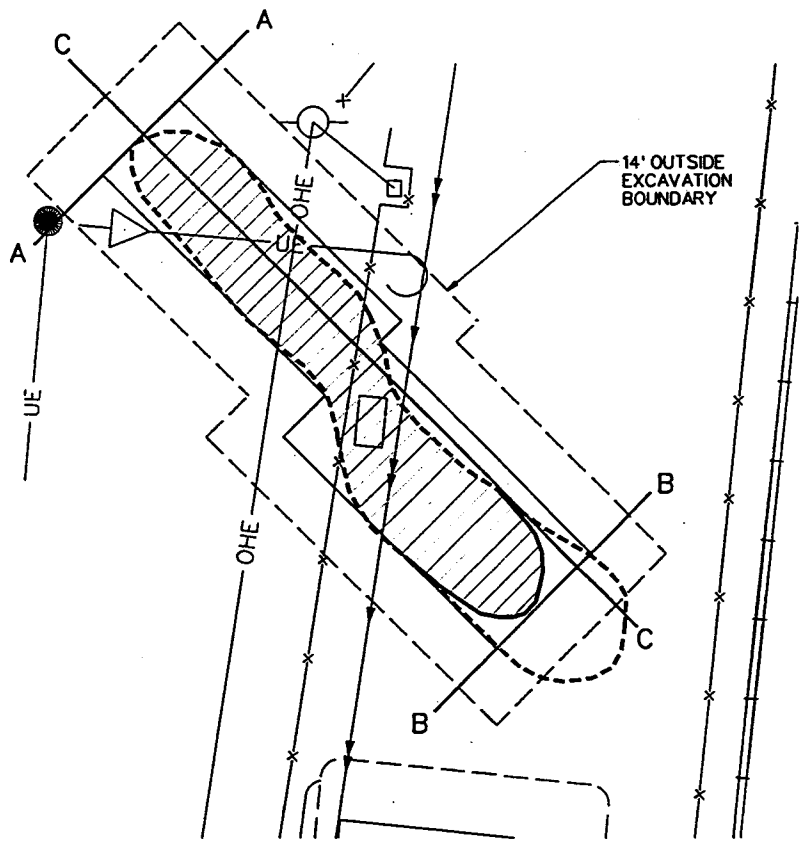
AREA EXCEEDING PRG'S J-ESTIMATED CONCENTRATION

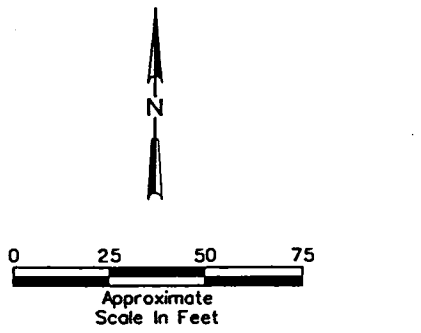
CHLOROBENZENE 1mg/kg CONTOUR

SAN ANTONIO AIR LOGISTICS CENTER
PARTNERS WITH THE ENVIRONMENT
ENVIRONMENTAL MANAGEMENT

FIGURE 2-2
Areas Exceeding PRG's for Deep Zone (>20')
Kelly Air Force Base
Site S-1 Soil Focused Feasibility Study-1998

CH2MHILL

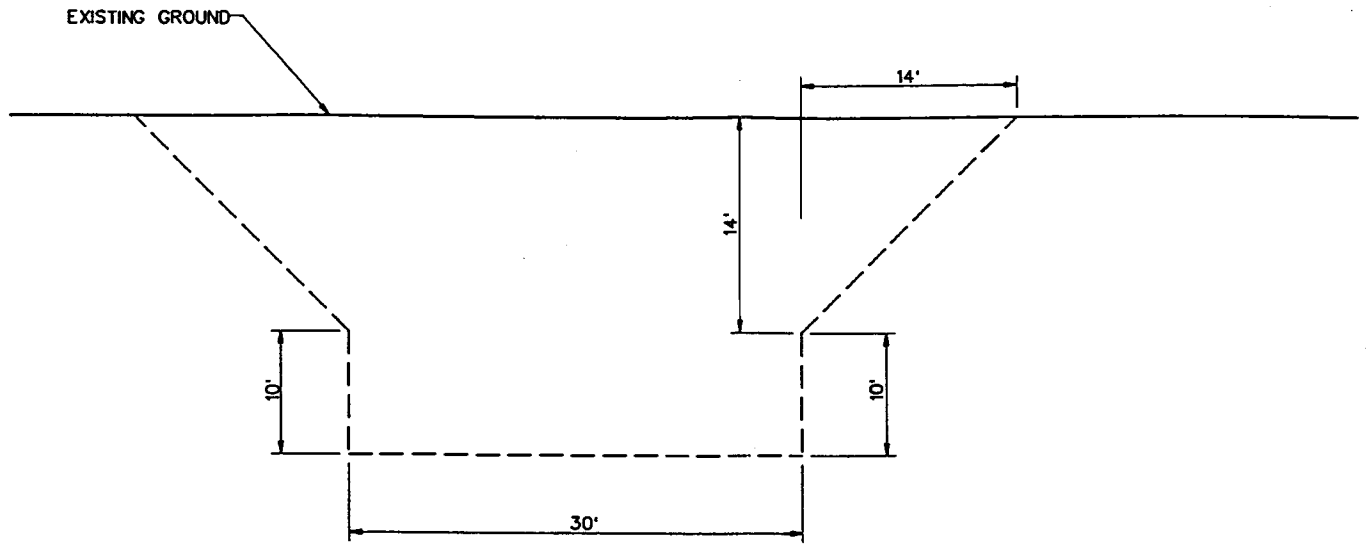




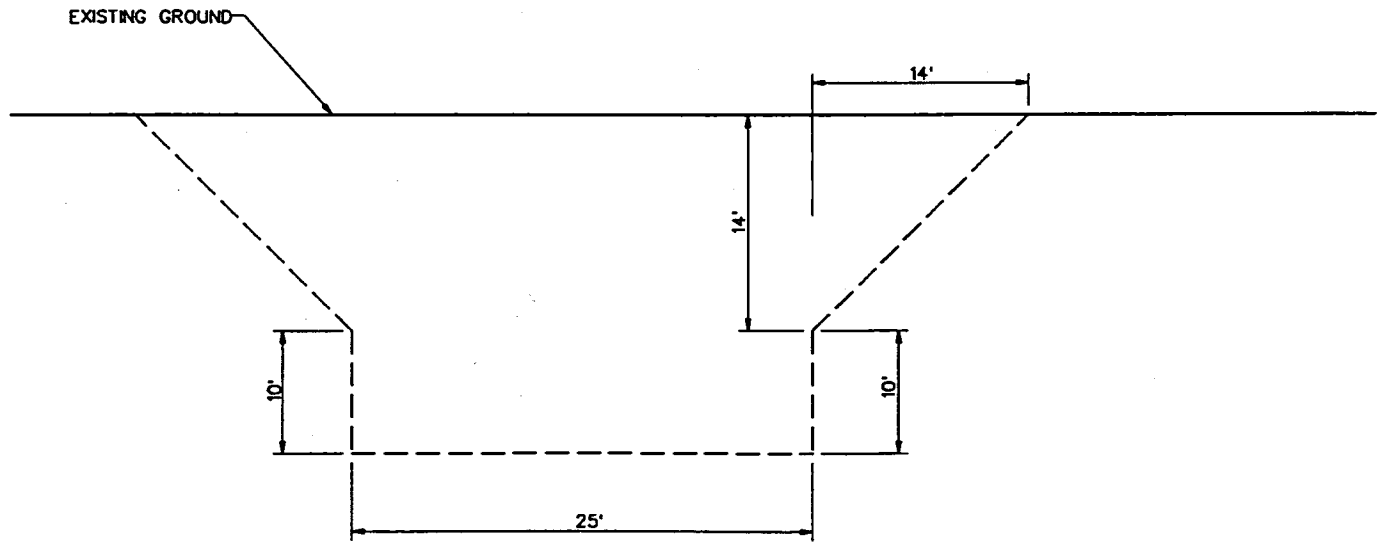
LEGEND

- ▲ RECOVERY WELL
- FORMER SUMP BOUNDARY
- —OHE— OVERHEAD ELECTRIC
- —UE— UNDERGROUND ELECTRIC
- INFLUENT/EFFLUENT LINE (UNDERGROUND) TO EXISTING GROUNDWATER TREATMENT SYSTEM
- FENCE
- RAILROAD TRACK
- AREA EXCEEDING CLEANUP CRITERIA

NOTE:
1. ACTUAL EXCAVATION LIMITS TO BE VERIFIED IN THE FIELD.



SECTION B
NTS



SECTION A
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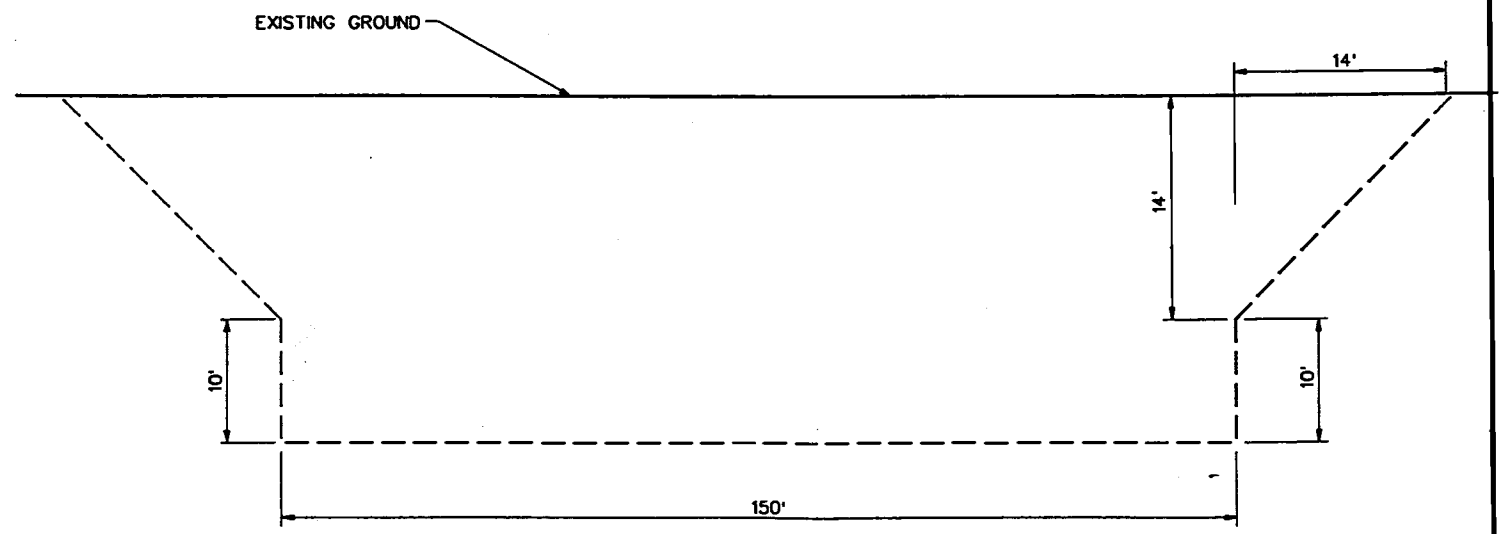

SECTION C
NTS

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DSGN	JW
DR	ML
CHK	EW
APVD	

NO.	DATE	REVISION	BY	APVD

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 ½"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

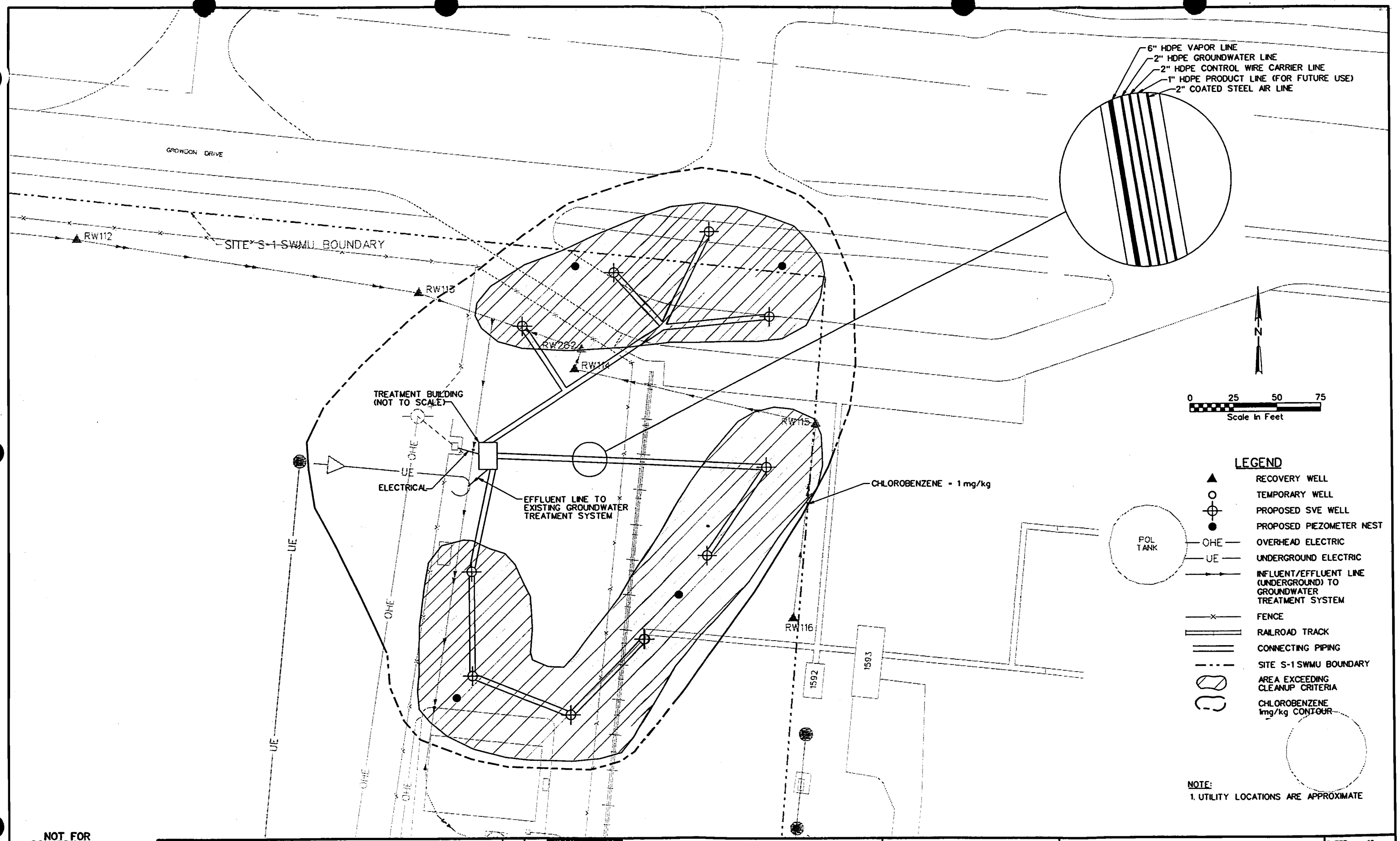
CH2MHILL

Site S-1
Soil 30% Remedial Design
Kelly Air Force Base
San Antonio, Texas

SC-2
CROSS-SECTION
OF SUMP AREA
EXCAVATION LIMITS

SHEET	15
DWG NO.	SC-2
DATE	OCT 1998
PROJ NO.	111494

//SAN/CAD/KELLY/ZN5 FFS/ sc-2.dlv 13-OCT-1998



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DSGN JW					VERIFY SCALE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.
DR ML					
CHK EW					
APVD	NO.	DATE	REVISION	BY	APVD

CH2MHILL

Site S-1
Soil 30% Remedial Design
Kelly Air Force Base
San Antonio, Texas

ZC-1
CIVIL SITE PLAN OF
SMEAR ZONE ALTERNATIVE

SHEET NO.	16
DWG NO.	ZC-1
DATE	OCT 1998
PROJ NO.	111494

//SAN/CAD/KELLY/ZN5 FFS/zc-1.dv
13-OCT-1998

To: Kelly AFB Restoration Advisory Board
Technical Review Subcommittee
From: George Rice
Subject: Comments on Final Site S-1 Soil Focused Feasibility Study, October 1998
Date: 29 March, 1999

These comments include material presented at the 9 February meeting of the Kelly AFB Restoration Advisory Board Technical Review Committee. The Feasibility Study is generally well done and based on a reasonable approach for cleaning up contaminated soils. However, like many Kelly AFB Installation Restoration Program documents, it does not contain information required to verify some of its major claims and conclusions.

Off-Base Groundwater Contamination

Page 1-9 states:

TCE and tetrachloroethene (PCE) are found primarily in off-base wells at low concentrations and do not appear to be associated with the former depression or releases at Site S-1 or other waste management activities at Kelly AFB.

The Study does not contain the information required to support this statement.

Exposure Assessment - Inhalation of Outgassing Volatiles in the Adjacent Neighborhood

Page 1-11 states:

Additional exposure routes were considered but were determined to be insignificant mechanisms for human exposure. These routes include inhalation of volatile emissions from Site S-1 itself, inhalation of volatiles in residential areas as a result of outgassing from groundwater, and exposure associated with erosional transport of surficial contaminants (Halliburton NUS, 1994b).

Regarding the neighborhood immediately north of Site S-1: Kelly AFB has not measured volatile gas concentrations in the neighborhood and the potential for volatile contaminants to out-gas from groundwater. How was this determined to be an insignificant mechanism for human exposure?

Documentation of Values used to Calculate PRGs

The document does not give the sources of values used to calculate the soil Preliminary Remediation Goals in Table B-3.

The attached calculations and maps show the effects of using different values of hydraulic conductivity and K_{OC} in the chlorobenzene calculation. The sources of the values I used are:

- K_{OC} (214 ml/g): 30 TAC Sec. 350.53(e), Figure 1.

- Hydraulic conductivity (7.7 ft/day): median value measured in five wells closest to Site S-1 (SS050MW044, SS050MW109, SS050MW118, SS050MW156, SS050MW157; *Kelly Air Force Base IRP Zone 5 Remedial Investigation Report,* January 1997).

As I stated at the 9 February meeting, I don't claim that my values are any better than the values used by Kelly AFB. I am merely using them to illustrate the practical effects of choosing different values, and the importance of documenting the sources of all values used in the calculations.

Please contact me if you have any questions or comments.

Sincerely,

George Rice
414 East French Place
San Antonio, TX 78212
tel/fax: (210) 737-6180

REPORTS FOR ST MARY'S

	REPORTS LISTED BELOW WERE TAKEN TO THE ST. MARY'S		
	LIBRARY ON 9 FEB 1999		
182	Design Submittal Zone 1 GW Collect Sys CMI WP Design Basis Report & Maps	Dec 98	Final
444	Quality Program Plan, Phase II Remedial Facility Investigation Zone 4 OU2	Dec 98	Draft Final
539A	Remedial Investigation Report for Zone 5 - 3 Volumes	Jan-99	Final
679A	Semiannual Compliance Plan Rprt for Jan 99 (Jul - Dec 98) w/BRA - 7 Vols	Jan-99	Final

Received by: Steve W. Lee

Date: 2/9/99

ATCH 2

Kelly Air Force Base
IRP Zone 5

Site S-1 Soil Focused Feasibility Study

Presented to:

Technical Review Subcommittee

San Antonio, Texas

February 9, 1999

Introduction

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- Recommended Alternative (s) from this FFS have been brought forward to design and implementation.

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- Smear Zone:

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FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE