



KELLY AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 3275

Kelly Restoration Advisory Board

Technical Review Subcommittee

Draft Meeting Agenda

February 12, 2002, 6:30 p.m.
Environmental Health & Wellness Clinic
911 Castroville Road
(previously Las Palmas Clinic)

- | | |
|---|---------------------|
| I. Introduction | Dr. Lené |
| a. Agenda Review and Handouts | |
| b. Approval of January TRS Minutes | |
| II. TAPP Report | Mr. Neathery |
| Zone 4 OU2 RFI | |
| III. Thermally Enhanced Soil Vapor Extraction Briefing | Ms. Hampton |
| IV. Charter Review Subcommittee Update | Dr. Smith |
| V. Administrative | Dr. Lené |
| a. BCT Update | |
| b. Spill Summary Report | |
| c. Documents to TRS/RAB | |
| d. Action Items | |
| January (Rodrigo Garcia, Nazarite Perez, Armando Quintanilla) | |
| (note: Mr. Quintanilla's concerns have been addressed by providing the Zephyr report at the January RAB in member packages) | |
| VI. Agenda/Location/Date/Time of Next TRS Meeting | |
| a. Request for Agenda Items | |
| b. Location TBD / March 12, 2002 / 6:30 p.m. | |
| VII. Adjournment | 9:00 p.m. |

Feb. 2002

MEETING MINUTES

KELLY AFB TECHNICAL REVIEW SUBCOMMITTEE (TRS) TO THE RESTORATION ADVISORY BOARD (RAB)

12 February 2002

SAMHD Health and Wellness Center
Dr. Gene Lené, TRS Community Co-chair

Attendees

Dr. Gene Lené, Community Co-chair
Dr. David Smith, Facilitator
Mr. William Ryan, AFBCA
Mr. Dan Zatopek, AFBCA
Ms. Rhonda Hampton, AFBCA
Mr. Doug Karas, AFBCA
Mr. Larry Bowman, Community Member
Mr. Sam Murrah, Community Member
Mr. Nazarite Perez, Community Member
Mr. Armando Quintanilla, Community Member
Mr. Robert Silvas, Community Member
Mr. George Rice, Community Member
Ms. Katherine Ramos, Community Member (alternate for Mr. Quintanilla)
Mr. Nicholas Rodriguez, Community Member
Mr. Mark Weegar, TNRCC
Ms. Abbi Power, TNRCC (alternate for Mr. Weegar)
Ms. Linda Kaufman, SAMHD
Ms. Kyle Cunningham, San Antonio Metropolitan Health District (SAMHD) (alternate for Sam Sanchez)
Mr. Jeff Neathery, Neathery Environmental Services
Mr. David Fleming, Thermal Remediation Services, Inc.
Mr. Jim Cleary, CH2M Hill
Ms. Lynn Myrick, Booz Allen Hamilton (Booz Allen)
Mr. Eddie Martinez, Booz Allen
Mr. Hugh Farr, Booz Allen
Mr. Scott Courtney, Booz Allen

I. Introduction: The meeting began at 6:34 p.m.

Mr. Quintanilla asked when Dr. Katherine Squibb would be returning. Dr. Gene Lené indicated that Dr. Squibb would return this March for the next TRS meeting at which time she would deliver a draft Technical Assistance TAPP report on Agency for Toxic Substances and Disease Registry (ATSDR). Ms. Lynn Myrick indicated that January TRS meeting minutes have been compiled but are still awaiting approval. They will be in the February RAB materials package on the 19th, next Tuesday.

II. TAPP Report: During the presentation, Mr. Quintanilla asked about contamination appearing to flow upgradient. Mr. Ryan explained that contaminants could spread in the vadose zone without regard to ground water flow direction. Mr. Sam Murrah asked if the report examined estimates of the cleanup time. Mr. Neathery responded that the modeling time was based on a 55-year model and that the model matched the conditions of the area covered in the report. Mr. Neathery ended his presentation by adding that the most reasonable recommendation made were continuous monitoring, although no conclusions were reached.

Mr. Quintanilla also asked if MW-125 was considered on base since the source is off site. Mr. Neathery and Mr. Ryan both replied that yes the site was on base. Mr. Quintanilla also asked if the refineries north of MW-125 were where the contamination was located despite the fact that the water flow is east. Mr. Ryan responded by saying that contaminants move through the soil and that this had been determined by testing of soils at Tropicana and the base boundary. Mr. Neathery added that groundwater flow for varying reasons, including drought and the changes of season.

Following the presentation, Mr. Quntanilla and Mr. Malone had questions about potential off-site sources of contamination. Mr. Neathery responded by saying there was no discussion of the off-site sources in the report. Mr. Weegar explained that the Air Force was looking for sources of contamination and in the process located other potential non-Kelly sources such as Tropicana and R&H Oil. If the Air Force can provide a specific source, The Texas Natural Resources Conservation Commission (TNRCC) can force the responsible party to address the issue. However, if contaminants from off-site sources have commingled with the Air Force plume, the Air Force will address the cleanup of those contaminants. Mr. Weegar did however add that some contaminants have no apparent Air Force source.

Mr. Quintanilla questioned Mr. Weegar regarding Dense Non-aqueous Phase Liquids (DNAPLs). Mr. Weegar explained that DNAPLs sink to the bottom of water and follow old paleochannels and that the term refers to free phase product found at the site. Site MP is contained in slurry wall and that only the dissolved phase plume is past that wall. The source of the contamination is contained by a slurry wall and is not contributing to the larger plume. Plume contaminants that are offsite are materials had migrated before the installation of the slurry wall.

Mr. Quintanilla asked about two unauthorized landfills in the area of Highway 90 and Zarzamora. Mr. Quintanilla said he did not recall those two landfills. Ms. Power's explained that that term refers to any dumpsite that is not officially authorized or recognized. She added that it could be an empty lot where the community placed unusable items. Information associated with these findings came from the Alamo Area Council of Governments (ACOG) database. These sites are on maps located in Volume 3. Mr. Neathery stated that the report did not go into detail, but simply mentioned the sites. Mr. Weegar added that the contractor used many databases to identify sites that could be potential sources of contamination.

Mr. Quintanilla mentioned our editorial correction to Mr. Neathery's report.

III. Thermally Enhanced SVE Briefing

Ms. Rhonda Hampton announced the public information period for next week. Two of those sites have Thermally Enhanced technology proposed.

Mr. Fleming of Thermal Remediation Services, Inc. gave a presentation entitled, Electrical Resistance Heating.

IV. Charter Review Subcommittee Update: Mr. Larry Bowman, Mr. Armando Quintanilla and Mr. George Rice have volunteered to be on the Charter Review Subcommittee. This charter review will follow an aggressive schedule, and the committee will prepare recommendations for the April RAB. Mr. Rice asked what changes were being proposed for the RAB Charter. Mr. Karas replied that first he envisioned a general review of the charter followed by some needed clarification of the election language. Mr. Karas later asked for volunteers willing to participate in the charter review subcommittee. Mr. Rice volunteered. Mr. Karas said that he believed the subcommittee should expect to meet by late February or early March timeframe. Mr. Quintanilla asked that since AFBCA would have an attorney present, could he also have an attorney. Mr. Quintanilla expressed his feeling that the community would be at a disadvantage without legal counsel present. Mr. Karas replied that if Mr. Quintanilla wanted legal counsel present during the meeting, that that would be fine. Ms. Katherine Ramos volunteered to be present at the RAB Charter Review Subcommittee meeting, however she never acknowledged if she herself was legal counsel in some capacity.

V. Administrative

- A. BCT Meeting Update No BCT meeting was held today. There was a BCT last month on 15 January. The BCT included comments from the TNRCC and EPA on the 2001 Semiannual Compliance Plan. Air Force responses were submitted this week.
- B. Spill Summary Report: There was a Groundwater Treatment Plant (GWTP) spill in late November. The Air Force tested water and soils. The AFBCA notified the state, which determined that no further actions were needed.
- C. Documents Delivered to TRS: Provided to Dr. Lené.
 - 1. Attach
- D. Action Items. Mr. Quintanilla requested that a briefing on the Zephyr report be given to the RAB. He requested that the City of San Antonio or Zephyr provide this information. Mr. Quintanilla expressed interest in learning more about the relationship between Zephyr and the City of San Antonio.
- E. Agenda/ Location/Date Time The next meeting will be held on March 12, 2002, at 6:30 p.m. Dr. Squibb's report will be presented at the next meeting.

Adjournment: The meeting adjourned at 8:41 p.m.

8S
MINUTAS DE LA JUNTA

**Subcomité de Revisión Técnica (TRS, por sus siglas en inglés) de la Base de la Fuera
Aérea de Kelly**
Junta Asesora de Restauración (RAB, por sus siglas en inglés)

12 de febrero de 2002

Dr. Gene Lené, Copresidente representando a la comunidad en el TRS

Asistentes:

Dr. Gene Lené, Copresidente representando a la comunidad
 Sr. David Smith, Facilitador
 Sr. William Ryan, Agencia de Conversión de Bases de la Fuerza Aérea (AFBCA, por sus siglas en inglés)
 Sr. Dan Zatopek, AFBCA
 Srta. Rhonda Hampton, AFBCA
 Sr. Doug Karas, AFBCA
 Sr. Larry Bowman, Miembro representando a la comunidad en el
 Sr. Sam Murrah, Miembro representando a la comunidad
 Sr. Nazarite Pérez, Miembro representando a la comunidad
 Sr. Armando Quintanilla, Miembro representando a la comunidad
 Sr. Robert Silvas, Miembro representando a la comunidad en el
 Sr. George Rice, Miembro representando a la comunidad en el RAB
 Srta. Katherine Ramos, Sustituta representando a la comunidad en el RAB
 Sr. Nicholas Rodríguez, Miembro representando a la comunidad
 Sr. Mark Weegar, Comisión para la Conservación de Recursos Naturales de Texas (TNRCC, por sus siglas en inglés)
 Srta. Abbi Power, TNRCC (Suplente del Sr. Weegar)
 Srta. Linda Kaufman, Distrito Metropolitano de Salud de San Antonio (SAMHD, por sus siglas en inglés)
 Srta. Kyle Cunningham, SAMHD(Suplente del Sr. Sam Sánchez)
 Sr. Jeff Neathery, Neathery Environmental Services
 Sr. David Fleming, Termal Remediation Services, Inc.
 Sr. Jim Clearly, CH2M Hill
 Srta. Lynn Myrick, Booz Allen Hamilton (Booz Allen)
 Sr. Eddie Martínez, Booz Allen
 Sr. Hugh Farr, Booz Allen
 Sr. Scott Courtney, Booz Allen

I. Introducción: La reunión inició a las 6:34 de la tarde.

El Sr. Quintanilla preguntó cuándo regresaría la Dra. Katherine Squibb. El Dr. Gene Lené dijo que la Dra. Squibb regresaría este mes de marzo para la siguiente reunión del TRS que sería cuando ella entregara un reporte en borrador del Programa de Asistencia Técnica y Participación Pública (TAPP, por sus siglas en inglés) con relación a la Agencia para el Registro de Sustancias Tóxicas y Enfermedades (ATSDR por sus siglas en inglés). La Srta.

Lynn Myrick indicó que las minutas de la junta del TRS de enero ya estaban compiladas pero que todavía faltaba aprobarlas, y que las iban a encontrar en el paquete de materiales del RAB del próximo jueves 19.

II. Reporte del TAPP: Durante la presentación, el Sr. Quintanilla preguntó sobre la contaminación que parecía estar fluyendo cuesta arriba. El Sr. Ryan explicó que los contaminantes se pueden diseminar en la zona de los vados sin importar la dirección del flujo del agua subterránea. El Sr. Sam Murrah preguntó si el reporte examinaba los estimados del tiempo para limpieza. El Sr. Neathery respondió que el tiempo del modelo estaba basado en un modelo de 55 años y que el modelo concordaba con las condiciones del área cubierta en el reporte. El Sr. Neathery terminó su presentación añadiendo que la recomendación más razonable era el monitoreo continuo, a pesar de que no se había llegado a ninguna conclusión.

El Sr. Quintanilla también preguntó si MW-125 se consideraba en la base ya que la fuente está fuera del sitio. El Sr. Neathery y el Sr. Ryan respondieron que sí, que el sitio estaba en la base. El Sr. Quintanilla preguntó si las refinerías al norte de MW-125 eran donde se localizaba la contaminación sin importar el hecho de que el flujo de agua es hacia el este. El Sr. Ryan respondió que los contaminantes se mueven a través del suelo y que esto había sido determinado con pruebas en los suelos de Tropicana y los límites de la base. El Sr. Neathery añadió que el agua subterránea fluye por diversas razones, incluyendo la sequía y los cambios de estaciones.

Después de la presentación, el Sr. Quintanilla y el Sr. Malone tenían preguntas sobre las posibles fuentes de contaminación fuera de la base. El Sr. Neathery respondió diciendo que no se había hablado de las fuentes fuera del sitio en el informe. El Sr. Weegar explicó que la Fuerza Aérea estaba buscando fuentes de contaminación y que durante el proceso, se encontraron otras posibles fuentes que no eran de Kelly. Esas eran Tropicana y R&H Oil. Si la Fuerza Aérea puede proporcionar una fuente específica, la Comisión para la Conservación de Recursos Naturales de Texas (TNRCC por sus siglas en inglés) puede forzar a la parte responsable a tratar el problema. Sin embargo, si los contaminantes de las fuentes fuera del sitio se han mezclado con la pluma de la Fuerza Aérea, la Fuerza Aérea se encargará de la limpieza de esos contaminantes. El Sr. Weegar añadió, sin embargo, que algunos contaminantes no tienen fuente aparente proveniente de la Fuerza Aérea.

El Sr. Quintanilla preguntó al Sr. Weegar sobre los líquidos en fase densa no acuosa (DNAPLs por sus siglas en inglés). El Sr. Weegar explicó que los DNAPLs se asientan en el fondo del agua y siguen los antiguos paleocanales y que este término se refiere al producto en fase libre que se encuentra en el sitio. El Sitio MP está contenido en una pared de lechada y solamente la pluma en fase disuelta está más allá de esa pared. La fuente de la contaminación está contenida por una pared de lechada y no está contribuyendo a que la pluma sea mayor. Los contaminantes de la pluma que están fuera del lugar son materiales que habían emigrado antes de la instalación de la pared de lechada.

El Sr. Quintanilla preguntó sobre dos rellenos sanitarios no autorizados en el área de la Carretera 90 y Zarzamora. El Sr. Quintanilla dijo que no recordaba esos dos rellenos de tierra. La Srta. Power explicó que el término se refiere a cualquier vertedero que no está

oficialmente autorizado o reconocido. Añadió que puede ser un lote vacío donde la comunidad tira material inservible. La información asociada con estos hallazgos vino de la base de datos del Consejo de Gobiernos del Área del Álamo (ACOG por sus siglas en inglés). Estos sitios están en los mapas localizados en el Volumen 3. El Sr. Neathery dijo que el reporte no especificaba los detalles, sino que simplemente mencionaba los sitios. El Sr. Weegar añadió que el contratista usó muchas bases de datos para identificar sitios que podían ser fuentes potenciales de contaminación.

El Sr. Quintanilla mencionó nuestra corrección editorial al reporte del Sr. Neathery.

III. Sesión de Información sobre el Realce Térmico (SVE, por sus siglas en inglés)

La Srta. Rhonda Hampton anunció el período de información pública para la siguiente semana. Dos de esos sitios tienen una propuesta de tecnología de Realce Térmico.

El Sr. Fleming de Thermal Remediation Services, Inc. dio una presentación titulada, Calentamiento con Resistencia Eléctrica.

IV. Actualización del Subcomité de Revisión de Estatutos: El Sr. Larry Bowman, el Sr. Armando Quintanilla y el Sr. George Rice se ofrecieron como voluntarios para estar en el Subcomité de Revisión de Estatutos. Esta revisión a los estatutos seguirá un programa dinámico, y el Comité preparará las recomendaciones para el RAB de abril. El Sr. Rice preguntó qué cambios se estaban proponiendo para los Estatutos del RAB. El Sr. Karas respondió que primero él pensaba en una revisión general de los estatutos seguida por algunas clarificaciones necesarias del lenguaje de las elecciones. El Sr. Karas posteriormente pidió voluntarios que desearan participar en el Subcomité de Revisión de Estatutos. El Sr. Rice se ofreció como voluntario. El Sr. Karas dijo que él creía que el Subcomité esperaba reunirse a finales de febrero o a principios de marzo. El Sr. Quintanilla preguntó si él también podía tener a un abogado ya que la AFBCA tendría a un abogado presente. El Sr. Quintanilla expresó su sentir de que la comunidad estaría en desventaja sin asesoría legal presente. El Sr. Karas respondió que si el Sr. Quintanilla deseaba asesoría legal durante la junta, que estaba bien. La Srta. Katerhine Ramos se ofreció a estar presente en la junta del Subcomité de Revisión de Estatutos del RAB; sin embargo, ella nunca aclaró si ella misma era asesora legal.

V. Asuntos Administrativos

- A. Actualización de la Junta del Equipo de Limpieza de BRAC (BCT por sus siglas en inglés) No se llevó a cabo una reunión del BCT el día de hoy. Hubo una reunión del BCT el pasado el 15 de enero. El BCT incluyó comentarios del Plan de Cumplimiento Semestral del 2001 del TNRCC y la EPA . Las respuestas de la Fuerza Aérea se emitieron esta semana.
- B. Reporte del Resumen de Derrames: Hubo un derrame en la Planta de Tratamiento de Agua Subterránea (GWTP por sus siglas en inglés) a finales de noviembre. La Fuerza Aérea llevó a cabo pruebas en el agua y los suelos. La AFBCA notificó al Estado, que determinó que no se necesitaban acciones adicionales.

- C. Documentos Entregados al TRS: Se proporcionaron al Dr. Lené.
 - I. Anexo

- D. Puntos de Acción: El Sr. Quintanilla solicitó que se proporcionara al RAB un resumen sobre el informe de Zephyr. Solicitó que la Ciudad de San Antonio o Zephyr proporcionaran esta información. El Sr. Quintanilla expresó interés en saber más sobre el problema de la relación entre Zephyr y la Ciudad de San Antonio.

- E. Agenda / Ubicación / Fecha / Hora La siguiente reunión se llevará a cabo el 12 de marzo del 2002 a las 6:30 de la tarde. El reporte de la Dra. Squibb se presentará en la siguiente reunión.

Suspensión de la Reunión: La reunión terminó a las 8:41 de la noche.

Neathery Environmental Services
F41622-98-A-5884 CALL 99001

January 22, 2002
Draft

Review of the Draft Final
Zone 4 RCRA Facility Investigation Report
Volume III – OU-2
Kelly Air Force Base
January 2001

Executive Summary

Neathery Environmental Services was contracted by the AFBCA/DK to conduct a review of the above-referenced document in accordance with the Technical Assistance for Public Participation (TAPP) contract F41622-98-A-5884-CALL 99001.

The report was prepared by CH2MHILL as part of their contract F41624-97-D-8019-0114. The report is Volume III of a four-volume report. The volumes are summarized below:

| | |
|------------|-------------------------------|
| Volume I | Zone 4 Introduction |
| Volume II | OU-1 RFI (Zone 4 soils only) |
| Volume III | OU-2 RFI (Zone 4 groundwater) |
| Volume IV | Appendices (supporting data) |

The report states that the primary goal of the investigation is to develop a conceptual site model for sites covered by the report that addresses, chemical release sites, chemical-release mechanisms, nature and extent of affected environmental media, chemical-transport pathways, potentially exposed human and ecological receptors and environmental media where the receptors may be exposed to contaminants.

The information developed from this report and other sources will be used to develop and evaluate corrective action alternatives.

For this contract Neathery Environmental Services reviewed Volume III. We also looked at information in the other Volumes as needed to verify our findings. This report review is being conducted with the design considerations in mind.

Several potential sources of contamination were identified in this area. Only two, Site SS051 and the MP site were identified as having COCs in excess of Risk Reduction 2 standards.

An extensive investigation was conducted that included soil vapor surveys, groundwater screening, soil borings, monitor well installation, groundwater sampling, statistical analyses, aquifer testing and groundwater modeling.

The nature and extent of contamination was adequately defined both in terms of groundwater and surface water impacts.

Several off-site sources were identified as possible sources of contamination. These sites were identified but no data was collected to determine what, if any, actual impacts exist.

Neathery Environmental Services
F41622-98-A-5884 CALL 99001

January 22, 2002
Draft

Based upon our review of the documents provided, we conclude the following:

- The overall quality of the work product was exceptional
- The level of investigation employed was sufficient enough to understand the complex nature of the alluvium.
- The mapping of the top of the Navarro and Midway groups was critical in understanding groundwater and contaminant migration.
- The report was written clearly and was easily understood. There were no distractions caused by typographic errors or other production problems.
- We feel that there is enough data and a level of understanding of the environment that design phases could proceed with little or no additional data collection needed.

Based upon our findings, we recommend the following:

- Place the effective dates on Figure 3.19 as seen on Figure 3.18.
- Continued monitoring of the plumes and updating of the plume models

Neathery Environmental Services
F41622-98-A-5884 CALL 99001

January 22, 2002
Draft

Introduction

Neathery Environmental Services was contracted by the AFBCA/DK to conduct a review of the above-referenced document in accordance with the Technical Assistance for Public Participation (TAPP) contract F41622-98-A-5884-CALL 99001.

The report was prepared by CH2MHILL as part of their contract F41624-97-D-8019-0114. The report is Volume III of a four-volume report. The following outlines the major components of each report:

| | | |
|------------|-----|--|
| Volume I | 1.0 | Introduction |
| | 2.0 | Environmental Setting |
| | 3.0 | References |
| Volume II | 1.0 | Introduction |
| | 2.0 | Hydrogeologic Setting |
| | 3.0 | Screening Survey Results |
| | 4.0 | Groundwater Plume Maps and Preliminary Source Identification |
| | 5.0 | Nature and Extent of Contamination |
| | 6.0 | Summary and Conclusions |
| | 7.0 | References |
| Volume III | 1.0 | Introduction |
| | 2.0 | Environmental setting |
| | 3.0 | Nature and Extent of Contamination |
| | 4.0 | Potential Off-Site Sources |
| | 5.0 | Summary and Conclusions |
| | 6.0 | References |
| Volume IV | A | Data Quality Evaluation |
| | B | Soil Vapor Results and Distribution Maps |
| | C | Soil Boring Logs |
| | D | Monitoring Well Logs |
| | E | Analytical Data Summary for Soil OU-2 |
| | F | Analytical Data Summary for Groundwater OU-2 |
| | G | Aquifer Pumping Tests and Slug Tests |
| | H | Natural Attenuation Analytical Data |

The report states that the primary goal of the investigation is to develop a conceptual site model for sites covered by the report that addresses:

- Chemical release sites
- Chemical-release Mechanisms
- Nature and extent of affected environmental media
- Chemical-transport pathways

Neathery Environmental Services
F41622-98-A-5884 CALL 99001

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Draft

- Potentially exposed human and ecological receptors
- Environmental media where the receptors may be exposed to contaminants.

The information developed from this report and other sources will be used to develop and evaluate corrective action alternatives.

For this contract Neathery Environmental Services will Review Volume III. We will, however, also look at information in the other Volumes as needed to verify our findings. This report review is being conducted with the design considerations in mind. Is there enough data present to begin remedial design phases?

Potential Sources

Several potential sources of contamination were identified in this area. They are as follows:

Site SS051

This is the portion of the Industrial Waste Collection System (IWCS) on East Kelly. COCs include trichloroethene (TCE) and degradation product cis-1,2-dichloroethene (cis-1,2 DCE). Levels of COCs are above Risk reduction 2 standards. On-site and off-site groundwater has been impacted. The vertical extent is limited by the low permeability clays of the Navarro and Midway formations. The lateral extent extends eastward to the San Antonio River.

AOC MW125

This is an area of affected soil located in the southeast corner of East Kelly around the elevated water storage tank. COCs include VOCs and SVOCs (refined fuels). Two offsite refineries are likely sources. COC levels are below Risk Reduction Standard 2 standards. There are no further actions proposed.

AOC MW-160

This is an area established after VOCs were found in a monitoring well near a former oil/water separator. The COC levels are below Risk Reduction Standard 2 standards. There are no further actions proposed.

Yard 68

This area was used for storage of outside vehicles and equipment. COC for this area include metals. This area is part of a larger area (Site SS099) that has been remediated. The COC levels for this site are below risk reduction 2 standards. There are no further actions proposed.

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MP

This is a former metal plating facility located in Zone 3. Remedial efforts at this site included the construction of a slurry wall to contain the majority of contaminants. Some contaminants remain outside the slurry containment wall. This report does not address dense non-aqueous phase liquids (DNAPLs) and associated dissolved-phase contamination within the slurry containment wall at the MP site. It does address impacted groundwater leaving Zone 3. The COCs for this site include arsenic, benzene, chromium, PCE, TCE, cis-1,2, DCE and vinyl chloride. Levels of COCs exceed Risk Reduction 2 standards. On-site and off-site groundwater has been impacted. The vertical extent is limited by the low permeability clays of the Navarro and Midway formations. The lateral extent extends to the southeast about two miles southeast of IH-35.

Investigative Methods

An extensive investigation was conducted that included soil vapor surveys, groundwater screening, soil borings, monitor well installation, groundwater sampling, aquifer testing and groundwater modeling.

Soil Vapor Survey and Groundwater Screening

A soil vapor survey was constructed on a grid with 200-ft centers. A total of 388 soil vapor samples were collected. At every other soil vapor sampling point, a groundwater sample was also collected for screening purposes.

Soil Borings and Monitor Well

A total of 295 soil borings were drilled. A total of 166 monitoring wells were installed.

Aquifer Testing

Five test wells were installed in order to conduct aquifer tests. In order to perform the aquifer tests, 23 additional aquifer observation wells. Aquifer pumping tests and slug tests were performed to characterize the hydraulic properties of the aquifer.

Environmental Setting

The report indicates that there is a good understanding of the environmental setting. This includes an understanding of the alluvium and the underlying Navarro and Midway clays. The mapping of the unconformity between the alluvium and underlying clays is critical in understanding the mechanisms of groundwater and contaminant flow.

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Nature and Extent of Contamination

Information from the 1999 base wide groundwater-sampling event as well as data obtain during this investigation was used to determine the nature and extent of contamination. This data was used to perform a statistical evaluation to identify COCs.

Initial COCs

SS051 Initially several COCs were identified. These include arsenic, total chromium, manganese, nickel, thallium, zinc, 1,3-dichlorobenzene, 1,1-dichloroethane, 1,1-dichloroethene, benzene, carbon disulfide, carbon tetrachloride, chlorobenzene, chloroform, cis-1,2-dichloroethylene, tetrachloroethene (PCE), toluene, trans-1,2-dichloroethene, trichloroethene (TCE), vinyl chloride and total xylenes.

MP Initially, several COCs were identified. These include arsenic, total chromium, cobalt, manganese, thallium, zinc, 1,3-dichlorobenzene, 1,4-dichlorobenzene, naphthalene, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, benzene, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, cis-1,2-dichloroethylene, ethylbenzene, tetrachloroethene (PCE), toluene, trans-1,2-dichloroethene, trichloroethene (TCE), vinyl chloride and total xylenes.

Plume Delineation

Based upon the COCs identified and the results of the statistical analyses, the contaminant plumes for Site SS051 and MP were divided into distinct zones. The Site SS051 plume was divided into 3 zones. These include 1) the source area, 2) the down gradient plume and 3) the San Antonio River Zone of Discharge (ZOD)

The MP plume was divided into 2 zones. These include 1) the source area and 2) the down gradient plume.

Comparison to TNRCC Risk Reduction 2 Standards

After comparing the initial list of COCs to the Risk reduction 2 standard, the following COCs were found to be in excess of Risk Reduction 2 standards:

SS051 total chromium, tetrachloroethene (PCE), cis-1,2 dichloroethene (cis-1,2 DCE), trichloroethene (TCE) and vinyl chloride

MP arsenic, benzene, total chromium, PCE Cis-1,2 DCE, TCE and vinyl chloride

Neathery Environmental Services
F41622-98-A-5884 CALL 99001

January 22, 2002
Draft

Surface Water Quality Evaluation

Seeps into San Antonio River contain COCs. No COCs detected in River. COC levels meet Chapter 307 requirements.

Groundwater Modeling

Groundwater models were developed for the TCE plume for Site SS051 and the TCE plume for the MP site. It appears that the plumes developed in the groundwater modeling closely parallel the measured plumes.

Potential Off-Site Sources

Four sites were identified as potential sources for 1,1,DCE. All but one were eliminated as a potential source of 1,1 DCE for the off-base plume north of east Kelly.

Other potential off-site sources were identified. These include:

- Numerous leaking petroleum storage tanks
- Three sites east of East Kelly that have voluntary cleanup plans on file with the TNRCC
- Two unauthorized landfills near East Kelly. One is just outside of the southern boundary of East Kelly; the other is northeast of East Kelly near Highway 90 and Zarzamora St.
- Two sites immediately southeast of East Kelly, found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS). R&H Oil Co. and Tropicana Energy Co. are the suspected off-site sources of soil contamination seen in AOC MW125 in the southeast end of East Kelly.

These sites were identified but no data was collected to determine what, if any, actual impacts exist.

Conclusions and Recommendations

Conclusions

Based upon our review of the documents provided, we conclude the following:

- The overall quality of the work product was exceptional
- The level of investigation employed was sufficient enough to understand the complex nature of the alluvium.
- The mapping of the top of the Navarro and Midway groups was critical in understanding groundwater and contaminant migration.

- The report was written clearly and was easily understood. There were no distractions caused by typographic errors or other production problems.
- We feel that there is enough data and a level of understanding of the environment that design phases could proceed with little or no additional data collection needed.

Recommendations

Based upon our findings, we recommend the following:

- Place the effective dates on Figure 3.19 as seen on Figure 3.18.
- Continued monitoring of the plumes and updating of the plume models

Document Review

**Zone 4 RCRA Facility Investigation Report
Volume III – OU-2
Kelly Air Force Base**

Prepared for:
Kelly Air Force Base
Restoration Advisory Board

Neathery Environmental Services

Purpose of Review

Conduct a review of the Volume III report prepared by CH2MHill to include:

- a simple explanation of work performed
- a technical review of the document
- An assessment of the

Neathery Environmental Services

Document Reviewers

Jeffrey S. Neathery, R.G., C.P.G.
Neathery Environmental Services

Christopher Mathewson, Ph.D., P.E., R.E.G
Texas A&M University

Neathery Environmental Services

Limitations

The report was reviewed as a “stand alone” document. Volumes I, II and IV were referred to during the review but were not the main focus of the review.

Neathery Environmental Services

Report Components

- Volume I – Zone 4 Introduction
- Volume II – OU-1 RFI (Zone 4 soils only)
- Volume III – OU-2 RFI (Zone 4 Groundwater)
- Volume IV – Appendices (Supporting Data)

Neathery Environmental Services

Goal of the Zone 4 RFI

To Develop a conceptual site model for the sites covered that addresses:

- Chemical release sites
- Chemical release mechanisms
- Nature & Extent of affected media
- Chemical transport pathways
- Potentially exposed human & Ecological receptors
- Environmental Media where receptors may be exposed to contaminants

Neathery Environmental Services

Potential Sources

- SS051 (part of the IWCS on East Kelly)
- AOC MW-125 (off site refineries)
- AOC MW-160 (oil water separator)
- Yard 68 (vehicle storage area)
- MP (Metal Plating)

Nesther Environmental Services

Identified Sources

- SS051
 - arsenic, total chromium, manganese, nickel, thallium, zinc, 1,3-dichlorobenzene, 1,1-dichloroethane, 1,1-dichloroethene, benzene, carbon disulfide, carbon tetrachloride, chlorobenzene, chloroform, cis-1,2-dichloroethylene, tetrachloroethene (PCE), toluene, trans-1,2-dichloroethene, trichloroethene (TCE), vinyl chloride and total xylenes.

Nesther Environmental Services

Identified Sources (MP)

- MP
 - arsenic, total chromium, cobalt, manganese, thallium, zinc, 1,3-dichlorobenzene, 1,4-dichlorobenzene, naphthalene, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, benzene, carbon tetrachloride, chlorobenzene, chloroethane, chloroform, cis-1,2-dichloroethylene, ethylbenzene, tetrachloroethene (PCE), toluene, trans-1,2-dichloroethene, trichloroethene (TCE), vinyl chloride and total xylenes

Nesther Environmental Services

Investigative Methods

- Soil Vapor Survey & Groundwater Screening
- Soil Borings and Monitor Well Installation
- Aquifer Testing

Nesther Environmental Services

Soil Vapor Survey & GW Screen

- Survey conducted on grid using 200 ft centers (388 points)
- Groundwater sample collected from every other vapor point

Nesther Environmental Services

Soil Borings and MW Install

- 295 soil borings
- 166 Monitoring Wells

Nesther Environmental Services

Aquifer Testing

- Installation of 5 test wells
- Installation of 23 observation wells
- 52 Slug tests
- 4 Aquifer pumping tests

Neathery Environmental Services

Environmental Considerations

- Alluvium over Clay (Navarro/Midway Group)
- Surface topography of top of clay
- Saturated thickness of alluvium
- Groundwater elevations
- Aquifer characteristics

Neathery Environmental Services

Plume Delineation

The plume was divided into three areas

- Source area
- Down gradient plume
- San Antonio River Zone of Discharge (ZOD)

Neathery Environmental Services

Comparison to RR2 Standards

- SS051
 - total chromium, PCE, cis-1,2-DCE, TCE and vinyl chloride
- MP
 - arsenic, benzene, total chromium, PCE, cis-1,2-DCE, TCE and vinyl chloride

Neathery Environmental Services

Modeling

- Groundwater models were developed for the TCE plume for both sites.
- Modeled plumes closely paralleled the measured plumes.
- Modeling extended for a life of 55 years (ending in 2009).
- Modeling shows a decrease in contaminant levels over time

Neathery Environmental Services

Off-Site Sources

- Four sites were identified as potential off-site sources for 1,1,DCE. All but one were eliminated as possible sourced for the off-base plume.
- LPST sites, 3 VCP sites, 2 unauthorized landfills, 2 CERCLIS sites.
- Sites identified but no data given. No determination of actual impact.

Neathery Environmental Services

Conclusions

- The report was written clearly and was easily understood.
- There is enough quality data and level of understanding of the environment that design phases could proceed with little or no additional data needed.

Netherly Environmental Services

Recommendations

- Place the effective dates on Figure 3.19 as seen on Figure 3.18.
- Continue monitoring the plume and updating the models.

Netherly Environmental Services



Thermal Remediation Services, Inc.

Electrical Resistance Heating for In-Situ Remediation of Soil & Groundwater

February 12, 2002

David Fleming
425-603-9036
dfleming@thermalrs.com
www.thermalrs.com



What is Electrical Resistance Heating?

- Takes common 3-phase electricity and directs it into the subsurface through electrodes
- Electrodes can be placed vertically to any depth or may be placed horizontally
- Once in the subsurface, the electrical energy resistively heats soil and groundwater
- Contaminants are removed by direct volatilization and in-situ steam stripping



Why Electrical Resistance Heating?

- Heating is uniform with no bypassed regions
- Heating is rapid – months vs. years
- Steam is produced *in-situ*
- Preferentially heats tight soil lenses and DNAPL hot spots
- Cost effective: most commercial, full-scale sites range from \$30-\$90 per yds³



Applications

- Low permeability & heterogeneous lithologies
- DNAPL & LNAPL cleanups by aquifer and smear zone heating
- Heavy hydrocarbon mobilization
- Bioremediation enhancement
- Remediation underneath operating facilities and in the presence of buried utilities



ERH Project History 1997-2001

| Site | Type | Phases Used |
|------------------------|----------------------|------------------------|
| Savannah River Site | single array pilot | six-phase |
| Niagara Falls AFB | single array pilot | six-phase |
| Dover AFB | single array pilot | six-phase |
| Chicago, IL | full-scale (failure) | six-phase |
| Fort Richardson Pilot | single array pilots | six-phase |
| Fort Wainwright | single array pilot | six-phase |
| Petroleum Refinery | single array pilot | six-phase |
| Skokie, IL | full-scale | six-, then three-phase |
| Western Washington | full-scale | three-phase |
| Fort Rich Full Scale | full-scale | three-phase |
| Georgia Manufacturer | full-scale | three-phase |
| Pesticide Manufacturer | single array pilot | six-phase |
| Launch Complex 34 | rectangular pilot | mostly three-phase |
| USAF Plant Four | single array pilot | six-phase |
| Waukegan, IL | full-scale | three-phase |
| Portland, OR | full-scale | three-phase |

8 pilots, 7 full scale 10 six-phase, 6 three-phase



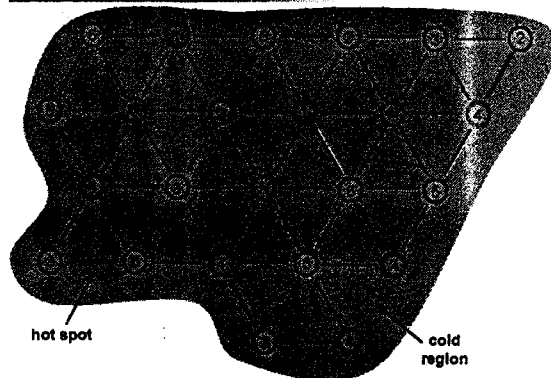
Upcoming ERH Projects 2002-2003

| Site | Type | Phases Used |
|----------------------|--------------------|-------------|
| NAS Dallas | single array pilot | six-phase |
| NAS Alameda | single array pilot | six-phase |
| Navy Charleston | full-scale | three-phase |
| Lowry Landfill | full-scale | three-phase |
| Air Force Plant Four | full-scale | three-phase |
| DOE Pindlas | full-scale | three-phase |
| DOE Paducah | single array pilot | six-phase |

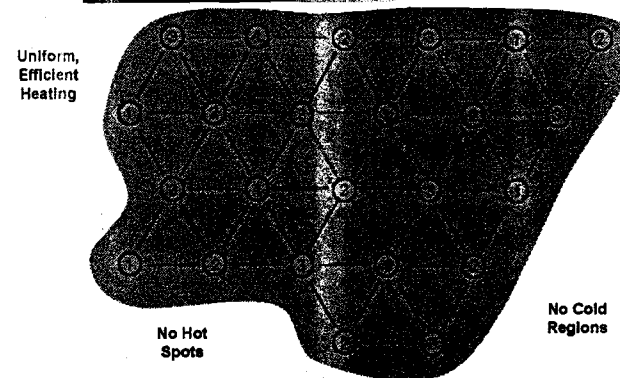
3 pilots, 4 full scale 3 six-phase, 4 three phase



Typical Six-Phase Pattern



Typical Three-Phase Pattern



THERMAL REMEDIATION SERVICES INC.

In-Situ Steam Generation

The diagram shows a cross-section of the ground with two electrodes on the surface. A central 'NEUTRAL' zone is indicated with a voltage of '<math>< 15\text{ V}</math>'. The electrodes are connected to a power source providing '150 V to 600 V'. A 'HEATED ZONE' is shown below the electrodes, with wavy lines representing steam rising from the soil.

1. Soil grains act as electrical resistors
2. Steam generation is uniform through the heated zone
3. Discrete intervals can be heated

THERMAL REMEDIATION SERVICES INC.

Surface Equipment

A black and white photograph showing a person in a dark environment. Labels point to various pieces of equipment: 'Power Control Unit' (a box on the left), 'Steam Condenser' (a large vertical cylindrical tank in the center), and 'Operating Electrode' (a vertical structure on the right).

Photo Courtesy of Brown and Caldwell

THERMAL REMEDIATION SERVICES INC.

Vapor Recovery System

The schematic shows a cycle of components: 'Water Storage Tank Or Sewer' at the top, 'Condenser' below it, 'ERH Power Control Unit' to the right, 'Carbon or Catox' at the bottom, and 'Vacuum Pump' on the left. A central diagram shows a hexagonal arrangement of electrodes labeled 1 through 6, with a temperature 'T' indicated. An arrow points from the electrodes to the condenser.

>99% of the contaminant mass remains in the vapor state

THERMAL REMEDIATION SERVICES INC.

ERH Power Control Unit

A black and white photograph of an outdoor industrial site. A large, rectangular structure, identified as the ERH Power Control Unit, is visible in the background. The foreground shows a fenced-in area with some equipment.

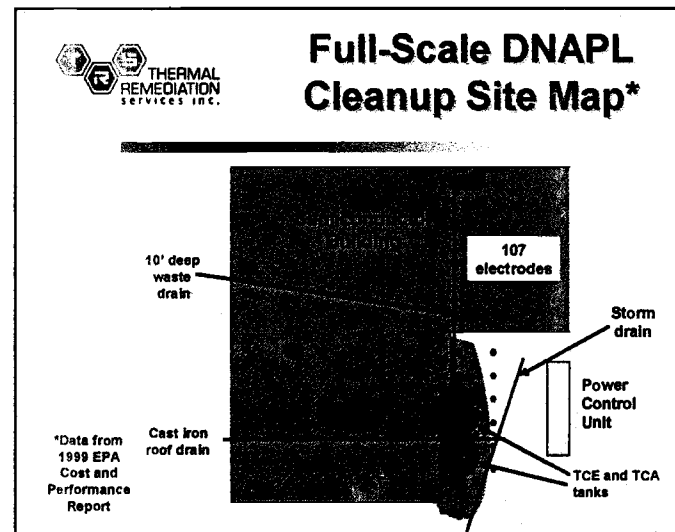
Photo Courtesy of U.S. Department of Energy

THERMAL REMEDIATION SERVICES INC.

Full-Scale DNAPL Cleanup the Problem*

- DNAPL (TCE & TCA) covering about 1 acre of an industrial site
- ENSR performed remediation for about 5 years and removed 30,000 pounds of TCE & TCA
- DNAPL remained in four areas, mostly under a large warehouse building
- Goal: Reach Tier III RBCA Cleanup Levels over entire site

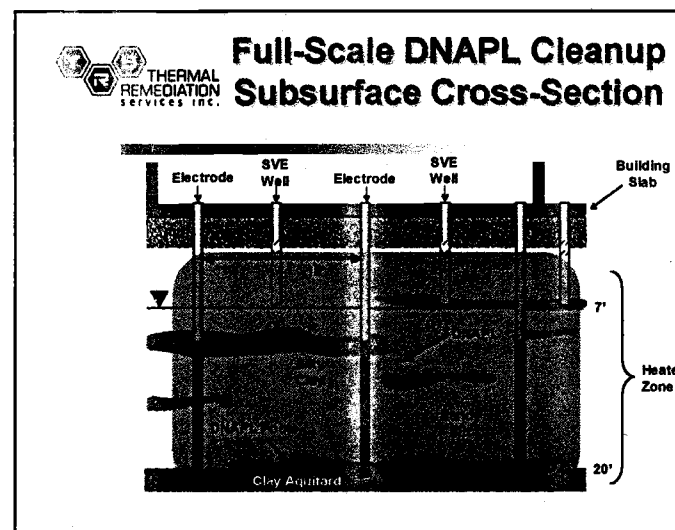
*Data from the 1999 EPA Cost and Performance Report



THERMAL REMEDIATION SERVICES INC.

ERH Remediation Beneath a Building

Photo Courtesy of Brown and Caldwell





Full-Scale DNAPL Cleanup Operations & Results*

Operations

- Heating (107 electrodes) started June 4, 1998
- Aquifer reached boiling in 60 days
- Maintained above the boiling point of TCE (73°C) for the next 3 months

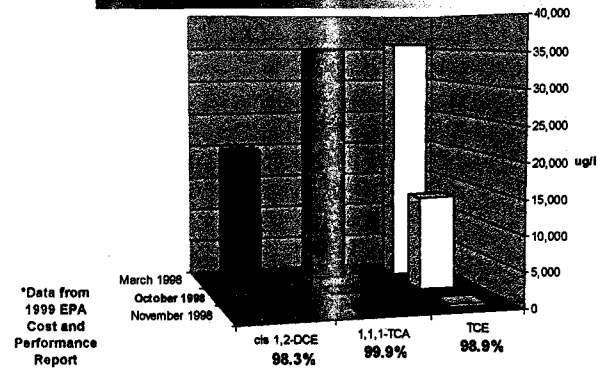
Results

- Tier III levels by late November 1998; the site is now closed
- >15,000 pounds of VOCs removed

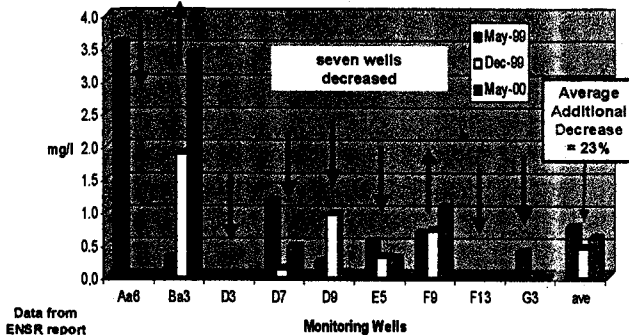
*Data from 1999 EPA Cost and Performance Report



Average Groundwater Concentrations Seven Most Contaminated Wells*



Do Groundwater Concentrations Rebound after ERH Remediation?



Polishing Mechanisms

- **Hydrolysis of Halogenated Alkanes**
 - ◆ Compounds such as TCA have a hydrolysis half-life of less than one day at steam temperatures.
- **Iron Reductive Dehalogenation**
 - ◆ Steel shot used as electrode backfill provides an iron source for reductive dehalogenation (iron filling wall)
- **Temperature Accelerates Reactions**
 - ◆ The above reaction rates are increased by factor of thousands at 100°C (Arrhenius Equation)
- **Bioremediation by Thermophiles**
 - ◆ Thermophilic bacteria are the most effective solvent dehalogenators and prefer 40-70°C

THERMAL REMEDIATION SERVICES INC.

Full Scale DNAPL Cleanup Cost & Performance Data*

- **Effectiveness**
 - ◆ Total operations took 18 weeks, five days
 - ◆ Treated approximately 30,000 cubic yards
 - ◆ Since completing, average groundwater VOC concentrations have continued to decrease
- **Costs**
 - ◆ Total project costs were \$32/cubic yard
 - ◆ The total includes electrical costs of \$6.50/cubic yard
 - ◆ Vapor treatment was not required. If vapor treatment had been required, the cost would have been about \$41 per cubic yard.

*Data from the 1999 EPA Cost and Performance Report

THERMAL REMEDIATION SERVICES INC.

TCE DNAPL Remediation Air Force Plant Four Fort Worth, Texas

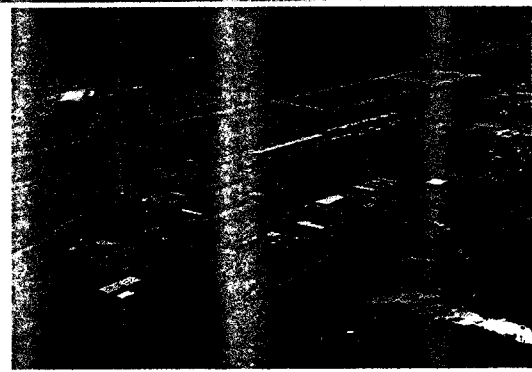
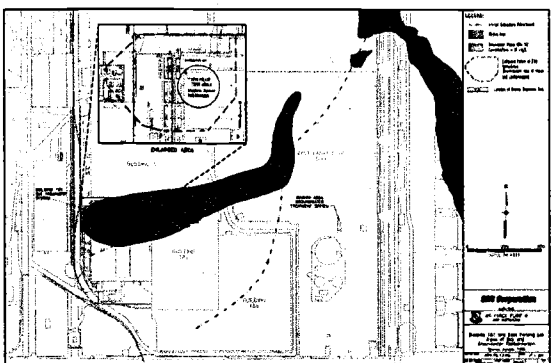


Photo Courtesy of URS

THERMAL REMEDIATION SERVICES INC.

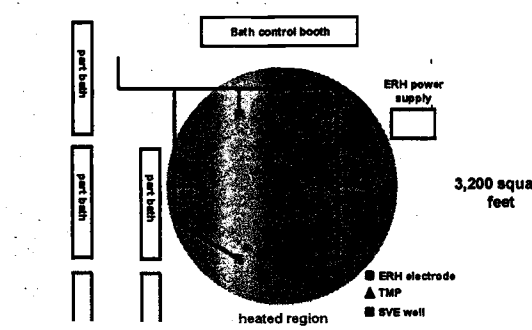
TCE Plume Building 181*



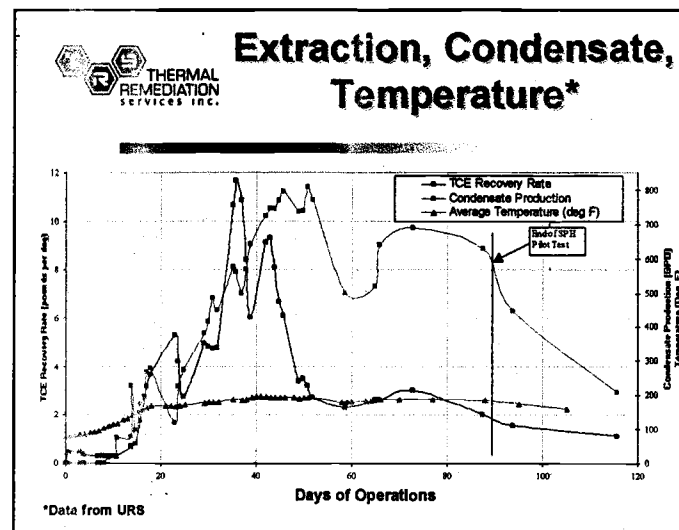
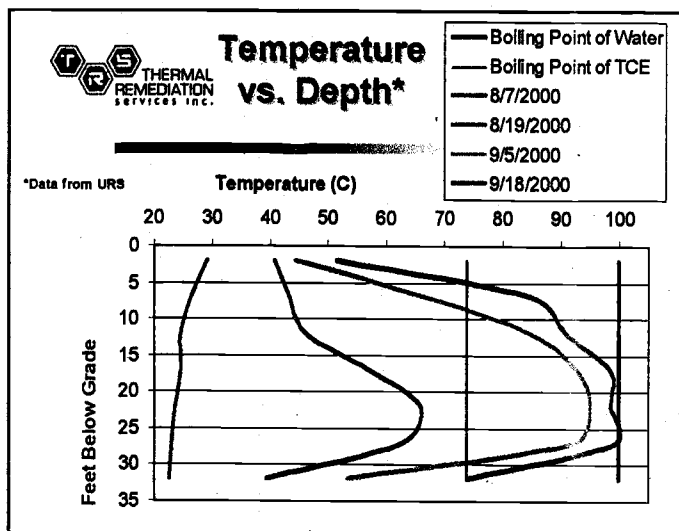
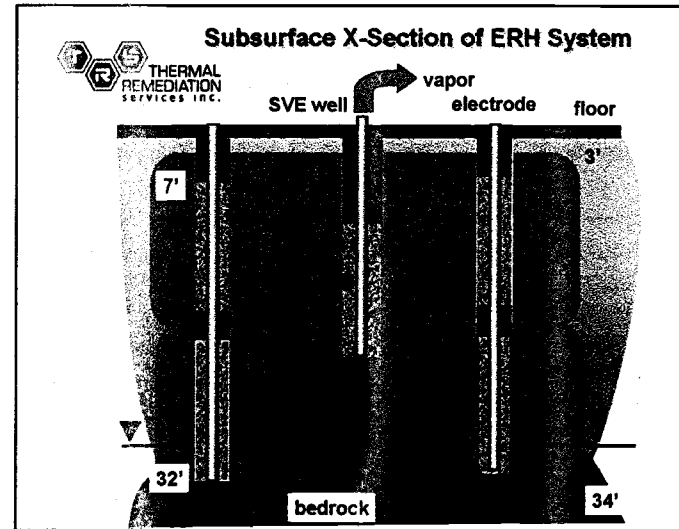
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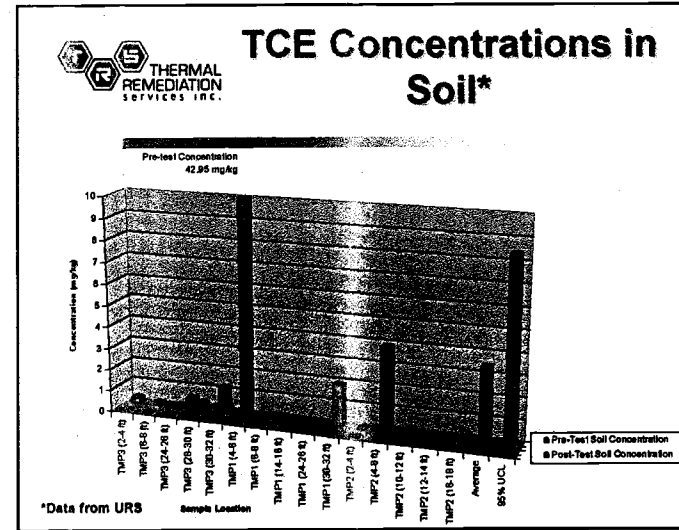
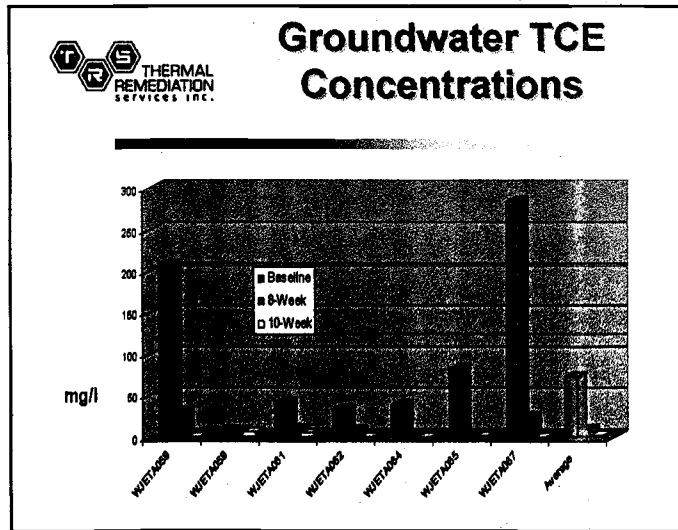
THERMAL REMEDIATION SERVICES INC.

ERH Pilot System*



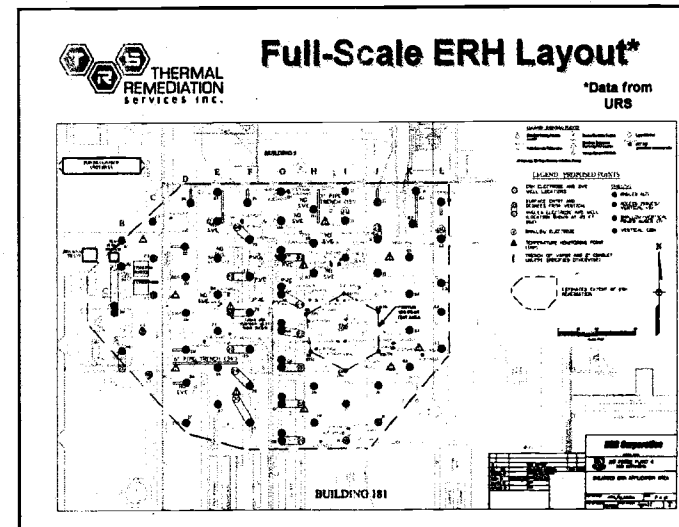
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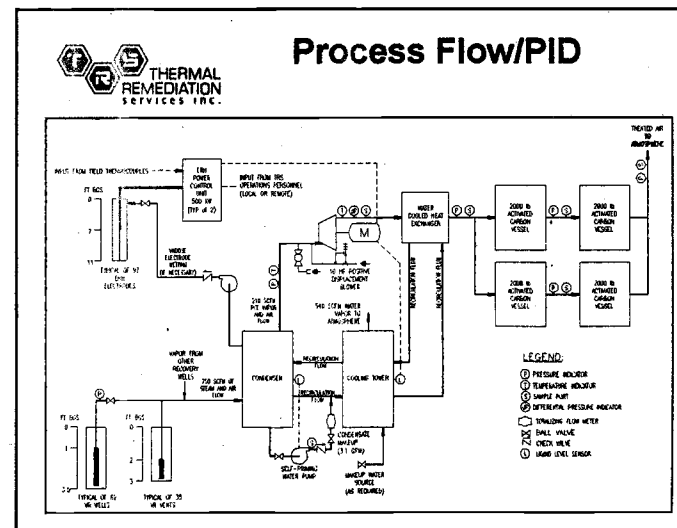
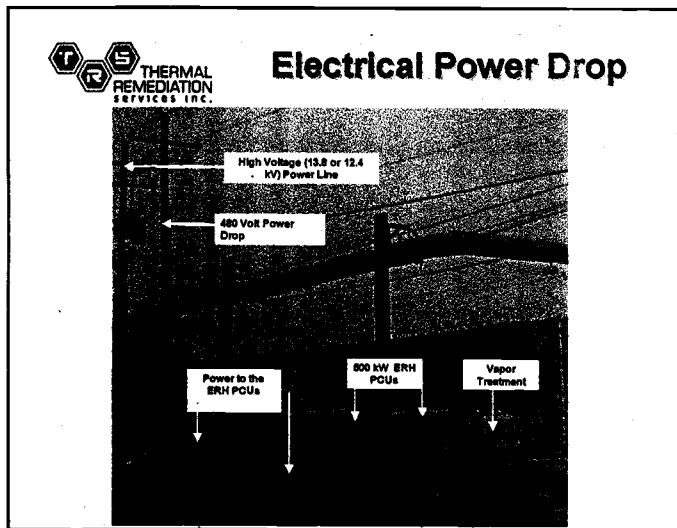
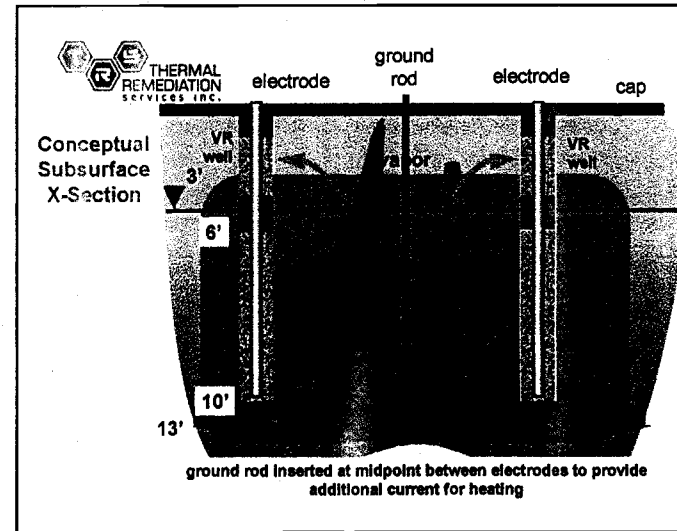
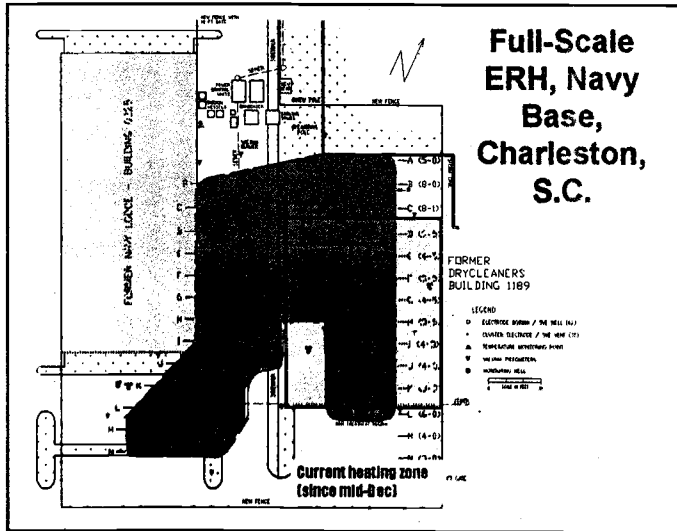


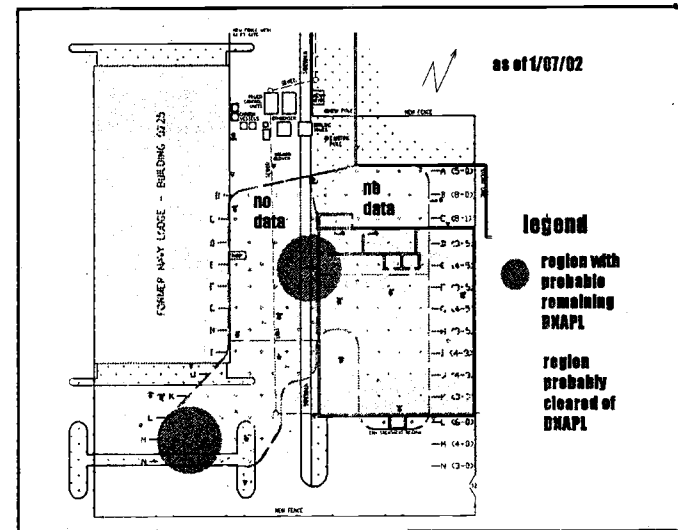
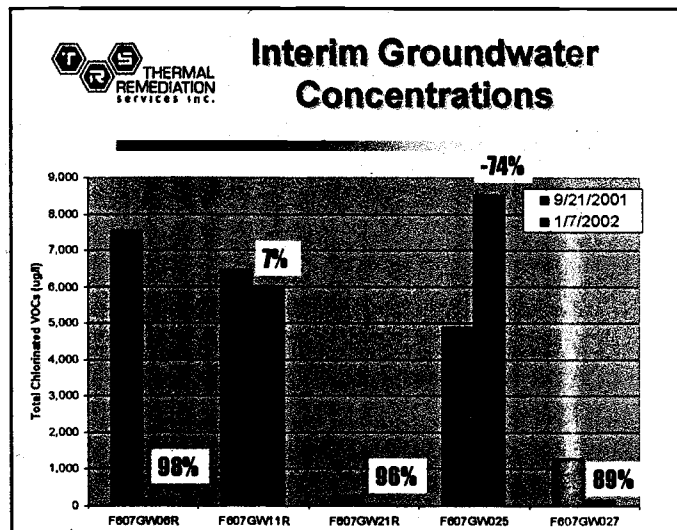
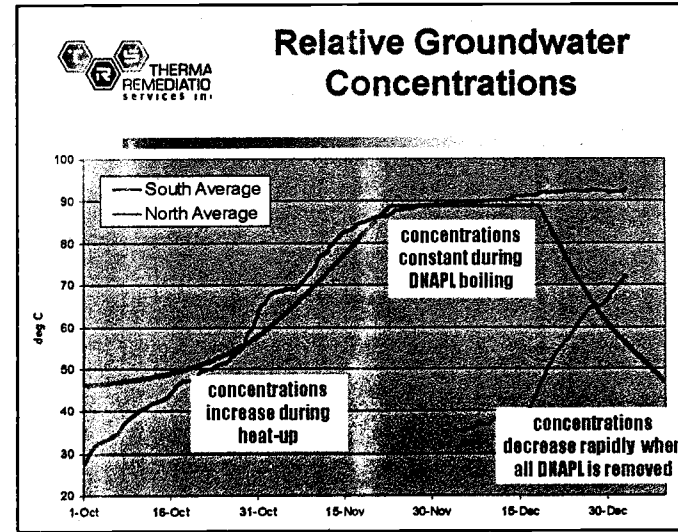
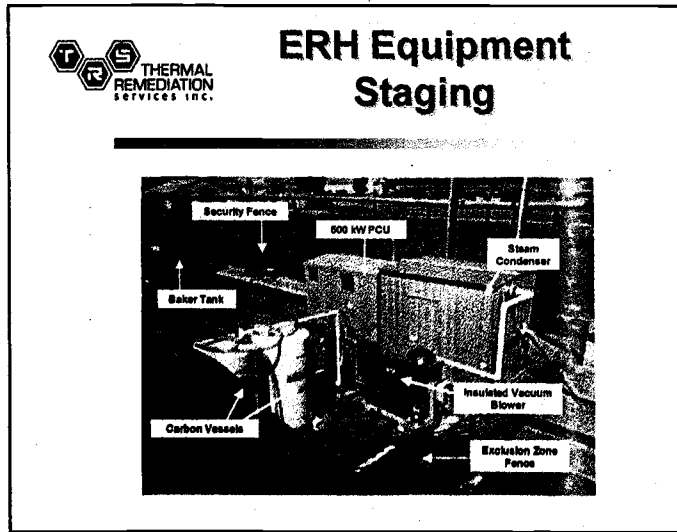


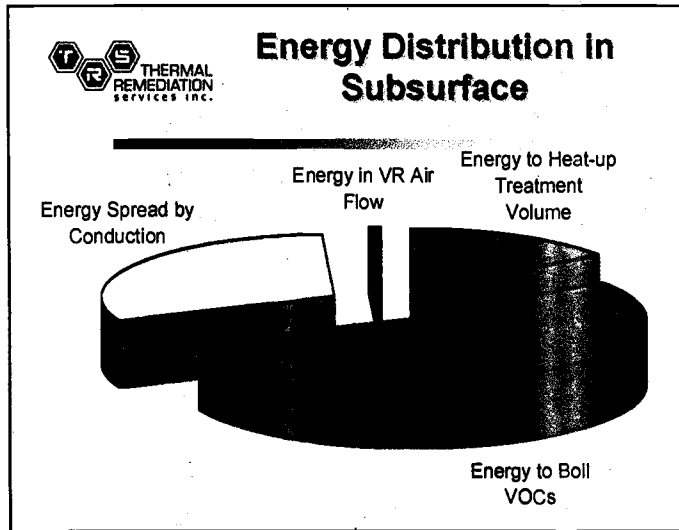
Full-Scale ERH at AF Plant 4

- Since pilot test met objectives, decision was made to apply electrical resistance heating (ERH) to 1/2 acre area inside and outside of Bldg. 181.
- 64 new electrodes and SVE wells installed in and around existing tanks, piping and equipment
- Drilling program began in December 2001
- Anticipate active heating in April 2002



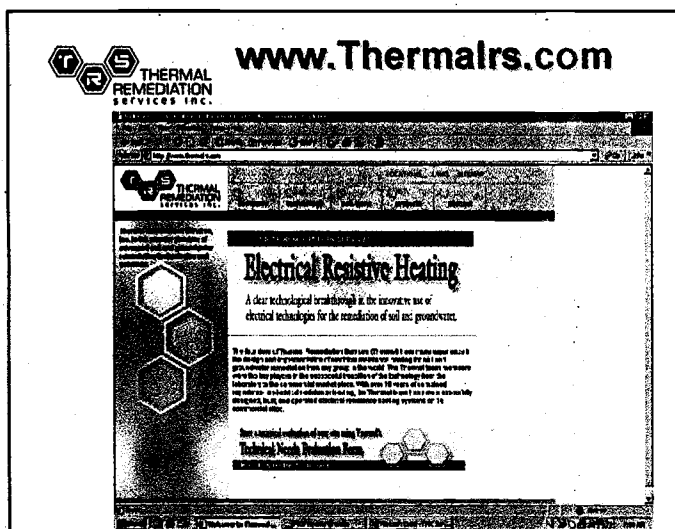






Charleston ERH Progress to Date

- The site is being heated in two sections. The south side has been boiling for about two months. The north side is rapidly heating and began boiling in late January.
- Interim groundwater results from the south side indicate that remediation is progressing as expected – some regions have been cleared of DNAPL, some need more boiling.
- The remediation is about two thirds of the way through the planned operational period.



FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE