Kelly Air Force Base Former Building 2093 Gas Station **Site Name**

SITE INFORMATION

IDENTIFYING INFORMATION

Site Name: Former Building 2093 Gas Station, LPST ID No. 93205, Facility ID No. 0038825.

Location: Kelly AFB, Texas

CERCLIS ID No.: NA

Regulatory Context: Lead agency is the Petroleum Storage Tank (PST) Division of the Texas Natural Resource Conservation Commission (TNRCC).

TECHNOLOGY APPLICATION

Period of Performance: July 1997 – July 1998

Area of Contaminated Zone (source area plus dissolved plume): 1.5 acres

BACKGROUND

Waste Management Practice That Contributed to Contamination: Leaking gasoline USTs and associated piping.

Site History: Three MOGAS USTs were integrity tested in 1989, and one failed the test. The USTs and some associated piping were removed in 1991 and were not replaced. Multiple monitoring well installation and groundwater sampling events between 1989 and 1997 indicated the presence of groundwater contamination.

Remedy Selection: A 1-year-long bioventing pilot test was concluded in January 1995; the test results indicated that site soils were not sufficiently permeable to enable use of this in situ source reduction technique. Later in 1995, the dispensing islands and remaining below-grade piping were removed, and 2,750 cubic yards of soil in the area of the former tank pad and dispensing islands were excavated. Based on this RBCA analysis, the TNRCC issued a no-further-action memorandum closing the site based on plume stability, the documented occurrence of natural attenuation of fuel residuals, and the conclusion that site contamination does not currently (and will not in the future) pose a significant risk to potential receptors.

SITE LOGISTICS/CONTACTS

(Provide name, address, telephone, e-mail)

Site Lead: Mr. Jerry Arriaga, SA-ALC/EMRO, 301 Tinker Dr., Suite 2, Bldg. 301, Kelly AFB, TX 78241, (210) 925-1819, garriaga@emgate1.kelly.af.mil.

Oversight: Mr. Jim Gonzales, AFCEE/ERT, 3207 North Rd., Building 532, Brooks AFB, TX 78235-5363, (210) 536-4324, james.gonzales@hqafcee.brooks.af.mil.

Regulatory Contact: Mr. Antonio Pena , Texas Natural Resource Conservation Commission, P.O. Box 13087, Austin, TX, 78711-3087, (512) 239-2200, APENA@tnrcc.state.tx.us.

Prime Contractor: Mr. John Hicks, Parsons Engineering Science, Inc., 1700 Broadway, Suite 900, Denver, CO 80290, (303) 831-8100, john.hicks@parsons.com

Additional Contacts: NA

MATRIX DESCRIPTION

MATRIX IDENTIFICATION

Type of Matrix Processed Through Technology System: RBCA study addressed soil, groundwater, and soil gas.

CONTAMINANT CHARACTERIZATION

Primary Contaminant Groups and Concentrations Measured During Site Investigation:
Gasoline constituents, see attached Figure 1 for distribution of BTEX in groundwater.

Contaminant Properties:

Based on a Tier 1 screening, only benzene in groundwater and soil was identified as a contaminant of potential concern at the former Building 2093 Gas Station. Benzene is volatile, highly soluble in water, and relatively mobile in the groundwater environment. It is also readily biodegradable under both aerobic and anaerobic conditions.

MATRIX CHARACTERISTICS AFFECTING TECHNOLOGY COST OR PERFORMANCE

(Provide information on relevant parameters for the application)

Parameter	Value	Measurement Procedure
Soil Classification	NA	NA
Clay Content and/or Particle Size Distribution	NA	NA
Additional Soil Characteristics (specify)	NA	NA

SITE GEOLOGY/STRATIGRAPHY/HYDROGEOLOGY

Describe heterogeneity, depth to groundwater, size and characteristics of applicable aquifers and units (especially important for in situ technologies)

The site is underlain by silty clay. A distinct clay unit approximately 3 to 5 feet thick is evident from 35 to 40 feet below ground surface (bgs). Groundwater occurs primarily in silt and possibly caliche seams that produce only small amounts of water. Boreholes that do not intercept one or more water-bearing zones do not yield water. Static groundwater levels range from 5 to 25 feet bgs, depending on location and season. The hydraulic conductivity of the silty clay unit is 0.2 to 0.5 ft/day based on slug tests, and the estimated horizontal groundwater flow velocity is 31 ft/year.

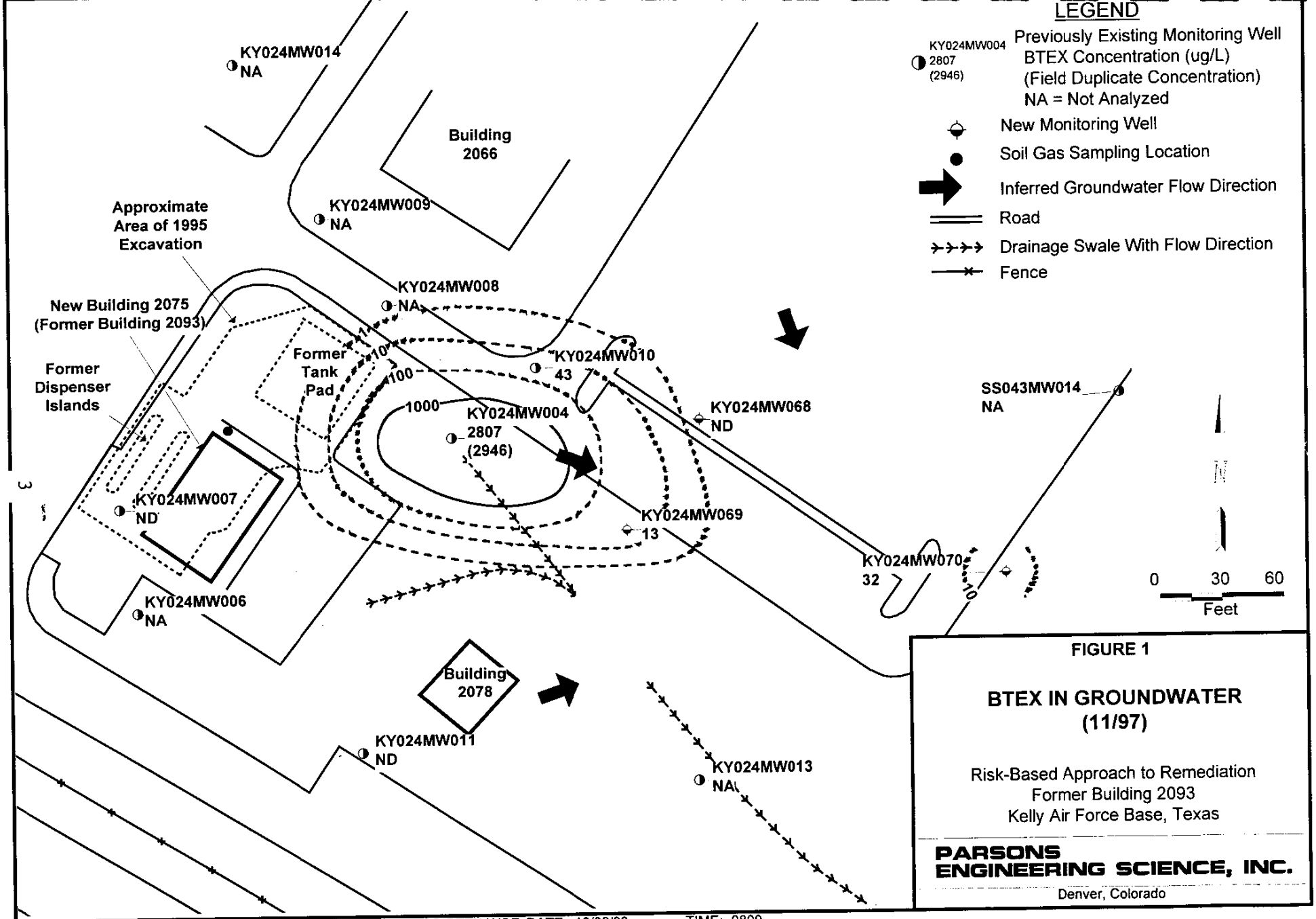
TECHNOLOGY SYSTEM DESCRIPTION

PRIMARY TECHNOLOGY

Monitored natural attenuation

SUPPLEMENTAL TECHNOLOGY TYPES

Soil excavation


LEGEND
KY024MW004
2807
(2946)
Previously Existing Monitoring Well
BTEX Concentration (ug/L)
(Field Duplicate Concentration)
NA = Not Analyzed
New Monitoring Well
Soil Gas Sampling Location
Inferred Groundwater Flow Direction
Road
Drainage Swale With Flow Direction
Fence
KY024MW014
NA
Building
2066
KY024MW009
NA
Approximate
Area of 1995
Excavation
New Building 2075
(Former Building 2093)
Former
Dispenser
Islands
KY024MW008
NA
Former
Tank
Pad
1
10
100
1000
KY024MW010
43
KY024MW004
2807
(2946)
KY024MW068
ND
SS043MW014
NA
KY024MW007
ND
KY024MW069
13
KY024MW070
32
10
KY024MW006
NA
Building
2078
KY024MW011
ND
KY024MW013
NA
N
0
30
60
Feet
FIGURE 1
BTEX IN GROUNDWATER
(11/97)
Risk-Based Approach to Remediation
Former Building 2093
Kelly Air Force Base, Texas
PARSONS
ENGINEERING SCIENCE, INC.
Denver, Colorado

REMEDIAL SYSTEM DESCRIPTION AND OPERATION

Fate and transport modeling using the analytical code BIOSCREEN (Newell *et al*., 1996) indicated that the maximum migration distance of dissolved benzene from the source area will be approximately 300 feet, and that dissolved benzene concentrations will be below groundwater quality standards within 10 years. Therefore, the site is a candidate for immediate closure according to TNRCC guidance. The Air Force will restrict use of the shallow groundwater at the site until all dissolved benzene concentrations decrease below TNRCC Plan A Category II criterion of 0.0294 mg/L.

OPERATING PARAMETERS AFFECTING TECHNOLOGY COST OR PERFORMANCE

(Provide information on relevant operating parameters for the application.)

Parameter	Value
Example: Temperature	NA
Others (as appropriate)	NA

TIMELINE

(Provide dates for key activities for the application, focusing on events related to technology.)

Start Date	End Date	Activity
July 1997	July 1997	Kickoff Meeting
August 1997	Nov. 1997	Project Work Plan (draft and final)
Nov. 1997	Nov. 1997	Field Site Characterization
Dec. 1997	July 1998	Data Analysis and Corrective Action Plan (draft and final)
	June 1998	Site Closure by TNRCC

TECHNOLOGY SYSTEM PERFORMANCE

CLEANUP GOALS/STANDARDS

The groundwater beneath the site is designated as Category II (TDS concentration of affected groundwater is less than 3,000 mg/L and no beneficial use is documented within 0.5 mile of the site, or the TDS is between 3,000 and 10,000 mg/L and beneficial use is documented within 0.5 mile of the site). The TNRCC (1994) Plan A target concentrations for Category II aquifers, and the TNRCC (1997) target concentrations for construction worker exposure are the cleanup goals for affected groundwater. Only the Plan A concentration for benzene of 0.0294 mg/L was exceeded.

Maximum-detected concentrations of BTEX in soil gas were compared to the chemical-specific OSHA 8-hour time-weighted average permissible exposure limits (PELs), and there were no exceedences.

PERFORMANCE DATA AND DATA ASSESSMENT

Results of previous groundwater sampling events indicate that the dissolved contaminant plume is not increasing in areal extent. Natural attenuation indicator parameters exhibit trends associated with a plume which is being naturally degraded. Because the source is mostly removed (prior excavation of contaminated soils), biodegradation will continue to decrease the concentrations of dissolved contaminants. Assimilative capacity calculations suggest that the shallow groundwater has the biological capacity to attenuate the existing contamination. BIOSCREEN modeling results indicate that the dissolved plume will not migrate off-site at levels above TNRCC criteria, and benzene concentrations should decrease below the cleanup goal within 10 years.

PERFORMANCE DATA QUALITY

An electronic Level III validation was performed on the February 1998 analytical results obtained from the fixed-base laboratories. Analytical results associated with non-compliant QC criteria were qualified appropriately.

COST OF THE TECHNOLOGY SYSTEM

PROCUREMENT PROCESS

Procurement involved selection of an analytical subcontractor. Bids were obtained from three qualified analytical laboratories, and the selected firm was Quanterra in Wheat Ridge, Colorado.

COST DATA

(Identify organization that provided cost data and whether cost data are actual or estimated costs)

Item	Cost ($ Year Basis)	Actual or Estimated (A or E)
Capital (specify cost/activity)	NA	NA
Operation and maintenance (specify cost/activity)	NA	NA
Other (specify)	NA	NA

REGULATORY/INSTITUTIONAL ISSUES

Identify the approvals, licenses, and permits required to operate the technology at the site.

NA

TECHNOLOGY APPLICABILITY AND ALTERNATIVES

Identify technology applicability, competing technologies, and technology maturity; may also discuss commercialization and intellectual property issues.

Remediation by natural attenuation (RNA) is applicable for all petroleum-hydrocarbon contaminated sites. RNA is advantageous for the following reasons:

- Contaminants can be transformed to innocuous byproducts (e.g., carbon dioxide or water), not just transferred to another phase or location within the environment;
- Current pump-and-treat technologies are energy-intensive and generally no more effective in reducing residual contamination;
- The process is nonintrusive and allows continuing use of infrastructure during remediation;
- Engineered remedial technologies may pose a greater risk to potential receptors than RNA (e.g., contaminants may be transferred into another medium during remediation activities); and
- RNA can be less costly than conventional, engineered remedial technologies.

A potential disadvantage of RNA is that, in some cases, natural attenuation rates are too slow to make RNA a practical remedial alternative.

OBSERVATIONS AND LESSONS LEARNED

COST OBSERVATIONS AND LESSONS LEARNED

Provide observations and lessons learned related to cost of the application.

No costs will be incurred due to regulatory site closure.

PERFORMANCE OBSERVATIONS AND LESSONS LEARNED

The following conclusions were drawn from the risk-based assessment of the site:

Given the low potential for current or future exposure to site contaminants, the historical groundwater data which indicates a contaminant plume that is not increasing in areal extent, and the strong geochemical evidence that natural attenuation is occurring at the site, Former Building 2093 is a candidate for immediate closure according to TNRCC guidance. Given the fact that dissolved benzene concentrations in groundwater remain above TNRCC Plan A Category II criteria near the source area, Kelly AFB proposes to restrict use of the shallow groundwater at the site.

OTHER OBSERVATIONS AND LESSONS LEARNED

The risk-based corrective action program administered by the PST Division of the TNRCC allows for rapid site closure if the groundwater contaminant plume is stable or declining in magnitude and/or size, the beneficial impacts of natural attenuation can be documented, and the potential for current or future expousre of receptors to site contamination is low. The risk-based corrective action process performed for this site can be used to achieve cost-effective site closure at other relatively low-risk fuel-contaminated sites.

List of references used in preparation of the cost and performance report.

REFERENCES

Newell, C.J., Mcleod, R.K., and Gonzales, J.R. 1996. *Bioscreen Natural Attenuation Design Support System User's Manual*, Version 1.3. Prepared for the Environmental Services Office, Air Force Center for Environmental Excellence (AFCEE) by Groundwater Services, Inc. June.

TNRCC. 1997c. Target Concentrations for Construction Worker Exposures. Facsimile from Vicki Montgomery at TNRCC Petroleum Storage Tank Division. Extracted from the March 6, 1997 TNRCC memorandum Clarifications and Amendments for Implementation of RG-36. July 24.

TNRCC. 1994. Risk-Based Corrective Action for Leaking Underground Storage Tank Sites. RG-36. January.

ACKNOWLEDGMENTS

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