



KELLY AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 3298

Sept 1999

MEETING MINUTES
KELLY AFB TECHNICAL REVIEW SUBCOMMITTEE (TRS)
TO THE RESTORATION ADVISORY BOARD (RAB)
 14 Sep 99, St. Mary's University, Garni Science Hall

I. Introduction: The TRS meeting began at 6:40 p.m. Attachment 1 is the attendance report. Documents delivered to the TRS are specified in atch 2. To accommodate the schedule of presenters, some matters were taken up out of agenda order and are recorded here as presented but with the original agenda item number to avoid confusion.

II. Site S-4 CMS Report: Mr. Gary Tiedeman, SAIC, presented an overview of the Site S-4 CMS addendum, while Dr. Steve Young, HydroGeologic, discussed calibration and application of the Site S-4 groundwater flow and transport model. Copies of the presentations are at atch 4

III. TAPP Contractor Review – Zone 4 OU-2 Workplan: Mr. Jeff Nethery, Neathery Environmental Services, presented a draft review of the Zone 4 OU-2 Workplan. Comments on the draft will be accepted by Dr. Lené through 17 Sep 99 and forwarded to Mr. Neathery. The final report was tentatively scheduled for presentation to the 5 Oct 99 RAB Quarterly Meeting. Copy at atch 5.

V. TAPP Report Comments: Mr. William Ryan, SA/ALC-EM, made brief comments and distributed a handout detailing the AF responses to the TAPP Review Report on the January 1999 Kelly AFB Compliance Plan Report. Mr. Gary Panozzo, CH2M HILL, also presented a response. Letter responses from the TNRCC and US EPA were briefly summarized by Dr. Lené (atch 6).

IV. TAPP '00 Application Update: Dr. Lené noted the item might be more appropriately labeled the TAPP '99 Update and reported progress was being made. He called for suggestions on subjects for '00 TAPP applications and noted that any funds not used to date may be used for a fifth year of reviews.

VI. Administrative

- a) BCT Update: Mr. William Ryan, SA/ALC-EM discussed the BCT meeting, held this date, and provided a copy of the minutes for the TRS.
- b) Spill Summary Report: There were no reportable spills for the month of August 1999. Report at atch 3
- c) Documents to TRS/RAB: Atch 2.
- d) Next TRS meeting: 12 Oct 99, 6:30 p.m., St. Mary's Garni Science Hall
- e) Action Items
 - 1) Mr. George Rice requested an extension to the S-4 CMS and Zone 1 CMS public comment period. Mr. Armando Quintanilla requested a brief at the next RAB meeting.
 - 2) Mr. Rice requested an executable file of the S-4 Groundwater model; and sensitivity analysis performed for retardation and degradation.
 - 3) Mr. Quintanilla requested maps of metals, particularly Thallium.
 - 4) Confirm RAB Workshop dates and arrangements with volunteers.
 - 5) Mail Final TAPP Report on Zone 4 OU-2 to RAB members upon receipt.
 - 6) Schedule Zone 4 OU-2 Risk Assessment Brief at the November 99 TRS meeting or January 00 RAB meeting.
- f) Other Administrative Items:
 - Next agenda:**
 - FY00 TAPP applications

VII. Adjournment: The TRS adjourned at 9:15 p.m.

Attachments:

1. Attendance
2. Documents list
3. Spill Summary Report
4. Site S-4 Presentations
5. TAPP Contractor Review (Mailed to RAB members under separate cover)
6. TAPP Report Responses

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Jeffrey A. Saitas, *Executive Director*



TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

September 8, 1999

Dr. Gene W. Lené, Community Co-Chair
Kelly AFB Restoration Advisory Board
Dept. of Earth Sciences
St. Mary's University
One Camino Santa Maria
San Antonio, Texas 78228-8531

Re: August 11, 1999 Letter Requesting TNRCC Response to TAPP Document on the Kelly AFB
Final January 1999 Semiannual Compliance Plan Report, January 1999

Dear Dr. Lené:

Thank you for the above-referenced letter, received August 16, 1999, in which you convey the interest of the Kelly AFB Restoration Advisory Board (RAB) in receiving comments from the Texas Natural Resource Conservation Commission (TNRCC) in response to the comments and recommendations of a July 6, 1999 document prepared by a contractor under the Technical Assistance for Public Participation (TAPP) grant awarded to the RAB. The document prepared by the TAPP contractor provided a review of the above-referenced January 1999 *Report* prepared by Kelly AFB.

The TNRCC wishes to express its appreciation for the RAB's continued interest and efforts in advising the U.S. Air Force on the investigation and remediation actions relating to Kelly AFB. Moreover, the TNRCC appreciates having the benefit of the additional perspectives provided by the TAPP contractor. Please be assured that the TNRCC will take into account the TAPP contractor's comments and recommendations in the review of the *Report*.

Thank you again for your efforts in facilitating the cleanup in connection with Kelly AFB. If you have any questions regarding this letter, please contact me at 512-239-5914.

Sincerely,

A handwritten signature in blue ink that reads "Gordon Banner".

Gordon Banner, Project Manager
Team II, Corrective Action Section
Remediation Division

cc: Ms. Laura Stankosky, EPA Region 6, Dallas

#26S
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)

14 de septiembre de 1999, Universidad de St. Mary's, Garni Science Hall
 Dr. Gene Lené, Copresidente del TRS

- I. Introducción:** La junta del TRS se inició a las 6:40 p.m. El Documento Adjunto # 1 es el informe de asistencia. **[NOTA DEL TRADUCTOR: El documento original en inglés no tenía documentos adjuntos].** Para que funcionaran mejor los horarios de los expositores, algunos de los temas se trataron en orden diferente al establecido en la orden del día pero se usó el número original del orden del día para evitar confusiones.
- II. Reporte del CMS Sitio S-4:** El Sr. Gary Tiedman de SAIC hizo una presentación general de la enmienda del Estudio de Medidas Correctivas (CMS) para el Sitio S-4, mientras que el Dr. Steve Young de HydroGeologic habló de la calibración y aplicación del flujo de agua subterránea del Sitio S-4 y del modelo de transporte. Se incluyó la copia de la presentación como Documento Adjunto # 4.
- III. Revisión del Contratista del Programa de Asistencia Técnica y Participación Pública (TAPP) – Plan de Trabajo de OU-2 en la Zona 4:** El Sr. Jeff Nethery, de Neathery Environmental Services, hizo una breve presentación del Plan de Trabajo del OU-2 de la Zona 4. El Sr. Lené aceptará cualquier comentario sobre este plan en borrador hasta el 17 de septiembre de 1999 y se los hará llegar al Sr. Neathery. El reporte final está tentativamente programado para que se presente el 5 de octubre de 1999 durante la junta trimestral del RAB.
- V. Comentarios sobre el Reporte del TAPP:** El Sr. William Ryan, de SA/ALC-EM (por sus siglas en inglés), hizo unos breves comentarios y distribuyó unos folletos que detallaban las respuestas de la Fuerza Aérea al Informe de Revisión del TAPP (por sus siglas en inglés) del Informe del Plan de Cumplimiento de la Base Aérea Kelly de enero de 1999. El Sr. Gary Pañoso de CH2M Hill también presentó una respuesta. El Dr. Lené resumió brevemente las cartas de respuesta de la Comisión para la Conservación de Recursos Naturales de Texas (TNRCC, por sus siglas en inglés) y de la Agencia de Protección Ambiental (EPA (por sus siglas en inglés)). (Documento Adjunto # 6).
- IV. Actualización de la Solicitud del TAPP del 2000:** El Dr. Lené mencionó que el título más apropiado de este punto sería Actualización del TAPP de 1999 y que se estaba reportando su avance. Pidió sugerencias de temas para las solicitudes del TAPP del 2000 e hizo notar que cualquier fondo que no se use hasta la fecha se puede usar para las revisiones de cincuenta años.

VI. Puntos administrativos:

- A. Actualización del Equipo de Limpieza BRAC (BCT por sus siglas en inglés): El Sr. William Ryan, de SA/ALC-EM habló de la junta del BCT que se había realizado el mismo día y le proporcionó una copia de las minutas al TRS.
- B. Informe del Resumen de Derrames: No hubo derrames reportables en el mes de agosto de 1999. Se adjunta el informe como Documento Adjunto # 3).
- C. Documentos que se entregaron al TRS /RAB: Documento Adjunto # 2.
- D. Siguiete junta del TRS: La siguiete junta del TRS será a las 6:30 p.m. del día 12 de octubre de 1999 en el Garni Science Hall, de la Universidad de St. Mary.
- E. Puntos de Acción:
 - 1. El Sr. George Rice solicitó una extensión del CMS S-4 y del período para comentarios del CMS de la Zona 1. El Sr. Quintanilla solicitó que hubiera una presentación en la siguiete junta del RAB.
 - 2. El Sr. Rice solicitó un archivo ejecutable del modelo de agua subterránea de S-4; y el análisis de sensibilidad que se realiza para retardar y degradar.
 - 3. El Sr. Quintanilla solicitó los mapas que muestran los metales, especialmente el talio.
 - 4. Confirmar las fechas de las mesas de trabajo del RAB y los arreglos con los voluntarios.
 - 5. Enviar por correo a todos los miembros el Informe Final del TAPP sobre el OU-2 de la Zona 4 una vez que se reciba.
 - 6. Programar la Presentación de la Evaluación de Riesgos del OU-2 de la Zona 4 en la junta del TRS de noviembre de 1999 o en la junta del RAB de enero de 2000.
- F. Otros Puntos Administrativos:
 - Siguiete orden del día:**
 - Solicitudes del TAPP para el año fiscal 2000

IV. Cierre de la Sesión: Se cerró la junta del TRS a las 9:15 p.m.

VI. Documentos Adjuntos:

- 1. Lista de Asistencia
- 2. Lista de documentos
- 3. Informe del Resumen de Derrames
- 4. Presentaciones del Sitio S-4
- 5. Revisión de Contratistas del TAPP (Enviada por correo a los miembros del RAB por separado)
- 6. Respuestas al Informe del TAPP

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

September 10, 1999

Dr. Gene W. Lené
RAB Community Co-chair
Dept. of Earth Sciences
St. Mary's University
San Antonio, TX 78228

RE: Technical Assistance for Public Participation Review of the January 1999 Semiannual Compliance Plan Report

Dear Dr. Lené:

Thank you for providing the EPA the opportunity to respond to the report prepared by Mr. Patrick Lynch under the Technical Assistance for Public Participation (TAPP) program. Mr. Lynch prepared an executive summary, report review, and comments and recommendations section on the January 1999 Semiannual Compliance Plan Report (July-December 1998).

The report provided by Mr. Lynch has been reviewed by the EPA. Comments and recommendations included in the report will be taken under advisement by the Base Realignment and Closure (BRAC) Cleanup Team (BCT). This snapshot of conditions at the base should enhance overall project activities as input for improving investigation and remediation efforts is always appreciated.

Should you have any questions or need any additional information please do hesitate to contact me at (214) 665-6785 or Laura Stankosky, of my staff, at (214) 665-7525.

Sincerely

David Neleigh
Chief, New Mexico - Federal
Facilities Section

cc: William Ryan, Chief, Environmental Restorations Operations Branch
Gordon Banner, TNRCC
Abigail Power, TNRCC/Region 13



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

19 SEP 1999

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

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

SUBJECT: Monthly Spill Report for August 1999

There have been no reportable quantity or otherwise notable spills for the month of August 1999. Should you have any further questions or require additional information, please contact Mr. Jerry Pantoja at 925-3100 ext. 310 or email jerry.pantoja@kelly.af.mil.

Sincerely

A handwritten signature in blue ink, appearing to read "C. Williams", is located below the word "Sincerely".

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

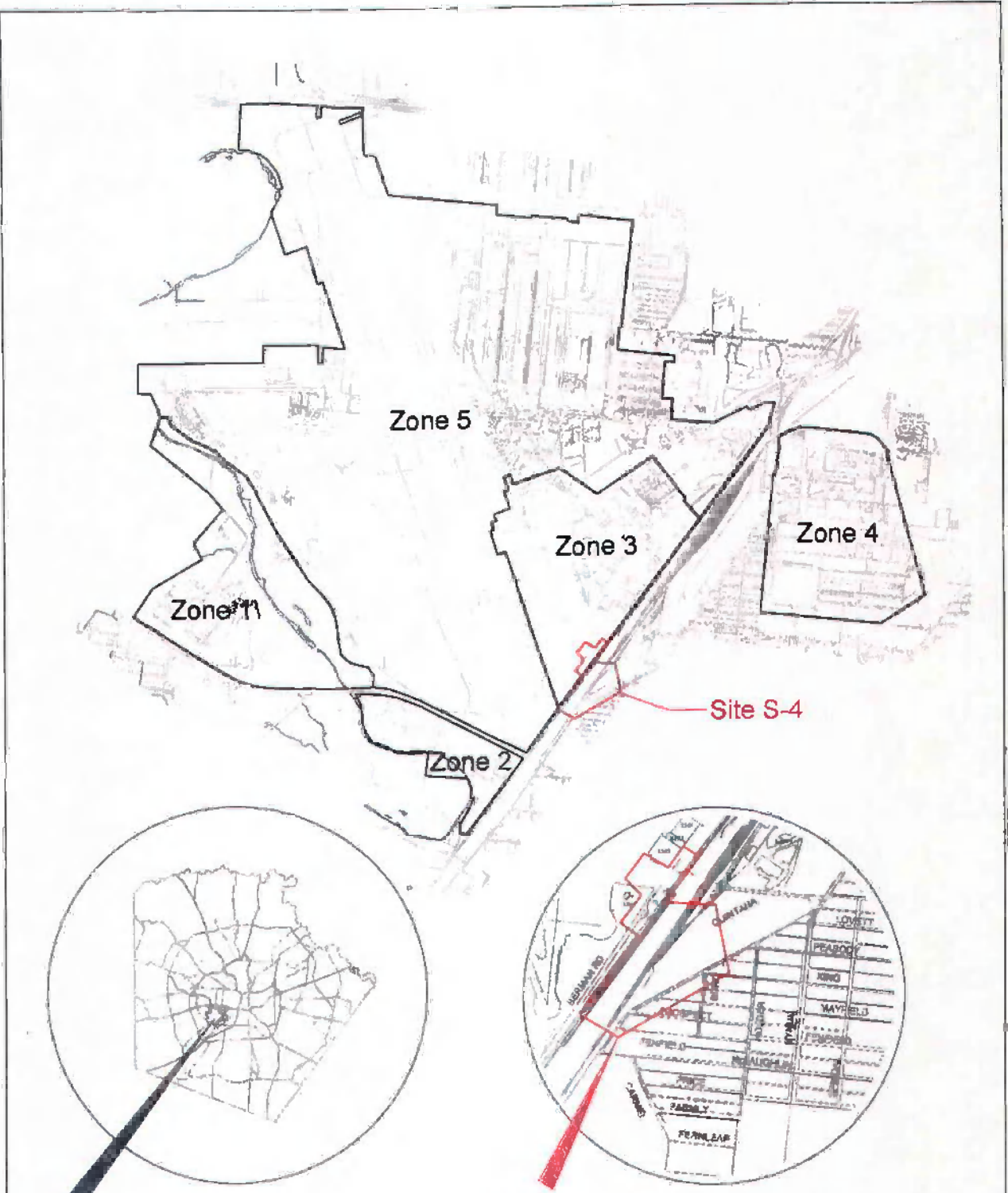


SITE S-4

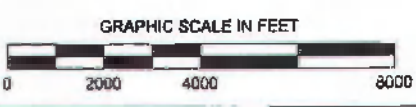
Historical Information



- Previous Historical Operations
- JP-4 Source Areas
- Suspected Solvent Source Areas



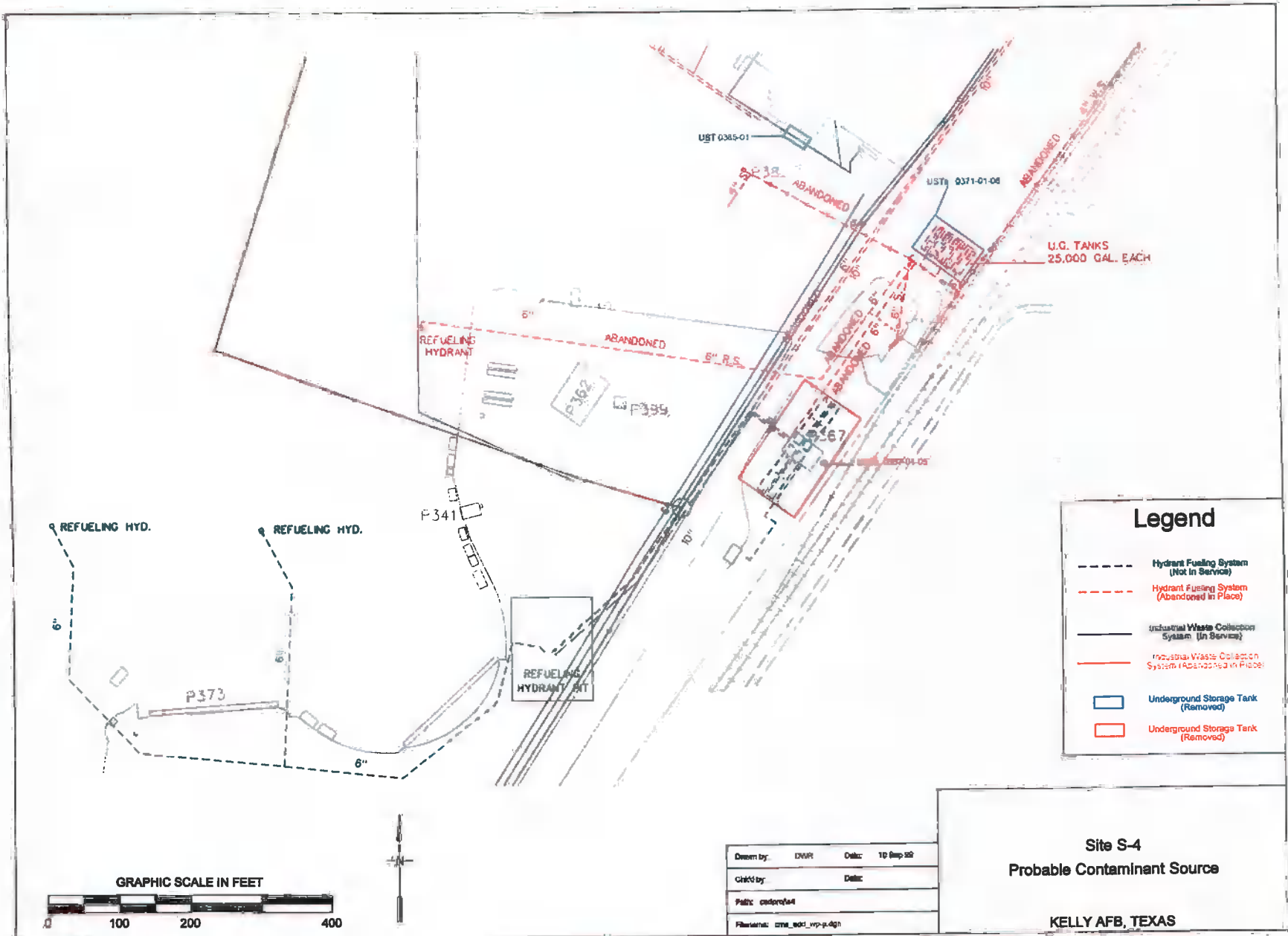
KELLY AFB BEXAR COUNTY



Drawn by: OVR/RDD	Date: 19 Jan 99
Checked by:	Date:
Path: S-4	
CADD Filename: s-4-loc.dgn	

Site S-4 Location Map

KELLY AFB, TEXAS



Legend

- Hydrant Fueling System (Not in Service)
- Hydrant Fueling System (Abandoned in Place)
- Industrial Waste Collection System (In Service)
- Industrial Waste Collection System (Abandoned in Place)
- Underground Storage Tank (Removed)
- Underground Storage Tank (Removed)

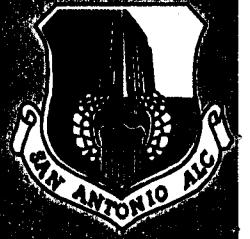
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Checked by:		Date:	
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Site S-4
Probable Contaminant Source

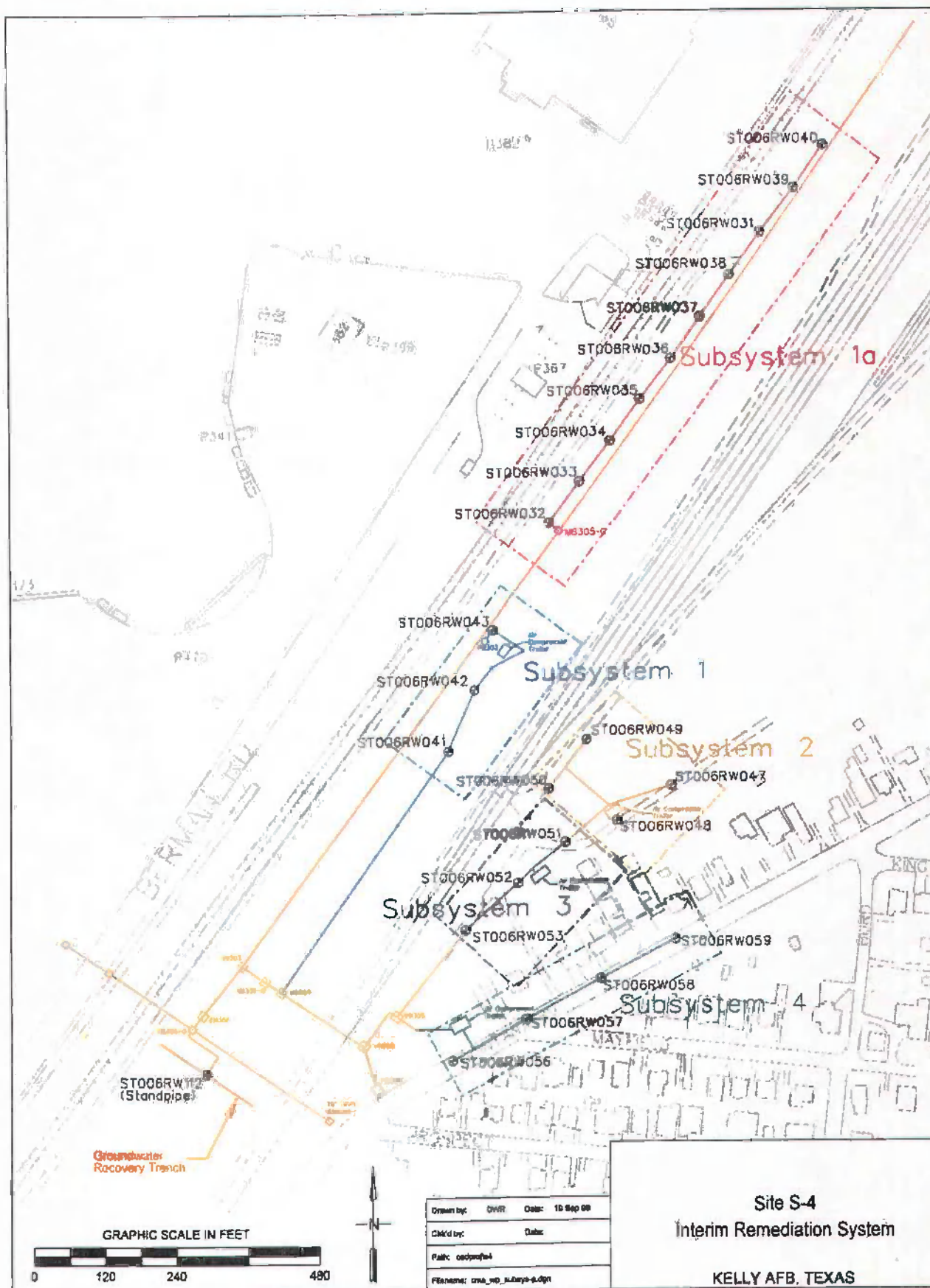
KELLY AFB, TEXAS

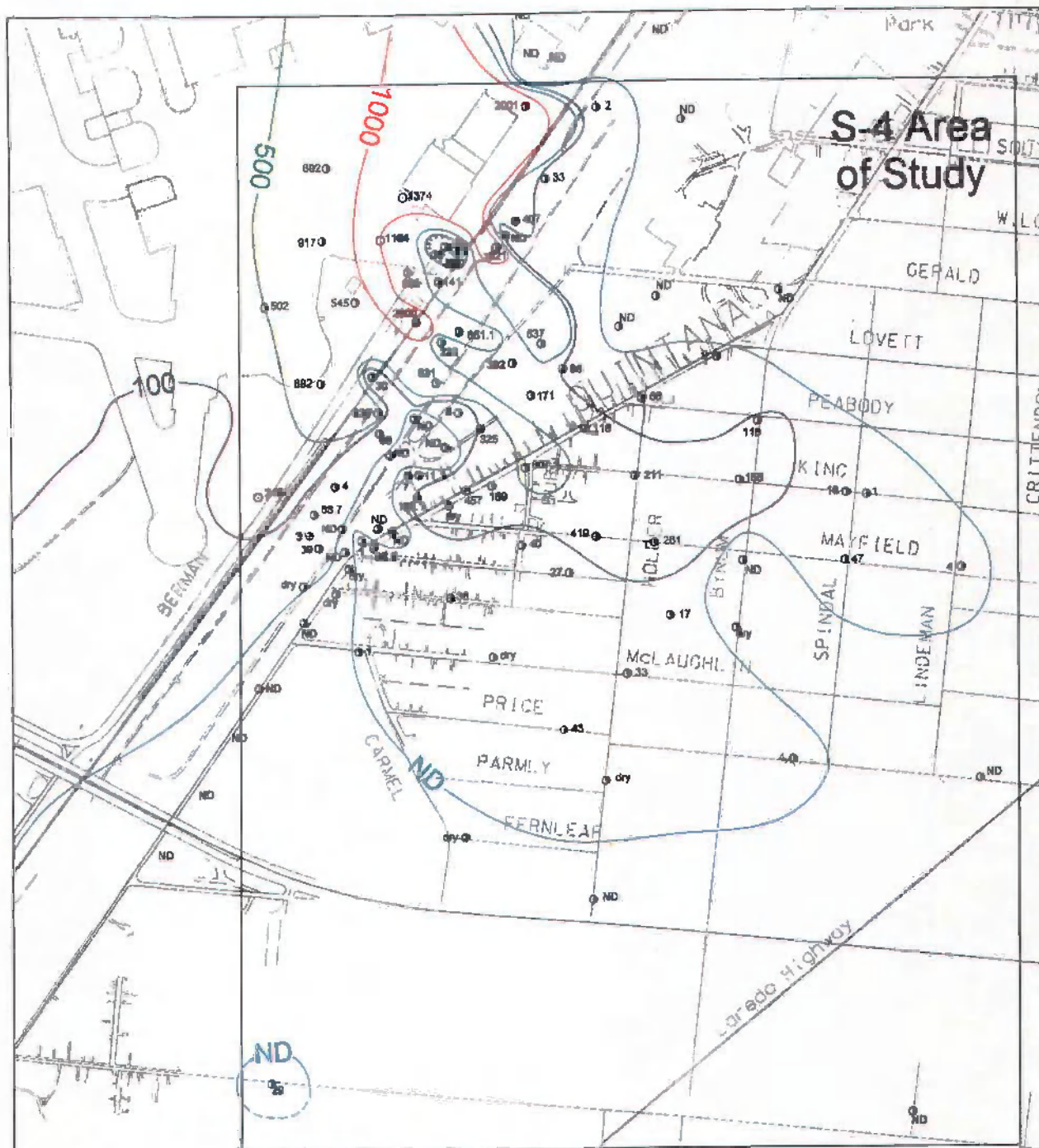


Site S-4 Feasibility Study



- Initial Interim Free Product Recovery System
- Interim Groundwater Recovery System
- Current Contaminant Plume





LEGEND

- 10 Sampled existing monitoring wells and total solvent concentration (ppb)
- ND Not Detected (See Figures 3-1 through 3-4 for individual detection limits)
- Total solvents (PCE, TCE, 1,2-DCE, and VC) concentration contour line (ppb)

Date Source: Kelly AFB IRPIMS Database and This Study



GRAPHIC SCALE IN FEET



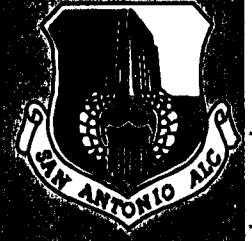
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Checked by:		Date:	
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Filename:	one-loc-4-010-p.dwg		

Site S-4 Area of Study

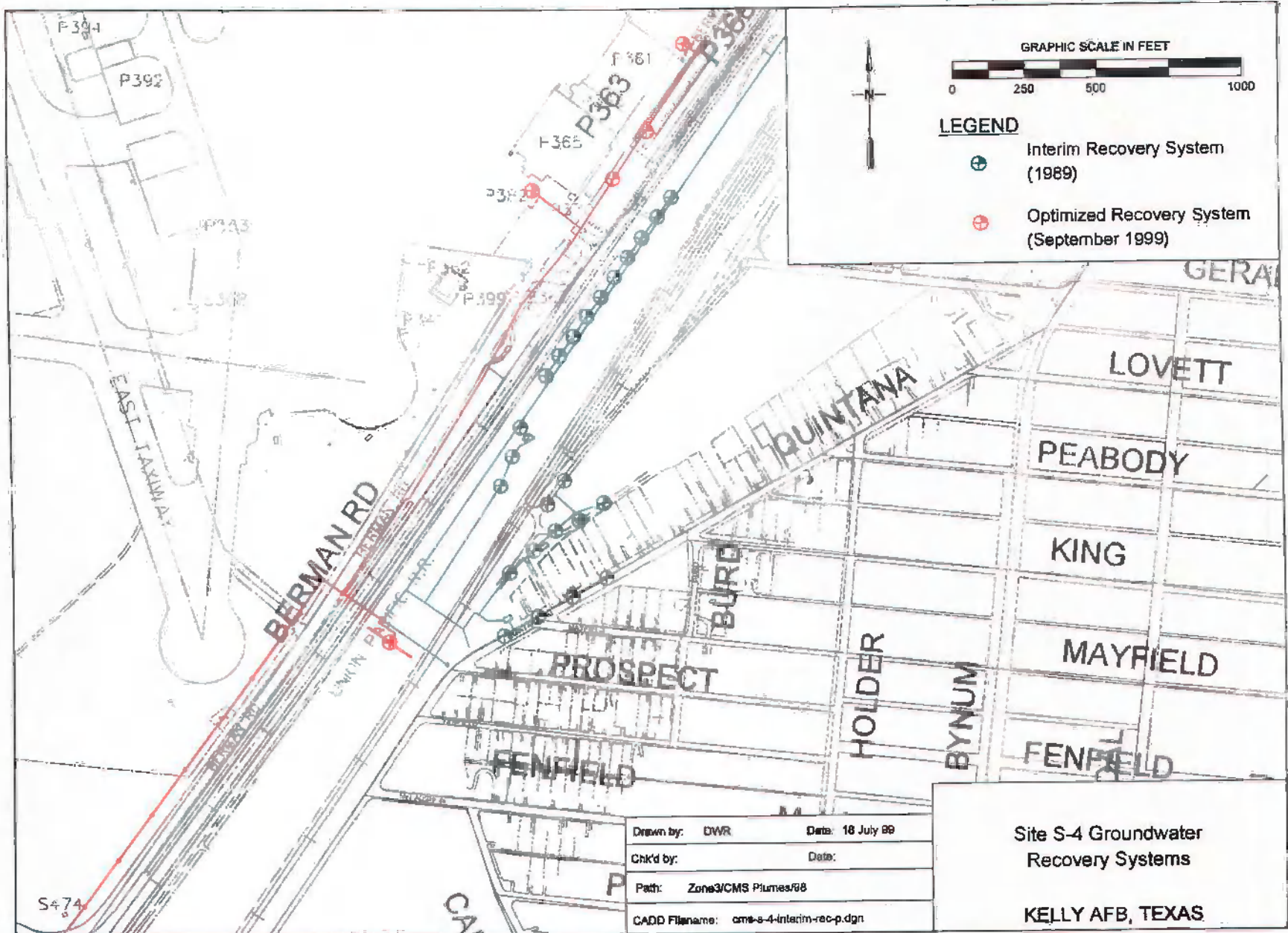
KELLY AFB, TEXAS



Site S-4 Corrective Measures Study Addendum



- Site S-4 Informal Technical Information Report
- Groundwater Modeling
- CMS Addendum



Drawn by:	DWR	Date:	18 July 89
Chk'd by:		Date:	
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Site S-4 Groundwater
Recovery Systems

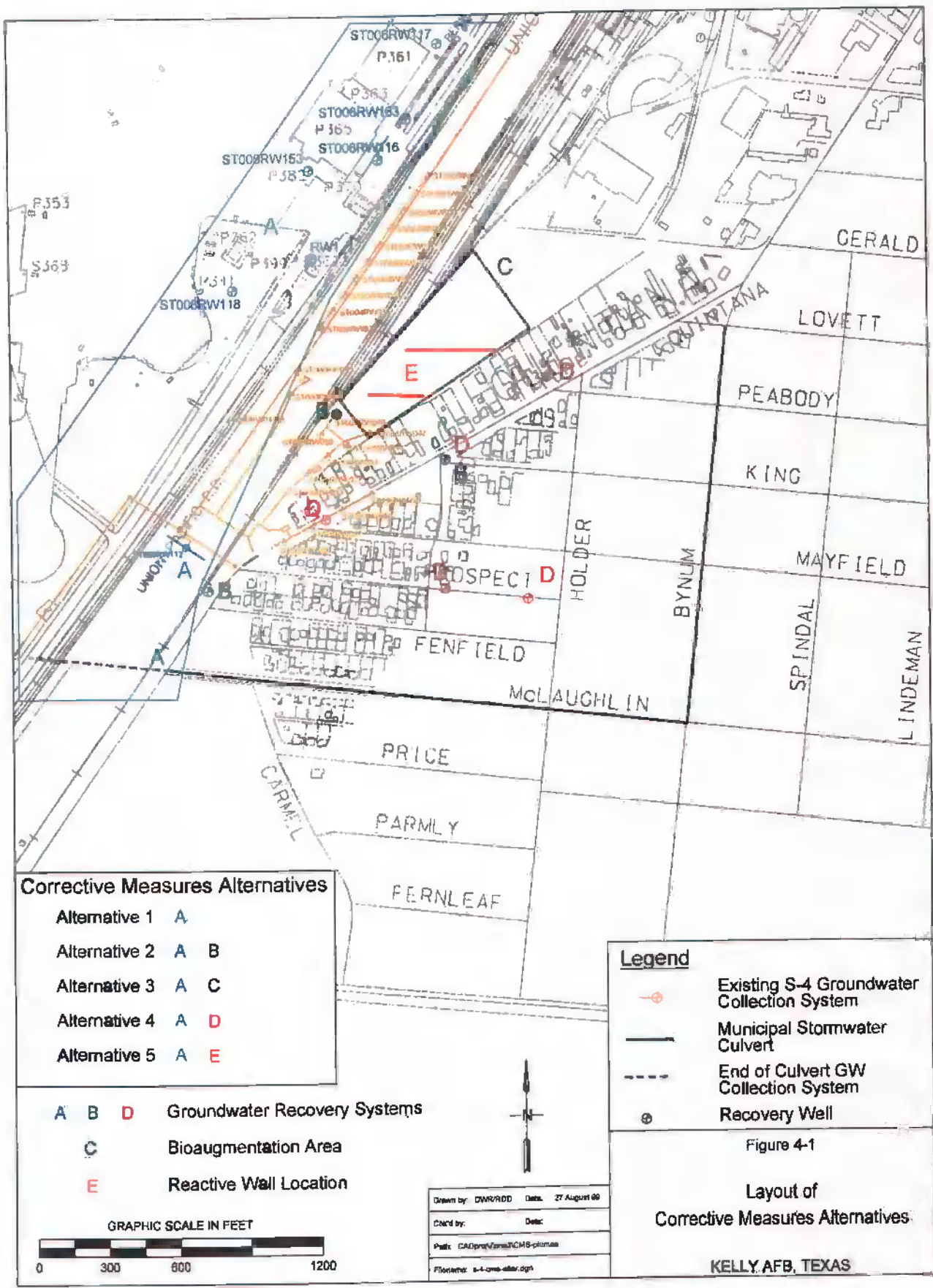
KELLY AFB, TEXAS



Site S-4 Corrective Measure Alternatives



- Description of Alternatives
 - Alternative 1 - Baseline
 - Alternative 2 - Baseline and off-base pump and treat
 - Alternative 3 - Baseline and off-base bioaugmentation
 - Alternative 4 - Baseline and entire off-base plume pump and treat
 - Alternative 5 - Baseline and off-base reactive walls
- Layout of Alternatives



- Corrective Measures Alternatives**
- Alternative 1 A
 - Alternative 2 A B
 - Alternative 3 A C
 - Alternative 4 A D
 - Alternative 5 A E

- A B D Groundwater Recovery Systems
- C Bioaugmentation Area
- E Reactive Wall Location

- Legend**
- Existing S-4 Groundwater Collection System
 - Municipal Stormwater Culvert
 - End of Culvert GW Collection System
 - Recovery Well

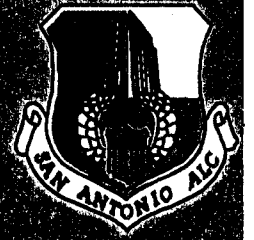


Drawn by: DWR/RDD Date: 27 August 99
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 Plotter: s-4-cms-stdr.dgn

Figure 4-1
 Layout of
 Corrective Measures Alternatives
 KELLY AFB, TEXAS



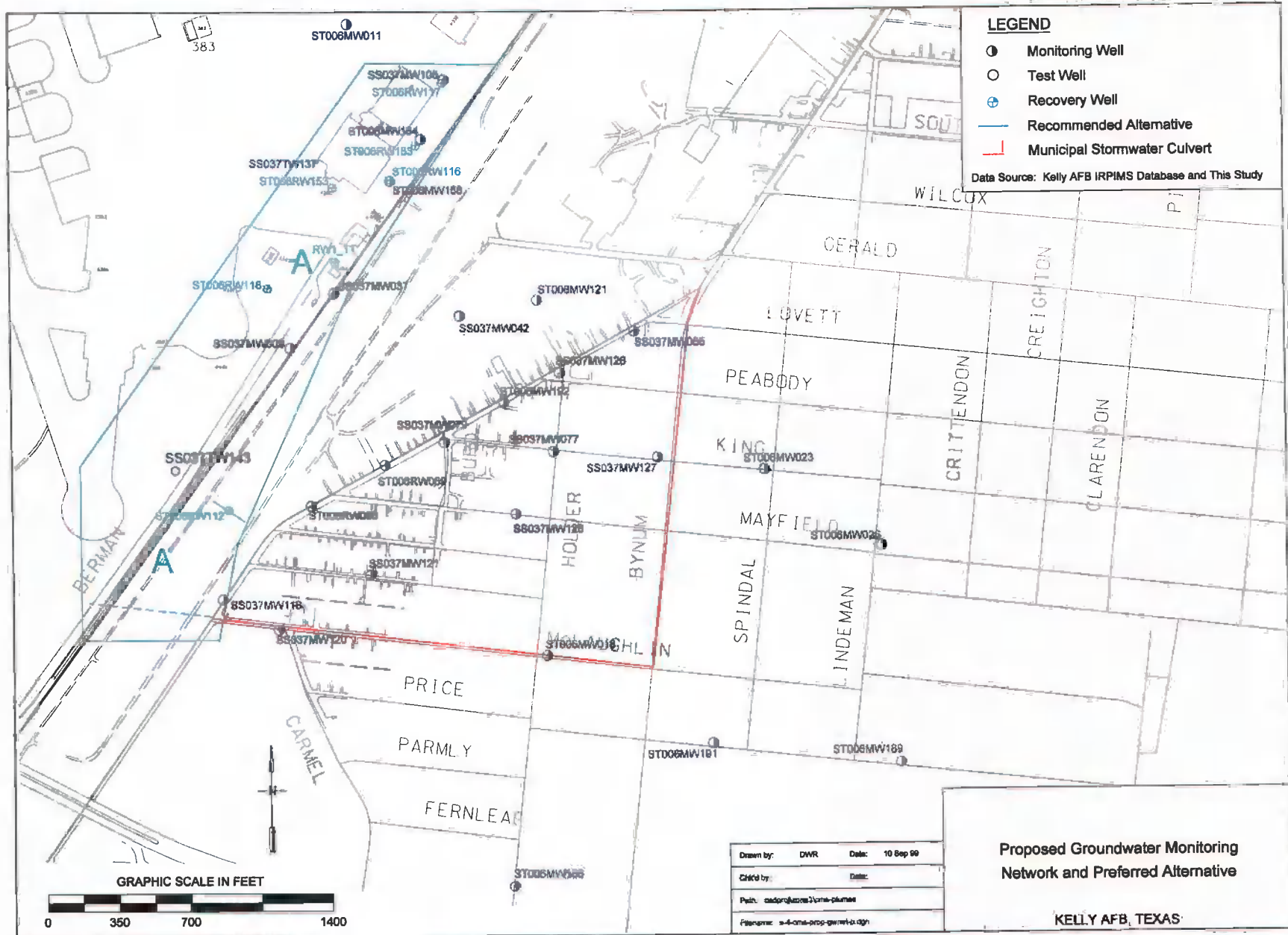
Site S-4 Corrective Measure Alternative Evaluation



- Summary of Alternative Comparisons
- Recommended Final Corrective Measure Alternative

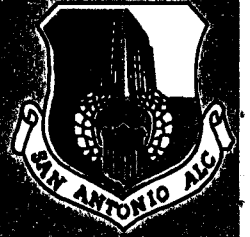
Summary of Alternative Comparisons

Standards	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	On-Base Pump & Treat, Natural Attenuation Existing Collection Trench Culvert GW Collection System	On-Base Pump & Treat, Natural Attenuation Existing Collection Trench Culvert GW Collection System Off-base Pump & Treat	On-Base Pump & Treat, Natural Attenuation Existing Collection Trench Culvert GW Collection System Off-base Bioaugmentation	On-Base Pump & Treat, Natural Attenuation Existing Collection Trench Culvert GW Collection System Entire Plume Pump & Treat	On-Base Pump & Treat, Natural Attenuation Existing Collection Trench Culvert GW Collection System Off-base Reactive
Protect Human Health and the Environment	All alternatives will adequately protect Human Health and the Environment.				
Attain Media Cleanup Standards	Time to reach MCL: On Base – 28.5 years Off Base – 25.7 years	Time to reach MCL: On Base – 28.4 years Off Base – 26.4 years	Time to reach MCL: On Base – 28.4 years Off Base – 25.4 years	Time to reach MCL: On Base – 28.4 years Off Base – 26.4 years	Time to reach MCL: On Base – 28.4 years Off Base – 25.6 years
Control the Sources of Releases	Each alternative controls the source of contamination in the same manner, with an on-base optimized pump and treat system.				
Comply with applicable standards for management of wastes ;	All alternatives comply with applicable regulations concerning managing waste.				
Long-term Reliability and Effectiveness	High reliability and effectiveness	High reliability and effectiveness	Reliability, certain, but pilot and field-scale tests may be needed to verify the effectiveness	High reliability and effectiveness	Reliability, certain, but pilot and field-scale tests may be needed to verify the effectiveness
Reduction in the Toxicity, Mobility or Volume of Waste	30-year mass removal: 359 kg	30-year mass removal: 360 kg	30-year mass removal: 359 kg	30-year mass removal: 358 kg	30-year mass removal: 359 kg
Short-term Effectiveness	5-year mass removal: 259 kg	5-year mass removal: 260 kg	5-year mass removal: 265 kg	5-year mass removal: 261 kg	5-year mass removal: 262 kg
Implementability	High	High	Certain	High	Certain
Total Present Worth Cost	\$4,789,031	\$5,843,214	\$9,451,031	\$6,722,460	\$12,740,331





Site S-4 Corrective Measure Alternative Implementation



- Public Involvement Program
- Corrective Measures Implementation Workplan
- Corrective Measures Implementation



Calibration and Application of Site S-4 Ground-water Flow and Transport Model

September 14, 1999





OUTLINE

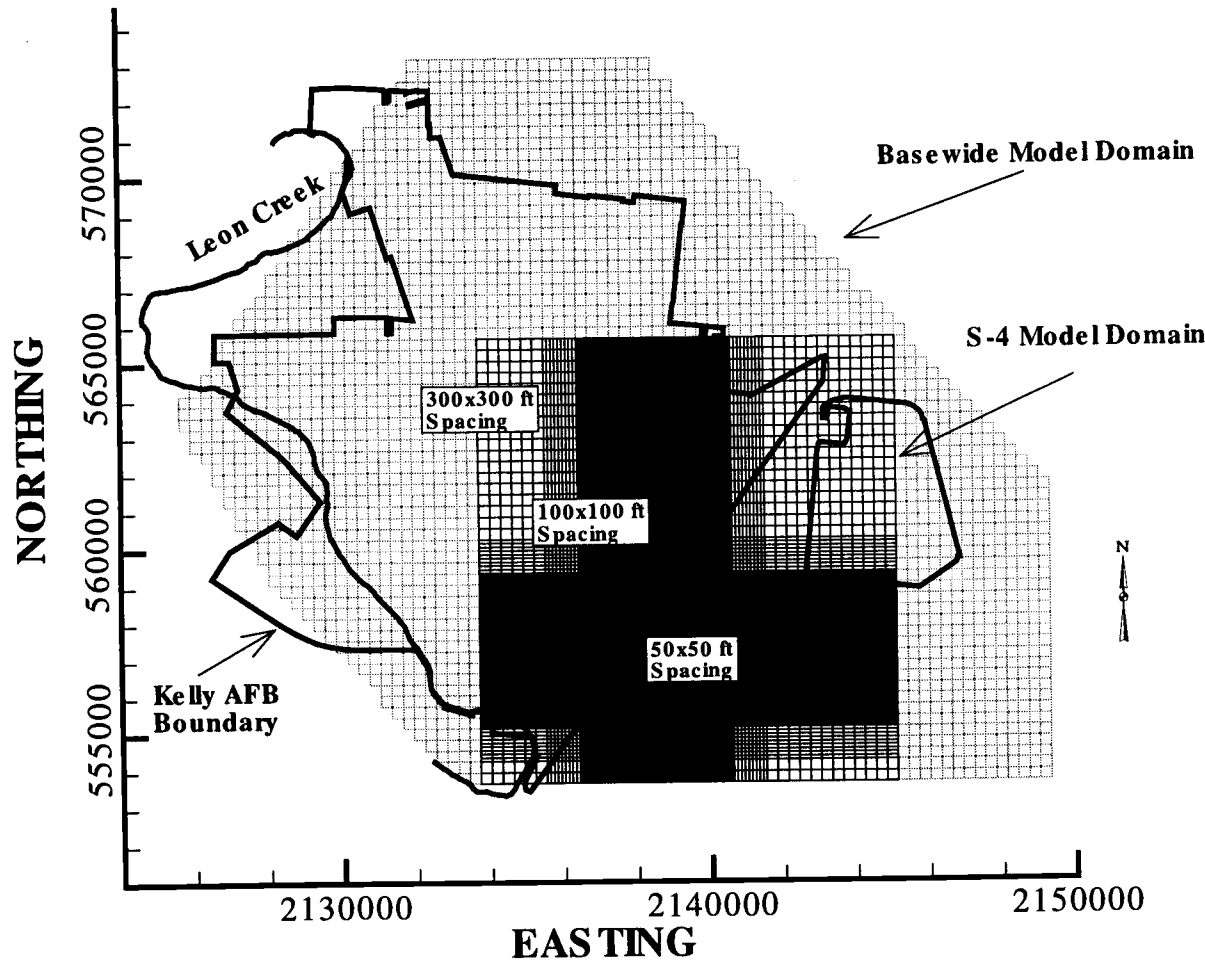
- REVIEW SITE S-4 FLOW MODEL
- EVALUATE CAPTURE ZONES FOR REMEDIATION ALTERNATIVES
- REVIEW SITE S-4 TRANSPORT MODEL
- SIMULATE PLUME MIGRATIONS FOR REMEDIATION ALTERNATIVES



FLOW MODEL CONSTRUCTION: BASED ON BASEWIDE GROUND-WATER FLOW MODEL



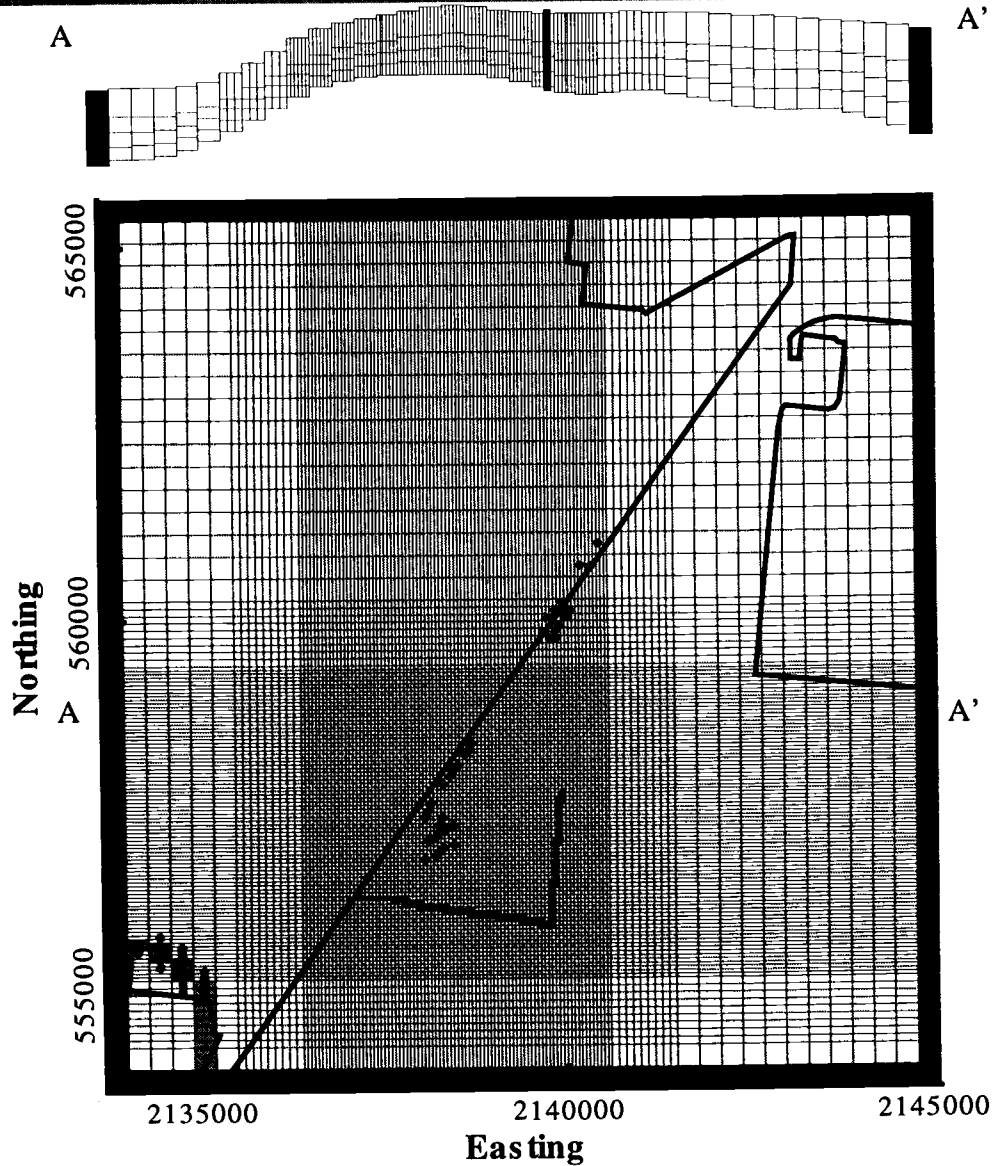
OVERVIEW BASEWIDE GROUND-WATER FLOW MODEL



- Includes 12 sq Miles and All of Kelly AFB
- Accounts for Recharge, Well Pumping, GW-Leon Creek Interactions, and Flow Through Model Boundaries
- Has Four Model Layers to Represent Geological Variability
- Calibrated Using 8,500 K Values Based on Geology at over 2000 Borehole Locations
- Calibrated Using Low and High Water-table Conditions
- Submitted to EPA Region 6 and TNRCC in March 1999 for Review



FLOW MODEL CONSTRUCTION: S-4 NUMERICAL GRID AND CELL PROPERTIES



LEGEND

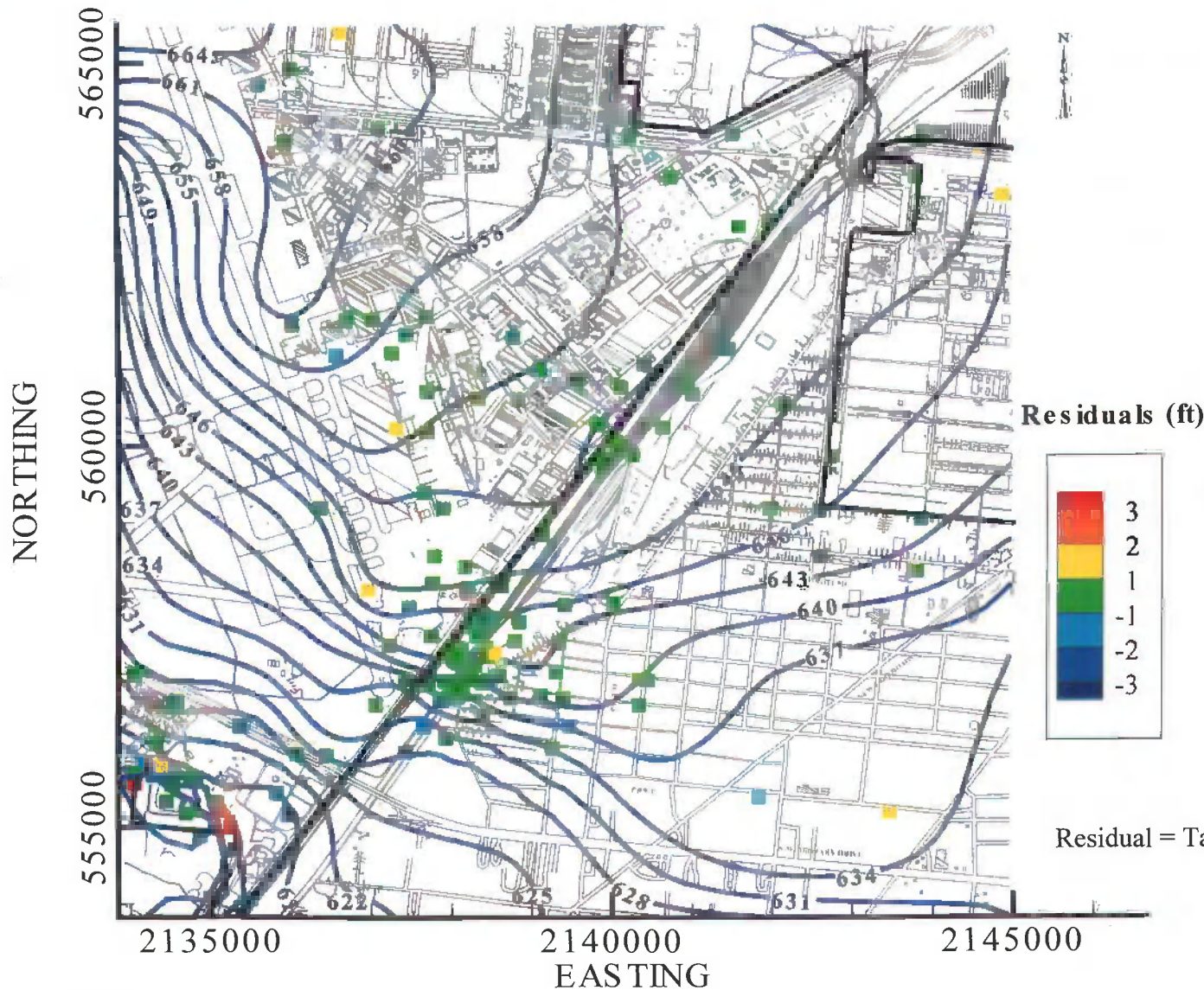
- Constant Head Cell
- River Cell
- Horizontal Flow Barrier
- Horizontal Well
- Recovery Well Cell

MODEL DETAILS

- Covers 3.7 sq miles
- Includes Lower Reach Leon Creek
- Includes 66 Extraction Wells from S-4, S-8, CS-2, and MP Systems
- Represents Quintana Barrier as a Very Low-K Wall
- Spatially-varying Recharge with Average of 3.2 inches/year
- Four-layer Model with Bottom as Navarro



MODEL CALIBRATION: HYDRAULIC HEAD CONTOURS

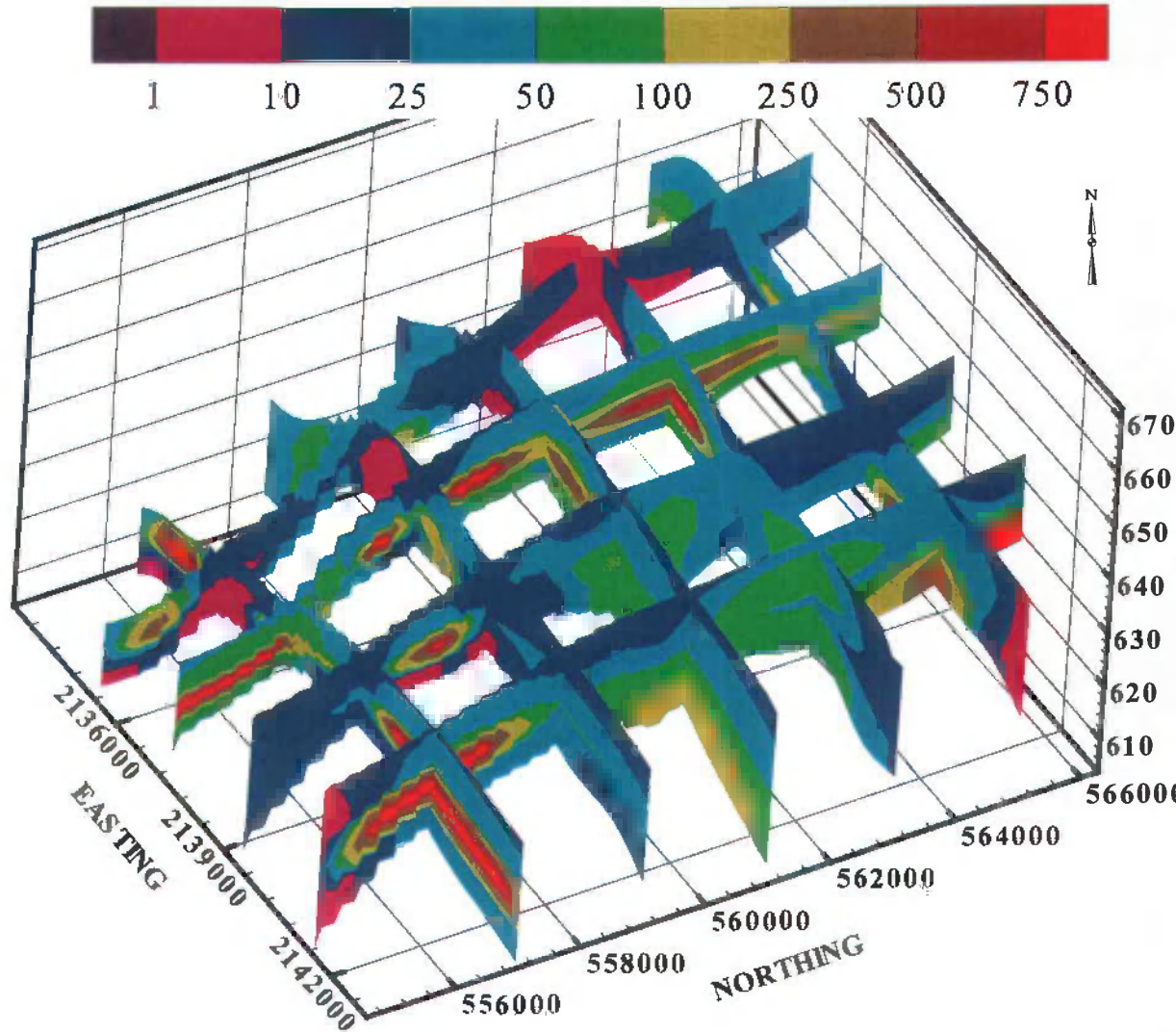


SUMMARY OF RESULTS

- Fitted to 170 Values
- Root-Mean-Square (RMS) is 0.8 ft
- Measurements Span 50 feet
- Mass Balance Error is .05%



MODEL CALIBRATION: HYDRAULIC CONDUCTIVITY FIELD



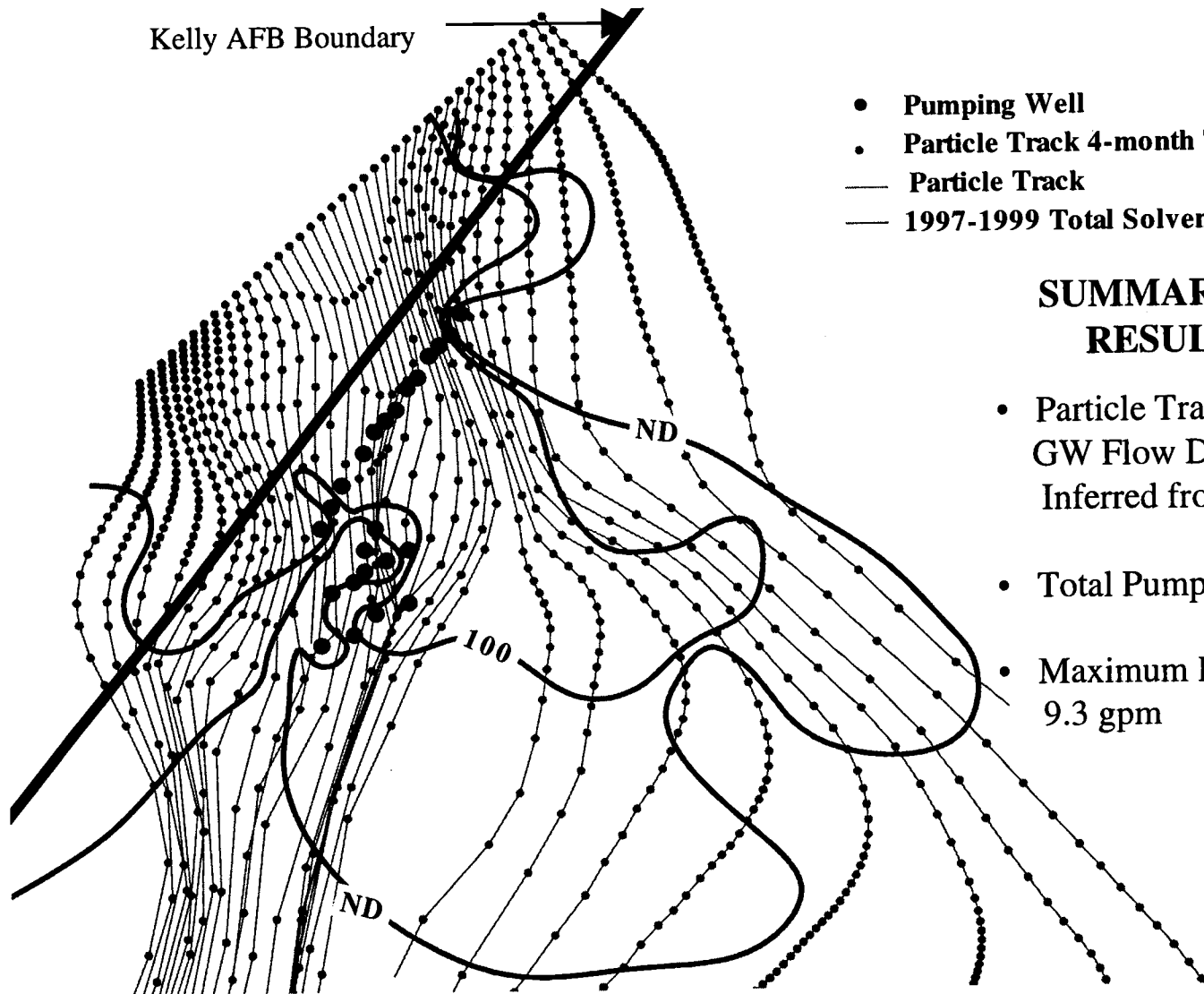
SUMMARY OF RESULTS

- Fitted to 3500 K Values at 850 Locations
- Low- and High-K Trends Exist
- Root-Mean-Square (RMS) for Model Fit is 1.6 of Ln K
- Root-Mean-Square (RMS) for Fit to Field Data is 1.9 of Ln K

	ft/day
• Navarro	0.1
• Fine-Grained	10
• Medium Grained	100
• Coarse-Grained	350



MODEL CALIBRATION: GROUND-WATER FLOW PATHS FOR DECEMBER 97 PUMPING RATES



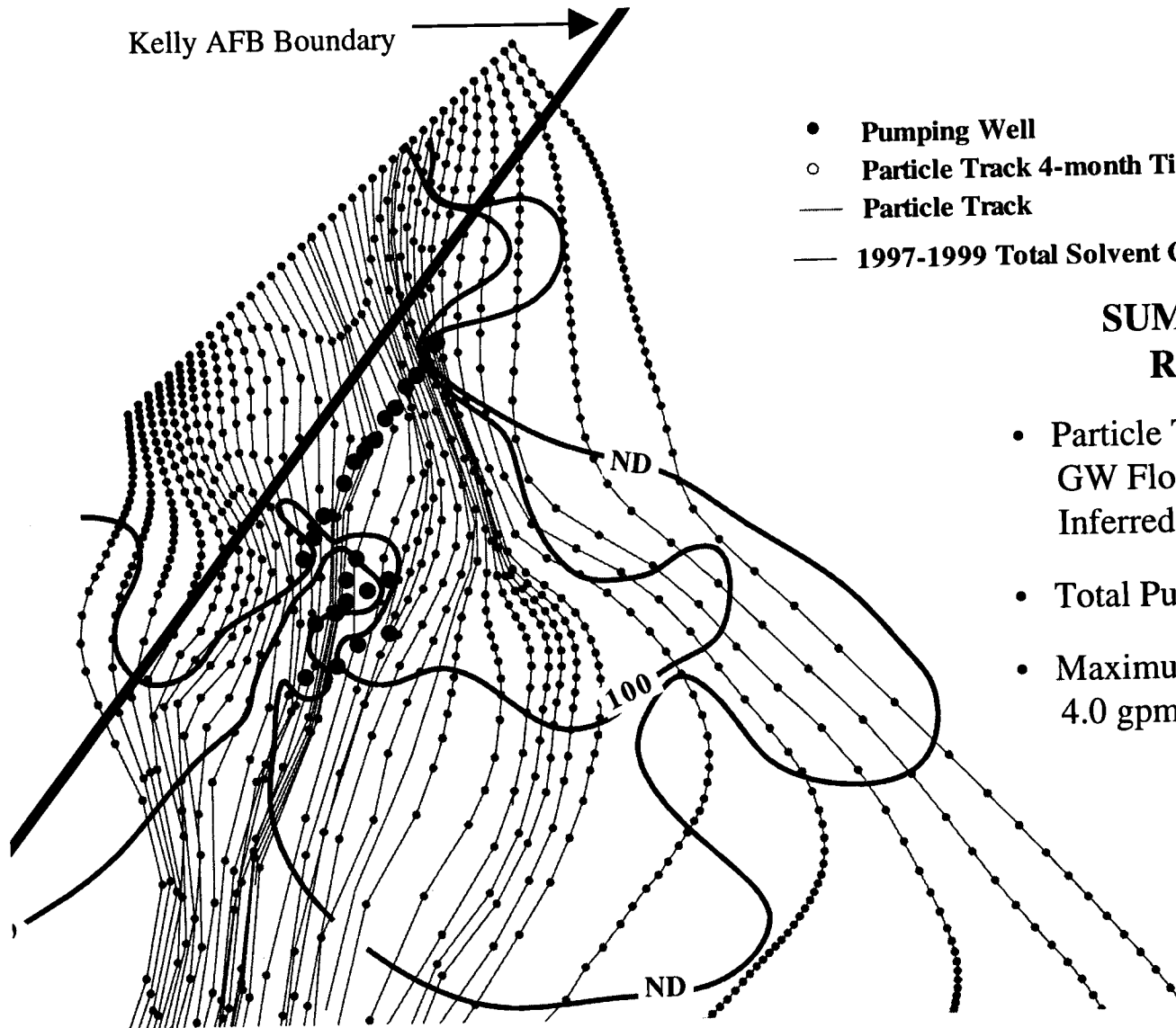
- Pumping Well
- Particle Track 4-month Time Marker
- Particle Track
- 1997-1999 Total Solvent Contours

SUMMARY OF RESULTS

- Particle Tracks Match GW Flow Directions Inferred from Plume Data
- Total Pumping is 26 gpm
- Maximum Pumping is 9.3 gpm



MODEL CALIBRATION: GROUND-WATER FLOW PATHS FOR HISTORICAL 97-99 PUMPING RATES



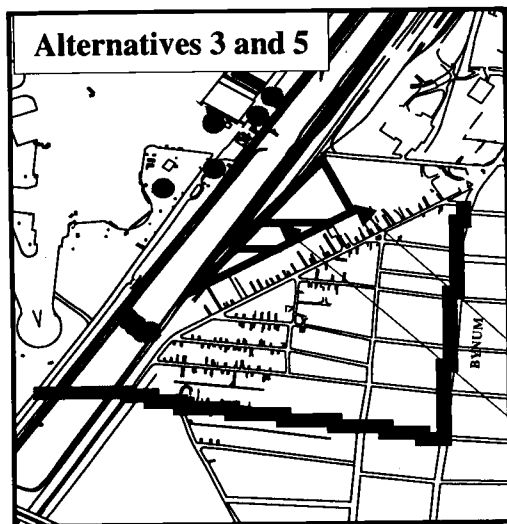
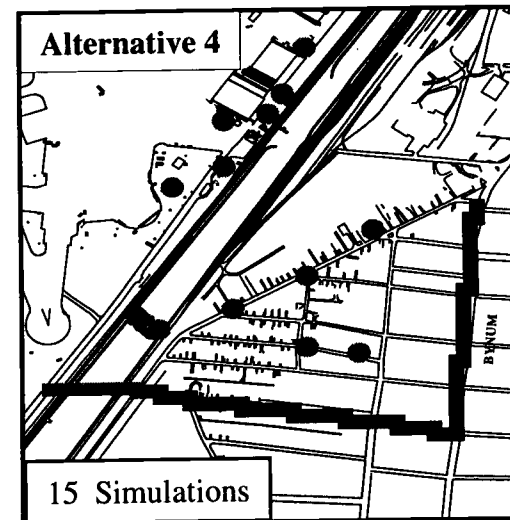
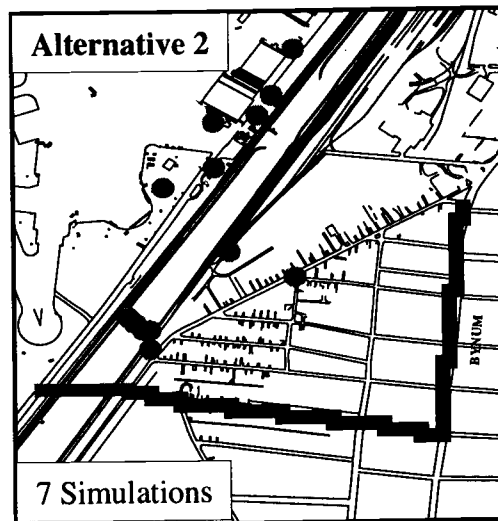
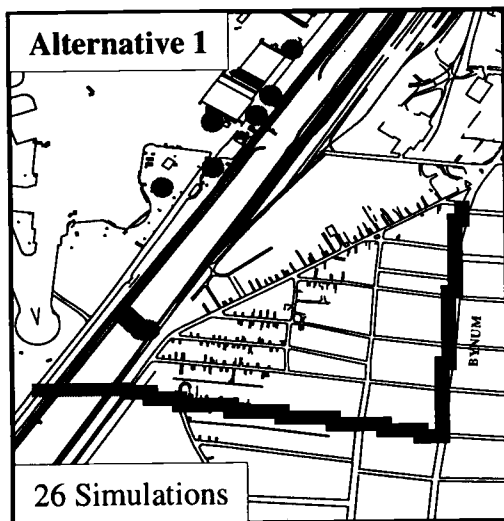
- Pumping Well
- Particle Track 4-month Time Marker
- Particle Track
- 1997-1999 Total Solvent Contours

SUMMARY OF RESULTS

- Particle Tracks Match GW Flow Directions Inferred from Plume Data
- Total Pumping is 27 gpm
- Maximum Pumping is 4.0 gpm



REMEDIAL ALTERNATIVES: LOCATION OF WELLS, 200-FT TRENCH, & 600-FT HORIZONTAL WELL



Bioaugmentation Triangle
Reactive Wall

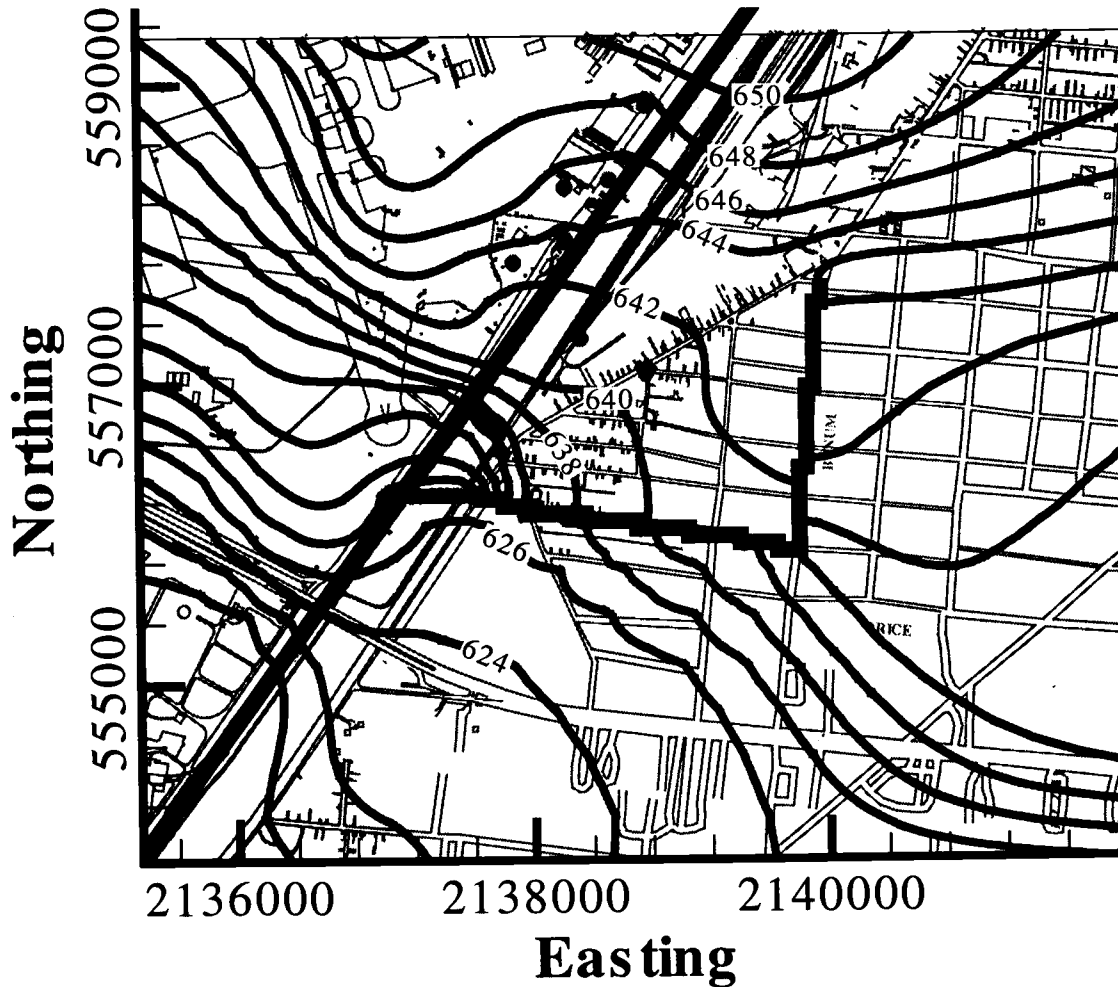
Flow Rates (gpm)

	Alternative 1	Alternative 2	Alternative 4
Baseline Wells	59.69	51.65	50.30
Trench	2.42	2.42	2.42
Additional Wells	N/A	19.96	36.59
Horizontal Well	23.88	22.75	19.66
Total	85.99	96.78	108.97



REMEDIAL ALTERNATIVES: EXAMPLE OF SIMULATED HYDRAULIC HEAD FIELD

Alternative 2



SUMMARY OF RESULTS

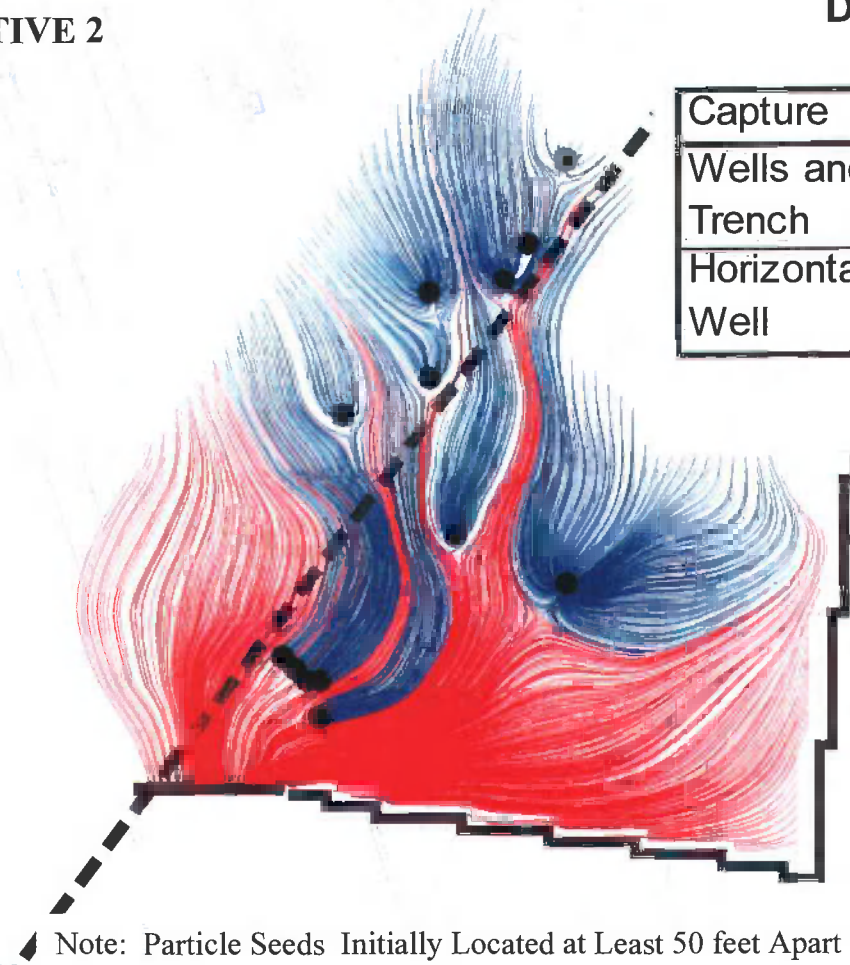
- General Flow Pattern for all Alternatives is very Similar
- Along both Sides of Barrier, Flow is to the Horizontal Well
- At Horizontal Well 1.5 feet of Saturated Aquifer Exists



REMEDIAL ALTERNATIVES: PARTICLE TRACKING RESULTS

ALTERNATIVE 2

Distribution of Captured Particles



Capture	Alternative 1	Alternative 2	Alternative 4
Wells and Trench	45%	60%	65%
Horizontal Well	55%	40%	35%

SUMMARY OF RESULTS

1. Three Different Alternatives Provide Nearly Identical Ground-water Capture Zones
2. Differences Among the Alternatives is the Percentage Captured by the Wells and the Horizontal Wells
3. On-base wells have a Lower Capture Efficiency for Alternative 1 than for Alternatives 2 and 4

Note: Particle Seeds Initially Located at Least 50 feet Apart



TRANSPORT MODEL CONSTRUCTION: SUMMARY OF KEY PARAMETERS

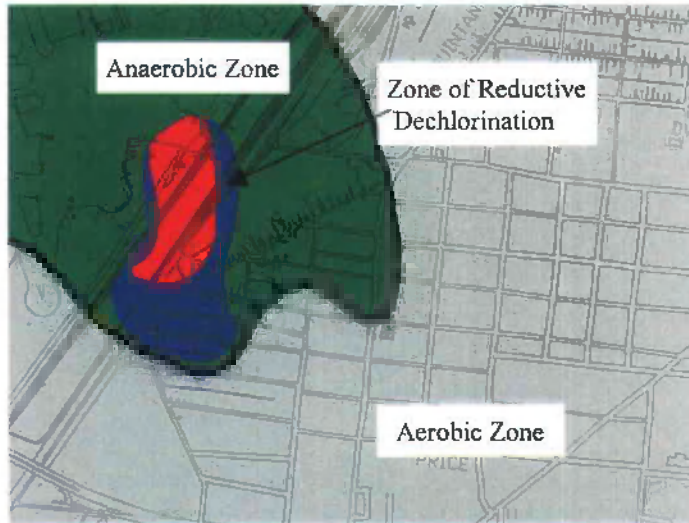


- PCE, TCE, DCE, AND VC PLUMES ARE BASED ON 1997-1999 FIELD DATA AND MASS IS PRESUMED TO EXIST IN THE UNSATURATED ZONE
- ADSORPTION MODEL BY USING RETARDATION FACTORS BASED ON FRACTION ORGANIC CONTENT
 - 2.0 for PCE
 - 1.4 for TCE
 - 1.2 for DCE
 - 1.0 for VC
- EFFECTIVE POROSITY IS UNIFORMILY SET TO 0.3
- DISPERSIVITIES SET TO:
 - $\alpha_{\text{Longitudinal}} = 15 \text{ ft}$
 - $\alpha_{\text{Lateral}} = 3 \text{ ft}$
 - $\alpha_{\text{Vertical}} = 0.05 \text{ ft}$
- BIODEGRADATION RATES FOR PCE>TCE>DCE>VC>ETHENE(OR CO₂+ H₂O) BASED ON FIELD DATA

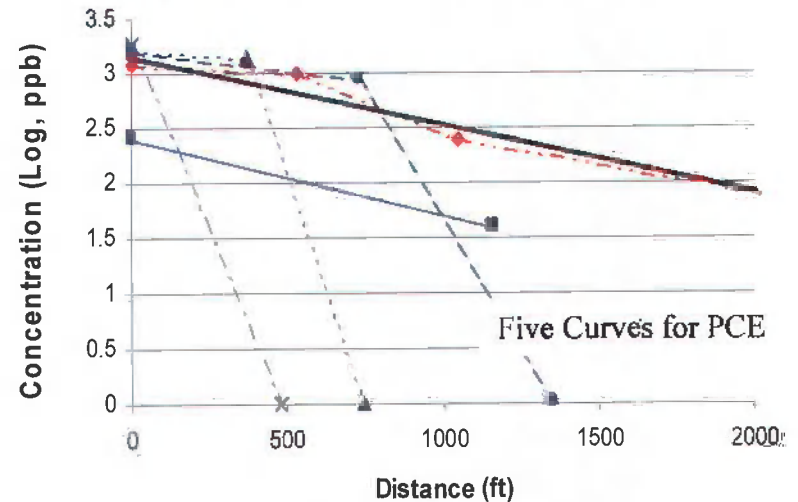


TRANSPORT MODEL CONSTRUCTION: THREE DATA SETS USED TO ESTABLISH BIODEGRADATION RATES

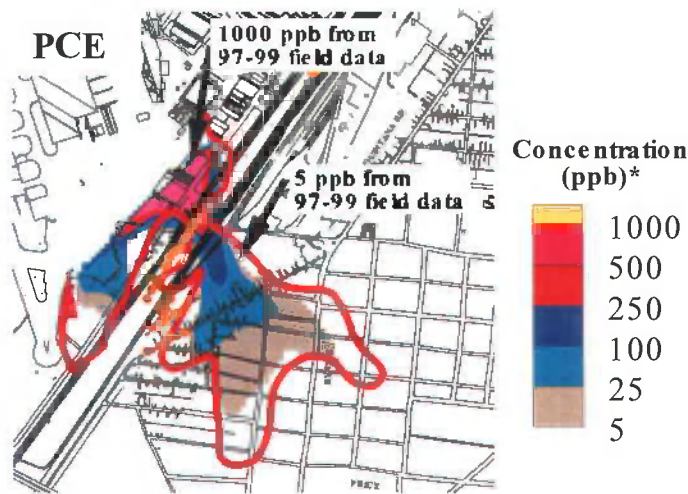
A) Define Geochemical Zones



B) Construct Breakthrough Curves



C) Model Evolution of Plumes



SUMMARY OF RESULTS

1. Spatially Variable Biodegradation Rates for All Solvents Based on Pattern in the Geochemical Trends for Dissolved Oxygen, Redox Potential, and Carbon Source (JP-4 Plume)
2. Biodegradation about 10 times Faster in JP-4 Plume Area than Outside of JP-4 Area
3. Outside of JP-4 Area, the Biodegradation Half-lives Range between 2 and 4 Years for All Solvents



TRANSPORT MODEL SIMULATIONS: BIODEGRADATION RATES, WELLS, AND BARRIER



- SIMULATE 30 YEARS OF TRANSPORT
 - Barrier in Place at 0 Years
 - Steady Pumping Rates at All Times
 - 0-5 Years with Anaerobic Conditions and with JP-Plume
 - 5-25 Years with Anaerobic Conditions and without JP-4 Plume

- USE CONSERVATIVE BIODEGRADATION HALF-LIVES

		Analysis Method			Transport Simulation Values
		Modeling Results	Breakthrough Curve Analysis		
			Analytical Solution	Visual Inspection	
PCE	Anaerobic Zone	~2	2.3 - 3.0	2-4	4
	JP-4 Area	<0.1	<0.25		0.5-0.75
TCE	Anaerobic Zone	~2	2.4 - 3.0	2-4	4
	JP-4 Area	<0.1	< 0.25		0.5-0.75
DCE	Anaerobic Zone	~3		3	3
	JP-4 Area	<0.3			0.5-0.75
VC	Anaerobic Zone	~-0.75 to 2.5		2	2
	JP-4 Area	<0.3			2

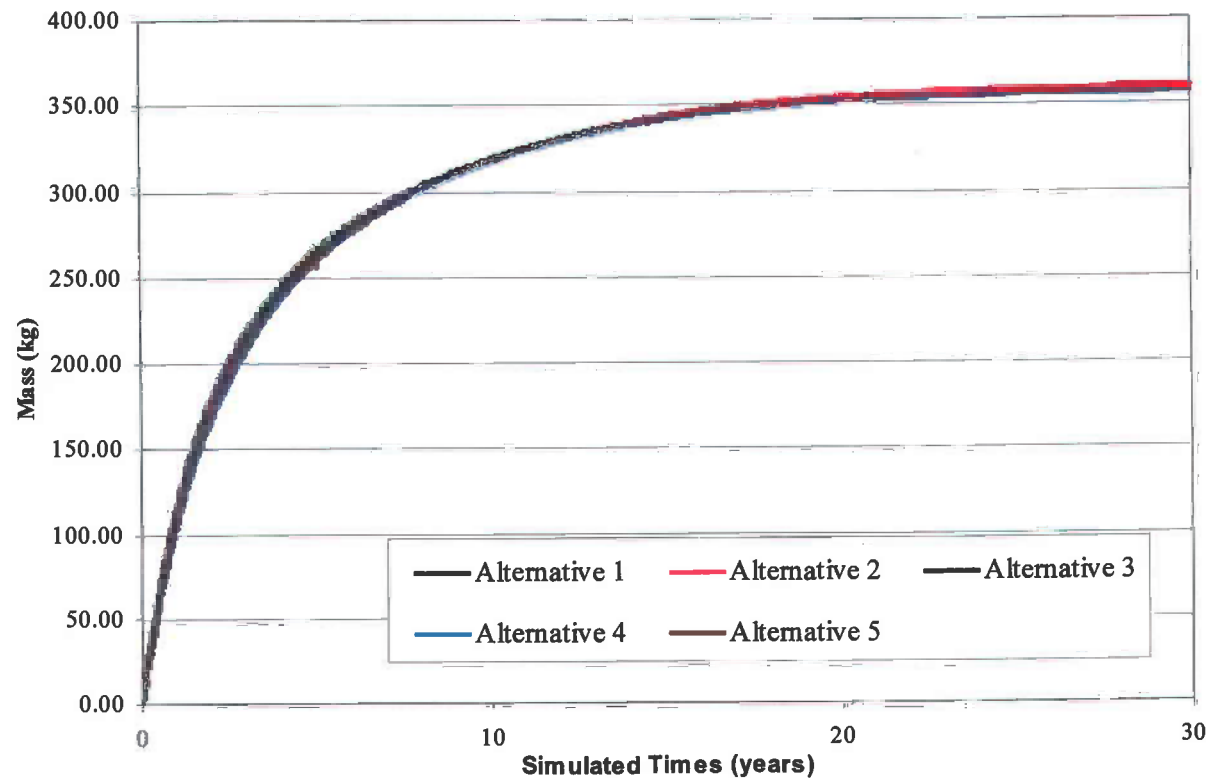


TRANSPORT MODEL SIMULATION: CUMULATIVE MASS REMOVAL



SUMMARY OF RESULTS

1. Total Mass Removals for Five Remediation Alternatives are Nearly Identical
2. About 70% of Mass Removal Occurs During First Five Years
3. At 26 Years, All Solvents below MCLs and 95% of Total Mass has been Removed





TRANSPORT MODEL SIMULATION: 30 YR MASS REMOVALS



	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Baseline Wells	RW116	59.95	RW116	51.61	RW116	58.99	RW116	49.15	RW116	58.99
	RW117	5.74	RW117	5.42	RW117	5.65	RW117	5.33	RW117	5.65
	RW153	106.76	RW153	96.31	RW153	105.05	RW153	94.05	RW153	105.05
	RW163	10.89	RW163	8.91	RW163	10.72	RW163	8.28	RW163	10.72
	RW18	41.89	RW18	22.14	RW18	41.22	RW18	21.65	RW18	41.22
	RW1_1	37.61	RW1_1	24.67	RW1_1	37.00	RW1_1	23.14	RW1_1	37.00
Baseline Subtotal		262.84		209.06		258.63		201.61		258.63
Additional Wells			RW1_2	13.38			RW2_4	34.32		
			RW2_2	29.81			RW3_4	3.88		
			RW3_2	2.16			RW4_4	11.18		
							RW5_4	10.26		
							RW6_4	9.90		
Trench (RW 112)		4.90		13.03		3.37		9.09		3.99
Horizontal Well		16.46		24.10		13.87		12.68		14.76
Additional Subtotal		21.37		82.48		17.24		91.30		18.75
Total due to S4 wells		284.20		291.54		275.87		292.91		277.38
Decay Losses		74.80		68.80		68.70		64.60		71.05
Additional Losses**		0.00		0.00		14.43		0.00		10.57
TOTAL LOSSES		359.00		360.34		359.00		357.51		359.00

Notes:

- masses shown are those for the total mass of all solvents (PCE, TCE, DCE and VC).

** Additional Losses refer to losses due to biodegradation triangle and reactive walls.



TRANSPORT MODEL SIMULATIONS: TIME TO REACH MCLs



Alternative	Time to MCL (years)							
	PCE		TCE		DCE		VC	
	On Base	Off Base	On Base	Off Base	On Base	Off Base	On Base	Off Base
Alternative 1	19.4	15.0	24.5	21.9	11.6	6.0	28.5	25.7
Alternative 2	19.3	17.9	24.4	23.3	11.7	7.8	28.4	26.4
Alternative 3	19.3	14.8	24.5	21.9	11.7	6.0	28.4	25.4
Alternative 4	19.3	17.9	24.5	23.2	11.7	7.8	28.4	26.4
Alternative 5	19.3	14.8	24.5	21.9	11.7	6.0	28.4	25.6

KELLY RESTORATION ADVISORY BOARD
TECHNICAL REVIEW SUBCOMMITTEE
MEETING AGENDA

Tuesday, 14 September 1999, 6:30 P.M.
St. Mary's University, Garni Science Hall

<u>Topic</u>	<u>Time</u>	<u>Presenter</u>
I. Introduction Agenda Review and Handouts	6:30 - 6:35	Dr Lené
II. Site S-4 CMS Report overview Site S-4 CMS modeling overview	6:35 - 7:15	Mr Buelter
III. Zone 4 OU-2 Workplan TAPP contractor review	7:15 - 7:45	Mr Neathery
IV. TAPP '00 Application Update	7:45 - 7:50	Dr Lené
V. TAPP Report Comments (AF, TNRCC, EPA)	7:50 - 8:20	Dr Lené
VI. Administrative a) BCT Update b) Spill Summary Report c) Documents to TRS/RAB d) Action Item Review e) Agenda/Location/Time of Next TRS Meeting	8:20 - 8:50	Dr Lené
VII. Adjournment	8:50	All

Document Review

of the

**Quality Program Plan, Phase II
Remedial Facility Investigation
IRP Zone 4 Operable Unit 2
Kelly Air Force Base, Texas**

Prepared for

**Kelly Air Force Base
Restoration Advisory Board**

DRAFT

Project No.: 98-033
September 7, 1999

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5.0 CONCLUSIONS AND RECOMMENDATIONS	7

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Project No.: 98-033
September 7, 1999

1.0 EXECUTIVE SUMMARY

Neathery Environmental Services has completed the review of the Quality Program Plan, Phase II Remedial Facility Investigation, IRP Zone 4 Operable Unit 2, Kelly Air Force Base, Texas hereafter referred to as the REPORT. The Report was prepared by CH2M Hill and dated May 1999. The REPORT was reviewed by Jeffrey S. Neathery, R.G., C.P.G. of **Neathery Environmental Services** and Christopher C. Mathewson, Ph.D., P.E., R.E.G. of **Texas A&M University**.

Overall the REPORT was weak on several levels. Portions of the REPORT were vague. Other portions were confusing. There were also some problems with production and internal review of the REPORT. A brief example of these follows:

The REPORT was vague. There was a great deal of information regarding techniques and methodology, but information on what work will actually be performed was vague. There is no information on which wells will be selected for aquifer testing. No information is given on how the degree of interaction between the alluvial groundwater and the San Antonio River will be evaluated.

The REPORT was confusing. One portion of the REPORT would state the type of work to be performed, however the methodology section of the REPORT would describe a different technique. This leads to confusion as to which method would actually be used.

The REPORT had production and internal review problems. Page 2-4 of the Work Plan is actually page 2-4 of the Field Sampling Plan. There is a page of information missing from the Work Plan. The REPORT needs further internal review to remove non-technical errors.

The REPORT indicates that dense non-aqueous phase liquids (DNAPLs) are used as indicator parameters. DNAPLs are heavier than water and "sink to the bottom of the water column. There is no discussion of the importance of paleochannels which are instrumental in the migration of DNAPLs.

Since this REPORT deals with contamination that has migrated off-base, it vital that any proposed work be clearly defined. **Neathery Environmental Services** recommends that the REPORT be revised. The revisions should include a clearer scope of work. Methodologies that will not be utilized should not be included. If there are alternative methodologies that may be used dependent upon field conditions, they should be stated as such.

DRAFT

Project No.: 98-033
September 7, 1999

2.0 INTRODUCTION

2.1 PURPOSE

The purpose of this project is to review the Quality Program Plan, Phase II Remedial Facility Investigation, IRP Zone 4 Operable Unit 2, Kelly Air Force Base, Texas hereafter referred to as the REPORT. The Report was prepared by CH2M HILL and dated May 1999. The review is to include a simple explanation of the work to be performed and a technical review of the proposed work. This review was conducted for the Kelly Air Force Base Restoration Advisory Board (CLIENT). Under Contract F41622-98-A-5884.

2.2 REVIEWERS

The REPORT was reviewed by Jeffrey S. Neathery, R.G., C.P.G. of **Neathery Environmental Services** and Christopher C. Mathewson, Ph.D., P.E., R.E.G. of **Texas A&M University**.

2.3 LIMITATIONS

The REPORT was reviewed as a "stand alone" document. No other documents were examined during the review of the REPORT. It is assumed that the background information included in the REPORT is accurate. It is further assumed that all of the data collected and relied upon in the REPORT is also accurate. All conclusions and recommendations contained herein are made solely on the contents of the REPORT.

This report was conducted is for the sole use of the CLIENT and may not provide adequate information for other purposes or parties.

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3.0 REPORT OVERVIEW

3.1 CONTENTS

The Report consists of four major components. These include:

Work Plan
Field Sampling Plan
Quality Assurance Project Plan
Health and Safety Plan

3.2 PURPOSE

The stated purpose of the Work Plan is as follows:

“This Work Plan describes the execution of the second phase of the RFI for Zone 4 OU-2 at Kelly AFB. The initial phase of this RFI evaluated the approximate limits of the groundwater contamination in the shallow alluvial aquifer. The results of the initial phase were presented in an Informal Technical Information Report (ITIR) (CH2M HILL, 1998a)

The rationale for the second phase of the field program and a description of the planned field activities are introduced. An RFI Report will be prepared to evaluate whether contaminants in OU-2 coming from Kelly AFB Pose a risk to human health and the environment. A logic schedule at the detailed and subtask level is presented. Progress-weighted milestones are assigned to each task to determine its percent of completion. Progress reports will be tracked against the baseline and schedule variances will be reported. A list of deliverables is provided in the Schedule section.”

The stated purpose of the Field Sampling Plan is as follows:

“The Field Sampling Plan (FSP) presents, in specific terms, the requirements and procedures for conducting the field operations and investigations. The project specific FSP has been prepared to ensure the following:

1. Data quality objectives for this project are met.
2. Field sampling protocols are documented and reviewed in a consistent manner.
3. Data collected are scientifically valid and defensible.”

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The stated purpose of the Quality Assurance Project Plan (QAPP) is as follows:

“The purpose of this document is to present in specific terms the QA/QC requirements designed to achieve the data quality goals described in the approved Field Sampling Plan (FSP) which are part of the activities performed by CH2M HILL at Kelly AFB.”

There is no specific stated purpose for the Health and Safety Plan.

In short, the Work Plan describes what will be done. The Field Sampling Plan describes the procedures and protocols to be used to obtain the data. The Quality Assurance Project Plan describes the quality control procedures that will be used to insure the validity of the samples. The Health and Safety Plan describes the procedures to be used to ensure worker safety.

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4.0 DISCUSSION

Overall the items listed as objectives in the Work Plan are fairly general items to complete. The Work plan goes on further to describe how these items will be conducted. Page 2-4 of the Work Plan is actually page 2-4 of the Field Sampling Plan. There is a page of information missing from the Work Plan that contains section 2.1.3.

The Work Plan states that the degree of interaction between the alluvial groundwater and the San Antonio River will be evaluated. No information, however, is provided on how this will be done.

In section 2.1.4 Aquifer Testing, the recovery period for the drawdown test should continue until the well has recovered to the original water level. The recovery period should not be limited to 12 hours.

Not until the FSP is the number on new monitoring wells mentioned. The number of new wells should be introduced in the Work Plan.

In section 2.5.1 the word "qualified" should precede hydrogeologist or geotechnical engineer.

In section 2.5.2 of the FSP the REPORT states that samples will be collected on 5 foot intervals for logging purposes. In a shallow alluvial aquifer, continuous sampling is recommended.

The method of well installation is not clear. In section 2.6.1 of the FSP, the REPORT states that the only acceptable drilling fluids include air, water and mud. However, in section 2.6.2 of the FSP the implication is that hollow stem augers will be used. Hollow stem augers do not use drilling fluids.

The slot size to be used in the monitoring wells is not clear. In section 2.6.4 of the FSP, the REPORT states that monitoring wells will have a screen size of 0.020 inches and test wells will have a screen size of 0.040 inches. Yes in item 4 of the same section, the REPORT states that a slot size will be selected to prevent 90 percent of the filter pack from entering the well. For wells where no filter pack is used, a slot size will be selected that will prevent 60 to 70 percent of the formation materials from entering the wells. This implies that the slot size will be variable dependent upon individual well conditions.

The method of collecting groundwater samples is not clear. In section 3.2.5 of the FSP, the REPORT states that collection of methane, volatile organics and TOC samples will be collected using a pump and a three-way valve. In section 3.1 and 4.3 of the FSP, the REPORT states that a new disposable bailer will be used to collect organic samples.

It appears that groundwater samples will be collected from the top of the groundwater column. (Section 3.1 of the FSP). This is a valid technique for sampling light non-aqueous phase liquids (LNAPLs). LNAPLs are lighter than water and "float" on top of the water column. However the indicator parameters listed in section 2.1.1 of the Work Plan are dense non-aqueous phase liquids

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(DNAPLs). DNAPLs are heavier than water and "sink to the bottom of the water column. It is not clear how the DNAPLs will be collected.

There are redundancies in the REPORT. In section 2.1.3 of the Work Plan information on surveying requirements are described. The surveying requirements are also described in 2.12 of the FSP.

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6.0 CONCLUSIONS AND RECOMMENDATIONS

The review of the REPORT performed by **Neathery Environmental Services** revealed the following:

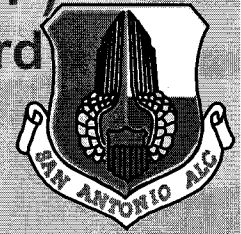
- The REPORT was somewhat vague. There was a great deal of information regarding techniques and methodology, but information on what work will actually be performed was vague.
- The REPORT was confusing. One portion of the REPORT would state the type of work to be performed, however another section of the REPORT would describe a different technique. This leads to confusion as to which method would actually be used.
- The REPORT had production and internal review problems. Page 2-4 of the Work Plan is actually page 2-4 of the Field Sampling Plan. There is a page of information missing from the Work Plan. The REPORT needs further internal review to remove non-technical errors.
- The REPORT indicates that dense non-aqueous phase liquids (DNAPLs) are used as indicator parameters. DNAPLs are heavier than water and "sink to the bottom of the water column. There is no discussion of the importance of paleochannels which are instrumental in the migration of DNAPLs.

Based on the results of this assessment, **Neathery Environmental Services** recommends that the REPORT be revised. The revisions should include a clearer scope of work. Methodologies that will not be utilized should not be included. If there are alternative methodologies that may be used dependent upon field conditions, they should be stated as such.

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The Technical Assistance for Public Participation (TAPP) process was utilized by the Restoration Advisory Board (RAB) for review of the January 1999 Kelly AFB Compliance Plan Report.



- Provide the public with a clearer understanding of the purpose and content of the compliance plan technical report
- Conduct an independent review of the findings in the report



The purpose of the compliance plan report is to periodically evaluate groundwater and surface water quality associated with the Kelly AFB Environmental Restoration Program.



- **Regulations and Permits** - *TNRCC Compliance Plan, Risk Reduction Rules*
- **Investigate potential contamination** - *Site Inspections, Preliminary Assessments, Soil and groundwater investigations*
- **Determine appropriate actions** - *Remedial Investigations, Risk Assessments, Corrective Measure Studies (Feasibility Studies)*
- **Implement Corrective Actions** - *Remedial Designs, Interim Measures, Remedial Installations*
- **Monitoring** - *Groundwater Monitoring Program, Leon Creek Monitoring, Semiannual Compliance Plan Report, Post closure monitoring*



The January 1999 Kelly Compliance Plan Report complies with all regulatory requirements (TNRCC Compliance Plan Permit No. CP-50310)

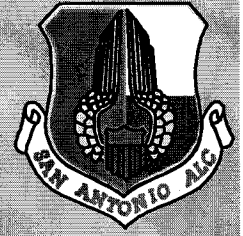


Findings in the January 1999 CP Report

- Eleven of the 14 Waste Management Areas have interim groundwater recovery systems
- Over 69 million gallons of groundwater was remediated between July and December 1998.
- The effectiveness of the systems range from 60% to 100% of the groundwater flow being intercepted by the systems.



The 1999 Kelly Compliance Plan Report complies with all regulatory requirements (TNRCC Compliance Plan Permit No. CP-50310).



Findings (continued)

- The extent of previously fully delineated known groundwater constituent plumes have remained the same or decreased since 1995.
 - The Zone 2 WMA E-3/SD-1 chlorobenzene plume extent has been dramatically decreased by over 1,000 feet.
- The lateral extents of groundwater plumes east and southeast of Zones 3 and 4 still remain undelineated.



The content of the TAPP review can be summarized into 14 comments. A response to each comment has been provided to the TRS

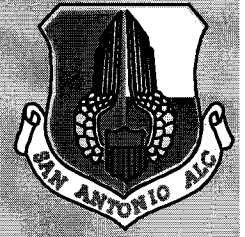


Breakdown of Comments

- Regulations and Permits - 2
- Investigate potential contamination - 1
- Determine appropriate actions - 4
- Implement Corrective Actions - 2
- **Monitoring (Semiannual CP Reports) - 5**



Response to 5 Monitoring Comments



- **Comment:** *Well locations not properly shown on well location maps. Accuracy of well identifications.*
- **Response:** Approximately 1500 monitoring wells exist on and off Kelly. These wells have been installed by multiple contractors since the early 1980s. Under these conditions, perfection with regard to well identity is difficult to achieve; however appropriate quality assurance is in place and ongoing with regard to well Ids in the environmental restoration program. Kelly AFB is undertaking a comprehensive well re-survey effort to correct inconsistencies. Kelly AFB continues to improve the accuracy of well Ids. The discrepancies identified do not affect the findings of the report.



Review Comments (continued)



- **Comment:** *Tables of groundwater analytical results did not include sample results from a number of monitoring wells. Missing data – A number of analytical results were not included in Volume IV Appendix C. Though the results were depicted on plume maps.*
- **Response:** The text, (Part I, Section 1) in the report lists all different sources of data used in the report. Data from projects outside of this project were used to help enhance and improve this report, but the detailed analytical results are not included. However, these reports are available for review. Future versions of the compliance plan report will be more “stand-alone” in nature as Kelly moves towards a predominantly operations and monitoring type program.



Review Comments (continued)



- **Comment:** *Stainless steel well materials cited as a potential source of the chromium and nickel. Having well constructed of PVC on log.*
- **Response:** Kelly has conducted a chromium / nickel study on well screens and the correlation with elevated levels of these metals found in the groundwater. The text only states the stainless steel screens as a potential source of Chromium and Nickel. The Semiannual Compliance Plan Report states that site CS-3 (landfills) is a potential source for nickel. Nickel and chromium contaminants at site CS-3 are not being attributed to stainless steel well screens in the report. The surface of each monitoring well is completed with PVC, and all pipe and screen at or beneath the water table is stainless steel. The field person was strictly noting the surface PVC completion.



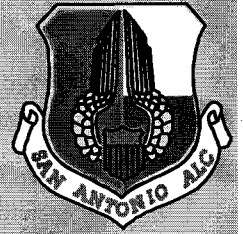
Review Comments (continued)



- **Comment:** *The report did not contain information to fully evaluate the effectiveness of the groundwater pump and treat systems as required by the CP.*
- **Response:** All information to evaluate the effectiveness of the remedial systems as required by the compliance plan is included in the report or subsequent submittals. Cone of depression and plume migration rates located in Part IV Section 5, and Part III Sections 4 and 5. A technical memorandum was delivered to the TNRCC with the quantities of recovered groundwater and graphs of monthly flow rates. This information could not be included into the referenced document due to time constraints, but the information was delivered to the TNRCC prior to the TNRCC CP deadline.



Review Comments (continued)



- **Comment:** *Key figures in the CP did not properly show monitoring wells used to determine groundwater compliance. Exhibits 6.8 did not accurately depict the monitoring wells that were used to determine compliance. Errors in Exhibit 8.6 and Exhibit L*
- **Response:** We have reviewed all of the figures and the only error is one point of compliance monitoring well (LF015MW004), which is color coded incorrectly as a background well. The well was correctly used as a point of compliance well in analysis and reporting of findings in the report. Therefore, this graphical error had no impact to the report findings.

Kelly AFB Responses to TAPP Review Report on the Semiannual Compliance Plan Report**General Comments:**

- The TAPP Report goes beyond a review of the semiannual compliance plan report, and actually critiques aspects of the Kelly cleanup program that are not in the scope of the compliance plan report.
- If the purpose of the TAPP report was to provide the community with a layman's interpretation of a technical document, the contractor failed to achieve that goal in this report. Rather than clarify technical issues and simply interpret the information for the community, the community received a critical review and in many instances providing misleading information or information presented in an improper context. Unfortunately, as demonstrated at the RAB, the reaction was one of alarm to some of the issues raised without the proper context being provided (e.g. saying that there is a 150 times greater increase in cancer risk to vinyl chloride when in fact no exposure is known to exist to this contaminant).
- The AF must question the objectivity of the report review as it was completely critical in nature. As background, Kelly has been performing the Basewide Remedial Assessment (BRA) voluntarily since 1994. The voluntary program became mandatory when the BRA was included as part of the permit requirements in 1998 (and is now known as the semiannual compliance plan report). Kelly found no instance in the TAPP report where Kelly was commended for doing something right or correctly. An objective review would have included identifying aspects of the report that were noteworthy and positive. Because the report was devoid of these observations, the AF questions the objectivity of the reviewer and the review.

Kelly AFB Responses to TAPP Review Report on the Semiannual Compliance Plan Report

	TAPP Report Comments/Recommendations	Remarks
1.	Full extent of off-base groundwater contamination still unknown	<p>TAPP Report: The full extent of groundwater contamination has not been determined to the Northeast, West and Southeast of Kelly AFB. Current data shows two chlorinated solvents, tetrachloroethylene (PCE) and trichloroethylene (TCE) exceed cleanup standards in groundwater samples collected three miles from Kelly AFB near the San Antonio River. This finding indicates that contaminated groundwater is moving away from Kelly AFB much faster than previously thought. The interaction of surface water and groundwater, the locations of faults, and the locations of Edwards Aquifer wells should be determined in the over 3,000 acre off-base area impacted by Kelly AFB contamination.</p>
		<p>Kelly AFB Response: Since the time of the TAPP contractor's review of the BRA, Kelly AFB mailed out more information showing the extent of shallow groundwater contamination in the vicinity of Kelly. As noted at the Restoration Advisory Board meeting on 20 Jul 99, only the area north of highway 90 remains in question. All other contamination has been delineated around Kelly AFB. Kelly AFB will be working with the regulatory agencies regarding further investigation of shallow groundwater contamination in the area north of highway 90. Kelly AFB is also working with the US Geological Survey (USGS) regarding interaction of surface water and shallow groundwater systems. The USGS also has a vast amount of information regarding local geology including location of faults around Kelly AFB. Although Kelly is investigating locations of old Edwards aquifer wells, the Edwards Aquifer Authority, Bexar Metropolitan Water District and the San Antonio Water system all maintain information on Edwards wells including chemical analytical data.</p>
2.	Effectiveness of existing Groundwater pump and treat Systems	<p>TAPP Report: Groundwater cleanup includes both the control of contamination sources as well as the recovery of contaminants. The existing pump and treat systems have addressed source control. Combined, the systems intercept contaminated groundwater as it migrates off base or into Leon Creek with varying effectiveness. The existing pump and treat systems do not address off-base groundwater contamination. Combined the pump and treat systems recover an estimated 35 gallons of solvent per year. Adding new recovery wells near spill area would increase contaminant recovery rates and reduce cleanup time.</p>
		<p>Kelly AFB Response: Groundwater pump and treat systems have been in operation on and off base for many years at Kelly. However, none of these systems are FINAL systems. All systems are INTERIM, the main purpose of which is to CONTAIN and CAPTURE contamination prior to moving off base, into the creek, or moving further off base. CLEANUP of contaminated groundwater is a secondary benefit of the interim capture systems. Kelly has data showing that cleanup of contaminated groundwater is occurring as a result of these systems working in concert with other mechanisms (e.g. natural attenuation) at several sites (e.g. S-1, S-4, E-3). None of the systems were installed for the specific purpose of cleanup. However, it is Kelly's intent that these interim actions be part of the FINAL cleanup action at a site. The inefficiency of pump and treat systems is well known throughout industry and Kelly is well aware of the limitations of pump and treat systems, particularly when viewed on a mass removal basis. However, the regulatory standards are the drinking water limits (5 parts per billion for PCE and TCE). A groundwater pump and treat system operating on a contaminated groundwater plume with very low concentrations of contaminants attempting to contain a very low concentration plume will inevitably be perceived as "inefficient" when viewed on a mass removal basis. Ultimately, Kelly will determine if other technologies are more efficient at achieving site cleanup goals.</p>

Kelly AFB Responses to TAPP Review Report on the Semiannual Compliance Plan Report

3.	Risk-based groundwater protection standards	<p>TAPP Report: Groundwater cleanup standards were based on ingestion of groundwater. Vinyl chloride is a gas formed by decomposing PCE and TCE. The groundwater cleanup standards for Kelly AFB did not consider the potential risk from vinyl chloride exposure in residential air, as a result of migration upward from a groundwater plume. Expedited cleanup of PCE and TCE contamination would reduce the continued formation of vinyl chloride.</p>
		<p>Kelly AFB Response: Kelly is subject to cleanup standards as promulgated by the TNRCC and EPA. Kelly cannot change cleanup standards, however, risk assessments can and do consider exposures from multiple pathways (ingestion, inhalation, contact, etc). Because the shallow groundwater is not used as potable water, there is no ingestion exposure pathway. Exposure to vinyl chloride via inhalation can and will be evaluated in an off base risk assessment, but given the known off base concentrations in the shallow groundwater, Kelly does not expect to find a significant contribution to cumulative risk as a result of vinyl chloride. Lastly, the TAPP report failed to note that vinyl chloride also degrades in the environment. In fact, the presence of vinyl chloride indicates that natural attenuation is occurring in the shallow groundwater. Although the TAPP report did not mention it, there are also available analytical results for ethene and ethane, breakdown products of vinyl chloride. Kelly does not concur with a course of action to prevent formation of vinyl chloride when vinyl chloride is known to degrade through natural means, and there is no eminent health threat. However, future remedial actions will be addressed in respective cleanup site reports.</p>
4.	Missing remedial system information.	<p>TAPP Report: The Compliance Plan Report did not contain information to fully evaluate the effectiveness of the groundwater pump and treat systems as required by the Compliance Plan Report Checklist.</p>
		<p>Kelly AFB Response: The Clearwater revival review overlooked the inclusion of the cone of depression and plume migration rates located in Part IV Section 5, and Part III Sections 4 and 5. A technical memorandum was delivered to the TNRCC with the quantities of recovered groundwater and graphs of monthly flow rates. This information could not be included into the referenced document due to time constraints, but the information was delivered to the TNRCC prior to the TNRCC CP deadline.</p>
5.	Errors in Key Figures.	<p>TAPP Report: Key figures in the Compliance Plan Report did not properly show monitoring wells used to determine groundwater compliance.</p>
		<p>Kelly AFB Response: The only noted errors from a follow up review are an improper color code on one well</p>
6.	Remedial recommendations	<p>TAPP Report: The following remedial alternatives should be installed or completed:</p> <ol style="list-style-type: none"> 1)Install soil vapor extraction 2)Soil excavation 3)Install off-site groundwater extraction wells 4) Monitor sites
		<p>Kelly AFB Response: Remedial recommendations is not the purpose and scope of this report. Remedial recommendations are not required in the compliance plan. This comment has no relevance to this document Kelly AFB is currently evaluating different remedial alternatives for each site, and looking at the remedial</p>

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		<i>alternatives cited in the review document along with new state of the art remedial technologies.</i>
7.	Ethylene Dibromide (EDB) Sampling	<p>TAPP Report: There is no indication that sampling for this chemical has been conducted at any of the Kelly AFB jet fuel spill sites.</p> <p>Kelly AFB Response: <i>The compliance plan does not require Kelly to sample for ethylene dibromide, EDB. However, Kelly has a total of 2,546 records for 1,2-Dibromoethane (Ethylene Dibromide) in the database. Of those 2,546 records, 1,048 are for soil and 1,488 are for groundwater. The rest are surface water and free product results. All results are ND: Non-Detect</i></p>
8.	Timeliness of data reporting	<p>TAPP Report: These sample results for May-June 1999 will not be reported to TNRCC and the public until January 2000 seven months later.</p> <p>Kelly AFB Response: <i>Timelines are specified in the compliance plan. Kelly meets these requirements. Although, analytical data from sampling can be made available to Kelly by September each year, the interpretation and associated reports take considerably longer to generate.</i></p>
9.	Accuracy of well identifications	<p>TAPP Report: Several of the wells had measured well depths that exceeded the installed well depth. Field measurements have raised concerns that well locations are not properly shown on site maps.</p> <p>Kelly AFB Response: <i>Errors in reporting are noted and corrected when identified. These errors are infrequent (nearly 1500 monitoring wells exist) and these few results will not impact cleanup decisions. Approximately 1500 monitoring wells exist on and off Kelly. These wells have been installed by multiple contractors since the early 1980s. A resurveying effort of selected wells commenced last year on 160 wells and another 100 will be performed soon. The contractor verifies well identities during the sampling event, and discrepancies. Any misidentification is corrected when discovered, but this situation is rare and not expected to drastically change any results or decisions.</i></p>
10.	Missing data	<p>TAPP Report: A number of analytical results were not included in Volume IV, Appendix C, though these results were depicted on plume maps. These data emissions made verifying the statistical analysis very difficult.</p> <p>Kelly AFB Response: <i>The text, (Part I, Section 1) in the report lists all different sources of data used in the report. Data from projects outside of this project were used to help enhance and improve this report, but the detailed analytical results are not included. However, these reports are available for review. Future versions of the compliance plan report will be more "stand-alone" in nature as Kelly moves towards a predominantly operations and monitoring type program.</i></p>

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11.	Monitoring well design	<p>TAPP Report: Many of the monitoring wells were constructed with submerged screens rather than being screened throughout the shallow aquifer. Submerged screens limit the ability to detect impacts to shallow groundwater caused by fuel hydrocarbons. In wells with submerged screens, LNAPLs, including vinyl chloride may also go unobserved. This well design may not provide accurate groundwater level readings because air is trapped in the casing. The groundwater level in the well may not equilibrate with atmospheric pressure if sufficient time is not provided between the opening of the well and the measuring of the groundwater depth.</p>
		<p>Kelly AFB Response: All new monitoring wells are constructed per the compliance plan provisions. Some older wells may not have been screened across the entire shallow aquifer. Kelly is very confident that the extent of fuel hydrocarbon (LNAPL) has been adequately delineated using the present network of monitoring wells. However, vinyl chloride is found as a dissolved phase component, not an LNAPL, and no complications with its detection would be expected as a result of well screen placement. Regarding the effect of atmospheric pressure, the shallow groundwater system around Kelly is very shallow and discontinuous in nature and relatively thin. While atmospheric pressure may have significant bearing in deeper wells such as in California, this is not a problem at Kelly.</p>
12.	Source of metal contamination	<p>TAPP Report: For Site CS-3, well screens (presumably constructed of stainless steel) were cited as a potential source of the chromium and nickel found in groundwater. The sampler also noted that the sample appeared to "turn green when exposed to sunlight." Nickel and chromium are likely site related. Well is constructed of PVC based on sampling log.</p>
		<p>Kelly AFB Response: Kelly has conducted a chromium / nickel study on well screens and the correlation with elevated levels of these metals found in the groundwater. The text only states the stainless steel screens as a potential source of Chromium and Nickel. Site CS-3 (landfills) is a potential source for chromium and nickel. The surface of each monitoring well is completed with PVC, and all pipe and screen at or beneath the water table is stainless steel. The field person was strictly noting the surface PVC completion.</p>
13.	Off-base surface water/groundwater interaction	<p>TAPP Report: The San Antonio River, San Pedro Creek, Six Mile Creek, and some unnamed waterways appear to be within the boundaries of Kelly AFB groundwater contaminant plumes. An evaluation of the interaction between these surface water bodies and the shallow aquifer should be performed.</p>
		<p>Kelly AFB Response: Kelly began several months ago working with the San Antonio River Authority and the US Geological Survey (USGS) in studying the interaction of shallow groundwater and the river. Only the San Antonio River has any hydraulic connection to the shallow groundwater system. Six Mile Creek is often dry and is primarily used for surface drainage. Also, Leon Creek has been the subject of extensive investigation by Kelly since 1994.</p>
14.	Fault study and Edward's aquifer wells	<p>TAPP Report: A well search and proper abandonment of out-of-services Edward's Aquifer wells was previously completed at Kelly AFB. In addition, a fault trace analysis was performed. A similar study should be completed in off-base areas impacted by the Kelly AFB groundwater contamination plumes.</p>
		<p>Kelly AFB Response: Kelly has used mailouts to local residents seeking information on known locations of old or abandoned Edwards wells. Another similar effort is planned in the near future. Information on faults in the local area is available through the USGS.</p>

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