

Executive Summary of State Data Related to Abandoned Centralized and Commercial
Drilling-Fluid Disposal Sites in Louisiana, New Mexico, Oklahoma, and Texas

Semi-Annual Technical Report

Reporting Period Start Date: August 24, 2002
Reporting Period End Date: February 24, 2003

by
H. Seay Nance

Alan R. Dutton, Principal Investigator

March 2003

DOE Award No. DE-AC26-99BC15225

Bureau of Economic Geology
Scott W. Tinker, Director
The University of Texas at Austin
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ABSTRACT

This 2003 Spring Semi-Annual Report contains a summary of the Final Technical Report being prepared for the Soil Remediation Requirements at Commercial and Centralized Drilling-Fluid Disposal (CCDD) Sites project funded by the United States Department of Energy under DOE Award No. DE-AC26-99BC15225. The summary describes (1) the objectives of the investigation, (2) a rationale and methodology of the investigation, (3) sources of data, assessment of data quality, and data availability, (4) examples of well documented centralized and commercial drilling-fluid disposal (CCDD) sites and other sites where drilling fluid was disposed of, and (5) examples of abandoned sites and measures undertaken for their assessment and remediation. The report also includes most of the figures, tables, and appendices that will be included in the final report.

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INTRODUCTION

A portion of oil and gas exploration and production (E&P) drilling fluids has been disposed of at Commercial and Centralized Drilling-fluid Disposal (CCDD) sites.

Commercial facilities accept drilling fluid and other waste allowed by their disposal permit from any operator on a fee basis. Centralized facilities receive spent drilling fluid from several leases held by an operator or from several sites on the same lease.

Centralized facilities are noncommercial sites with no commingling of waste from other operators. During the past few decades, the amount of spent drilling fluids sent offsite for disposal at CCDD sites has decreased from about 28 to 2 percent on a nationwide basis (American Petroleum Institute, 2000).

Drilling fluids used in oil and gas exploration and production (E&P) operations may be mixed with drilling additives, cuttings, formation water and crude oil. Although current regulations address the operation and closure of present-day drilling-fluid disposal sites, many older sites were operated under less comprehensive and, perhaps, less attentive regulation. Sites may have received wastes other than spent drilling fluids and may have been abandoned without proper closure. Prediction of constituent identities and concentrations at abandoned facilities is difficult because few compilations and summaries are available. Closure of abandoned CCDD sites in Louisiana, New Mexico, Oklahoma, and Texas is the jurisdiction of State regulatory agencies: Louisiana Department of Natural Resources Office of Conservation (LOC); New Mexico Energy, Mineral, and Natural Resources Department Oil Conservation Division (NMEMNRD); Oklahoma Corporation Commission (OCC); and Railroad Commission of Texas (TRRC).

This study is a census, compilation, and summary of information on currently active, inactive, and abandoned CCDD sites in these four States. It also includes data from a few sites that received spent drilling-fluid in addition to their primary operations. Information was collected from State-agency files to (1) develop and evaluate a multi-state information data base of credible technical data, (2) provide a basis for making State-funded site assessment and remediation more cost effective, and (3) participate in technology transfer workshops to document how this data base can be used for improving regulation, assessment, and remediation. Because data on abandoned sites is sparse, we also examined permitted sites that are currently operating (active) or have been closed (inactive) under State regulation. We tested the hypothesis that data from well-documented active or recently active sites could be used to predict conditions that at poorly documented abandoned sites.

CCDD sites in the four states included in the study differ both because of State regulation and industry practice as well as local and regional environmental conditions. New Mexico, for example, discourages off-site disposal of drilling waste. Off-site commercial disposal, however, permitted under special conditions, for example, where sensitive environments would be otherwise impacted. Louisiana and Oklahoma allow no centralized pits and no commingling of drilling waste on a noncommercial basis. Texas allows on-site, centralized, and commercial disposal of spent drilling fluid.

RESULTS AND DISCUSSION

Census Results

Data were collected and tabulated for 286 CCDD sites (fig. 1; table 1) from the LOC, NMEMNRD, OC, and TRRC. Data (appendix A) included: (1) names and locations of sites; (2) number of pits or land-treatment cells per site (fig. 2); (3) size of disposal pits or land-treatment cells per site (fig. 3); (4) chemical analyses of pit or cell sludge, pit water, sump water (land treatment), and groundwater sampled at monitoring wells (table 2, fig. 4, appendix B); and (5) groundwater elevations. Each data type was not available for every site. The sites in our database do not compose an exhaustive list of all currently and previously operating CCDD sites, but rather are sites for which data were available during the data collection phase of our investigation.

In our survey clay-lined earthen pits were found to be the most common repositories for drilling wastes. Treatment cells from 12 CCDD land-treatment facilities were also examined (table 1, appendix A) because they provided additional data on E&P waste composition and on-site groundwater characteristics. A few sites that were permitted as salt-water disposal or oil-reclamation facilities were also included where drilling fluid waste was identified on the site. There also are some data where drilling fluids had been discharged at an unauthorized site.

Comparison of Cited Analytical Methods

Standard laboratory procedures (USEPA, 1983, 1986, ALPHA-AWWA-WPCF, 1985) were found referenced in data reports, although many data reports contained no reference to analytical method. Reports that did not specify analytical methodologies

might have applied standard procedures. We assumed that data from different sites can be compared regardless of analytical method.

Constituents of Concern

The multi-state database provides information about the composition and distribution of constituents that can be mapped. Most State files do not contain mapped data, but mapping of monitoring data provides a useful picture to show how site conditions vary through time. Examples of mapped constituent concentrations in drilling-fluid waste are provided in figures 5 to 7. Examples of mapped constituent concentrations in groundwater are provided in figures 6 and 8 to 30. Data on water levels from site monitoring wells also were mapped as part of this analysis. Examples of how water level can vary across a site are given in figures 6, 8 to 10, 14 to 18, 28 to 30, 36. Comparison of well documented active and inactive CCDD sites versus poorly documented abandoned sites shows that maximum average concentration of constituents are generally consistent. Constituent concentrations at abandoned sites generally are within the range for constituents at active and inactive sites. At some abandoned sites, maximum average concentration of barium, chromium, lead, silver, TPH, or BTEX, of constituents is greater than at active and inactive CCDD sites that we reviewed (table 3). We conclude that data from well-documented sites may be used to predict conditions at abandoned sites except that older abandoned sites might have outlier concentrations for these metals and organics. The differences may reflect a change in industry practice. Also, we obtained data on soil contamination outside of disposal areas or treatment cells only for two sites (figs. 31 and 36); findings, therefore, apply only to on-site conditions.

Spent drilling-fluids are classified as non-hazardous wastes and are exempt from RCRA regulations. However, States included in our study have different requirements for permitting, operation, and closure of drilling-fluid disposal sites (table 4). No Texas regulations pertain specifically to CCDD sites. Differences in regulatory requirements and in industry practices result in variations in the abundances of data for CCDD sites in State agency files. The OCC has abundant data on groundwater for many sites because the OCC requires that several on-site monitoring wells be installed at each site. Louisiana currently has monitoring wells installed around all land treatment sites and has an abundance of monitoring data for historical disposal-pit sites. Texas has no general requirement for monitoring of sites, so the most abundant data are from detailed assessment of specific sites.

We compared average constituent concentrations calculated for sites in the database with various State and EPA standards and guidelines (table 4). Groundwater at a significant number of sites had chloride average concentrations (greater than 250 mg/L) that exceeded unenforceable aesthetic EPA secondary drinking water standards (SMCL), or TDS concentrations (greater than 10,000 mg/L) that exceeded EPA standards for underground drinking water sources (USDW) (USEPA, 2000).

There have been a number of recent or ongoing investigations at abandoned sites by the States (appendix A): 9 in Louisiana (figs. 9, 14), 10 in Oklahoma (figs. 5, 23), and 11 in Texas (figs. 6, 28 to 36). We identified no records of abandoned CCDD sites in New Mexico. A list of abandoned CCDD sites in Louisiana with the status of assessment and remediation activities was provided by the LOC. TRRC maintains a list of oil and-gas E&P sites in Texas that are or have been under investigation was provided by the TRRC;

but it did not distinguish CCDD from other types of sites. The count of abandoned CCDD sites in Oklahoma and Texas was compiled from information in agency files.

Summary of Assessment Techniques

Agency files also contain information on practices for site assessment for abandoned CCDD sites. Data from Oklahoma and Texas indicate that techniques used for site-assessment ranged from visual inspections to comprehensive geotechnical and scientific surveys. Survey measurements have included geophysical measurements; sampling and analyses of chemical composition of wastes, soil, groundwater, and surface water; measurement of water levels in monitoring wells; soil-gas measurement; radon detection; well tests of hydraulic conductivity; elevation surveys; and coring and description of core. Louisiana has assessed and closed one abandoned CCDD site, is assessing one abandoned CCDD site, is developing plans to assess six sites, is in the process of remediating one abandoned CCDD site, and is developing plans to remediate three abandoned CCDD sites. Most assessments of abandoned CCDD sites in Oklahoma consisted of stratigraphic surveys and chemical analyses of solid wastes; historical data for surface water and groundwater were available for several sites. TRRC conducted comprehensive assessments at some sites with stratigraphic surveys, chemical analyses of wastes, surface water, and groundwater, and geophysical measurements. Such in-depth assessments are expensive, however, and may not be cost-effective for all sites. At other Texas sites, assessments included inspection, mapping, and chemical analyses of soils, wastes, and groundwater.

Summary of Remediation Techniques Applied at CCDD Sites

Site remediation measures had been undertaken for one Louisiana CCDD site and three abandoned CCDD- and other sites in Texas (figs 30, 35, and 36) as of data collection phase of this study. Remediation techniques were recommended on the basis of site assessments. Remediation alternatives discussed for seven Texas CCDD sites addressed (1) a physical hazard related to waste pits having low load-bearing strength and (2) potential for groundwater transport of dissolved salt and petroleum hydrocarbons that might be leached from wastes. Recommended options included excavation of wastes and contaminated adjacent soils followed by either (1) removal to permitted disposal facilities, or (2) land farming (land spreading or land treatment) if sufficient on-site area were available. In one case on-site burial and capping with impervious materials were recommended. Groundwater remediation was not found to be necessary at any abandoned CCDD site in Texas as of December 2002. Installation of additional monitoring wells and continued monitoring of on-site groundwater were generally recommended; further monitoring may indicate a need for remediation. Assessments are continuing for most abandoned CCDD sites in our investigation and final determinations for remediation measures are pending.

CONCLUSIONS

We found records for 286 CCDD sites in Louisiana, New Mexico, Oklahoma, and Texas. Of these, 55 were active and 197 were inactive as of January 2002, and 34 had been abandoned. Most (95 percent) were disposal-pit facilities and the rest were used for land treatment of drilling fluids. The typical disposal-pit facilities has fewer than 3

disposal cells on site. The median size of a facility's pits is approximately 2 acres. The sites in our database do not compose an exhaustive list of all currently and previously operating CCDD sites, but rather are sites for which data were available during the data collection phase of our investigation.

Frequency graphs for typically measured constituents of concern at CCDD sites, including chloride and TPH in groundwater and in pit water, BTEX in pit water, and chloride, TPH, BTEX, barium, and arsenic in sludge, provide a statistical reference for evaluating the mean value of a constituent of concern at an individual site. Standard laboratory procedures are being used in the four states so data comparability is high, although we could not find specific analytical references for many reports. Groundwater at a significant number of sites had average chloride concentration greater than 250 mg/L, the unenforceable aesthetic EPA secondary drinking water standards (SMCL), or TDS concentration greater than 10,000 mg/L, the EPA standards for underground drinking water sources.

Groundwater at a significant number of sites had chloride average concentrations (greater than 250 mg/L) that exceeded unenforceable aesthetic EPA secondary drinking water standards (SMCL), or TDS concentrations (greater than 10,000 mg/L) that exceeded EPA standards for underground drinking water sources (USDW) (USEPA, 2000).

Techniques used for site-assessment range from visual inspections to comprehensive geotechnical and scientific surveys with geophysical measurements; sampling and analyses of chemical composition of wastes, soil, groundwater, and surface water; measurement of water levels in monitoring wells; soil-gas measurement; radon detection;

well tests of hydraulic conductivity; elevation surveys; and coring and description of core. Such in-depth assessments are expensive, however, and may not be cost-effective for all sites. Screening criteria that semi-quantitatively prioritize sites for detailed assessment are used.

Recommendations for remediation typically are developed as part of site assessment. Remediation alternatives for CCDD sites include excavation of wastes and contaminated adjacent soils followed by either removal to permitted disposal facilities, or land farming if sufficient on-site area were available. Groundwater remediation was not found to be necessary at any abandoned CCDD site in Texas as of December 2002. Assessments or monitoring are continuing for most abandoned CCDD sites in our investigation and final determinations for remediation measures are pending.

TECHNOLOGY TRANSFER

We presented a workshop on regulation, assessment, and remediation of oil field exploration and production sites, in Texas and Louisiana. The workshop was organized as a short course at the Annual Meeting of the Gulf Coast Association of Geological Societies in Austin, Texas. Presenters included Dr. Alan R. Dutton and Dr. Jeffrey G. Paine, Bureau of Economic Geology; Dr. Lloyd Deuel, Jr., Soil Analytical Services, Inc.; Mr. John Tintera, Railroad Commission of Texas; and Mr. Carroll Wascom, Louisiana Office of Conservation. The technology transfer workshop covered topics such as State regulation of CCDD sites in Texas and Louisiana, assessment techniques for CCDD sites, case histories of several CCDD sites, and considerations for selection of appropriate remediation methods.

A second technical paper was published presenting some of the results of this study. The paper by Nance and Dutton (2002) was published in the Transactions of the 52nd Annual Meeting of the Gulf Coast Association of Geological Societies. Approximately 50 people attended the technical presentation of the paper. The technical session at which the presentation was made was chaired by Mr. John Tintera (TRRC) and Mr. Carroll Wascom (LOC). The previous paper by Dutton and others (2000) was published in the Proceedings of the Ground Water Protection Council.

We constructed and continue to update a web area on the Bureau of Economic Geology web site (<http://www.beg.utexas.edu/research<<address>>>) wherein the public can review many of our findings. The Final Technical Report will be posted on the sight.

PLANS FOR NEXT REPORTING PERIOD

The remaining activity for the final reporting period through May 2003 is completion of the Final Technical Report. That report will integrate information from the previous semi-annual technical progress reports, the two published papers, and case histories from in-depth studies of CCDD sites in Texas.

ASSESSMENT OF PROSPECTS FOR FUTURE PROGRESS

We anticipate completing the Final Technical Report by the scheduled end of the contract in May 2003.

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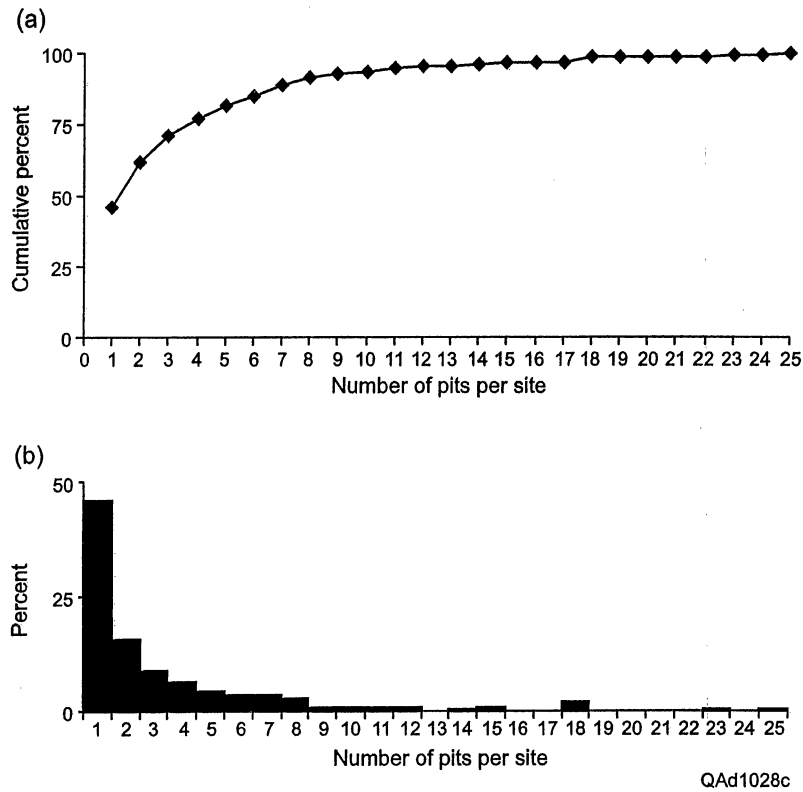
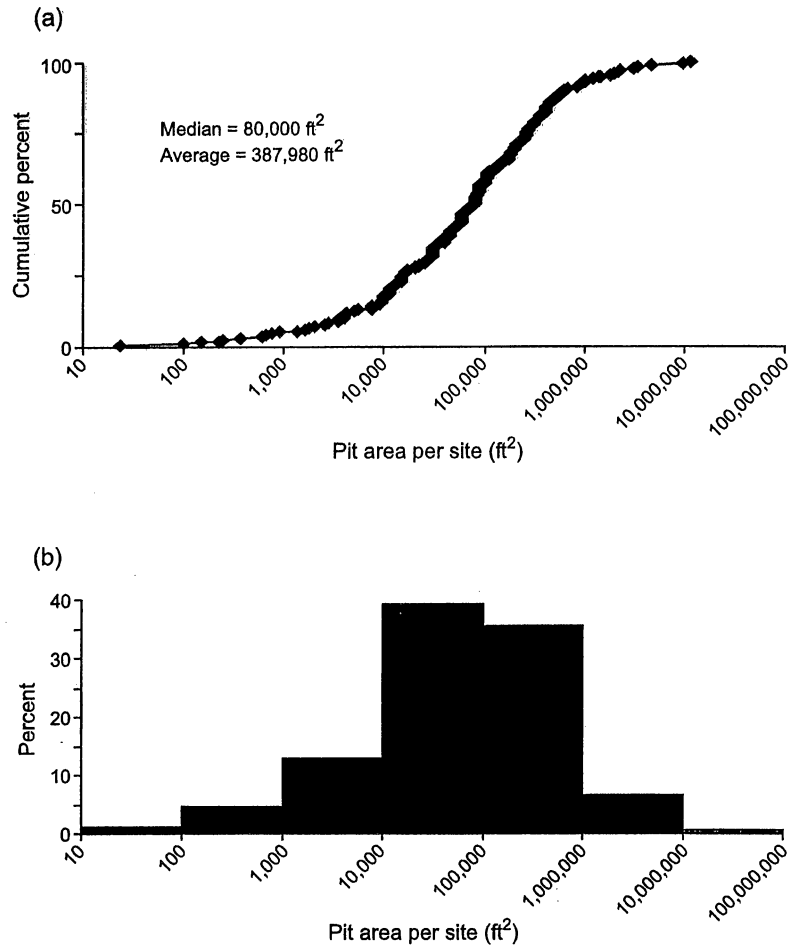
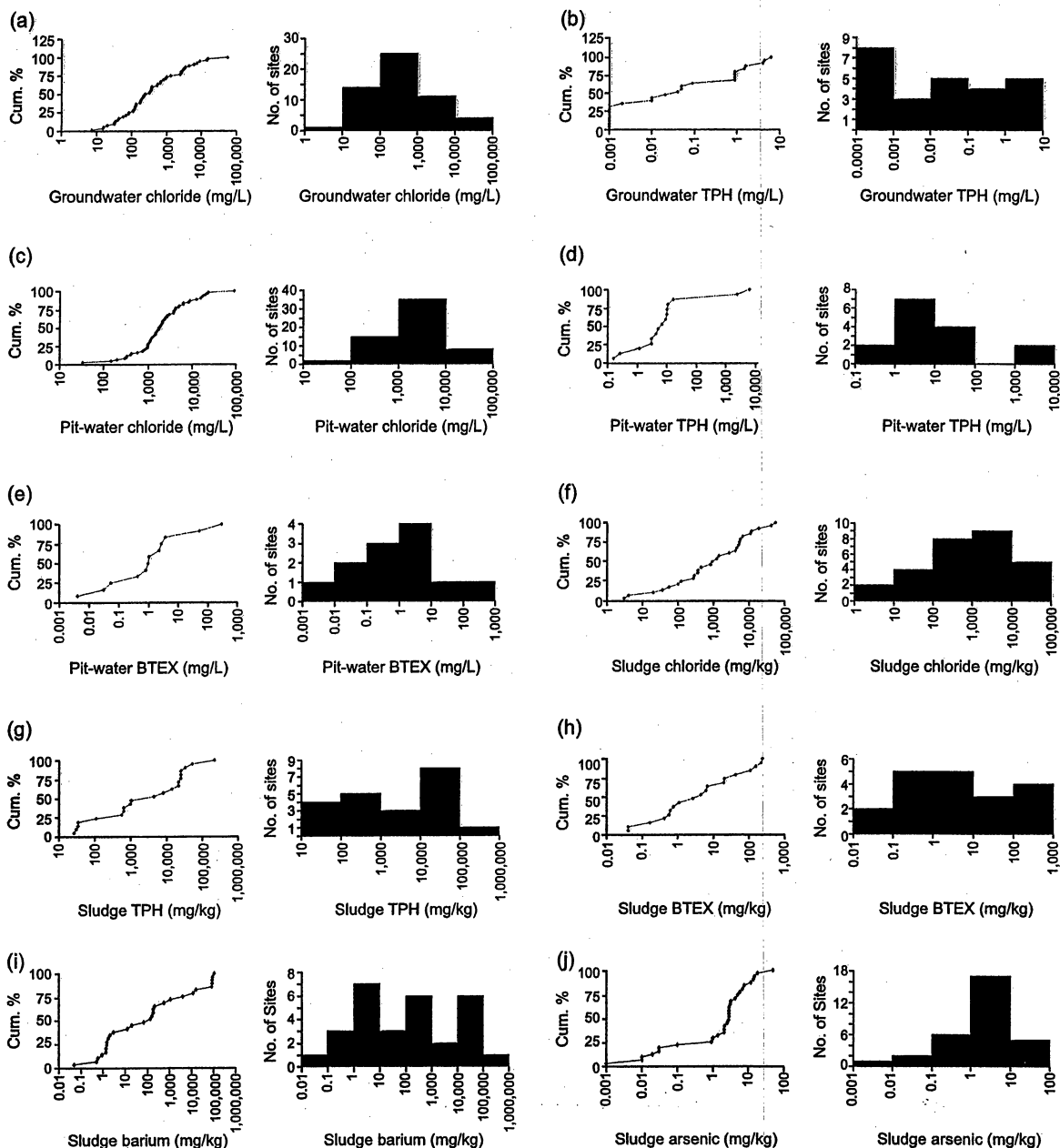


Figure 2. Cumulative (a) and frequency (b) graphs of numbers of pits per CCDD site in the database compiled to date.



QAd1037c

Figure 3. Cumulative (a) and frequency (b) graphs of areal coverage of pits per CCDD site in the database compiled to date.



QAAd764c

Figure 4. Cumulative and frequency graphs for selected constituents in groundwater and disposal pit contents: (a) chloride in groundwater, (b) TPH in groundwater, (c) chloride in pit water, (d) TPH in pit water, (e) BTEX in pit water, (f) chloride in sludge, (g) TPH in sludge, (h) BTEX in sludge, (i) arsenic in sludge, and (j) barium in sludge. Applicable plots are used (Figs. 5-30) as bases for comparison of individual sites with all sites in the database.

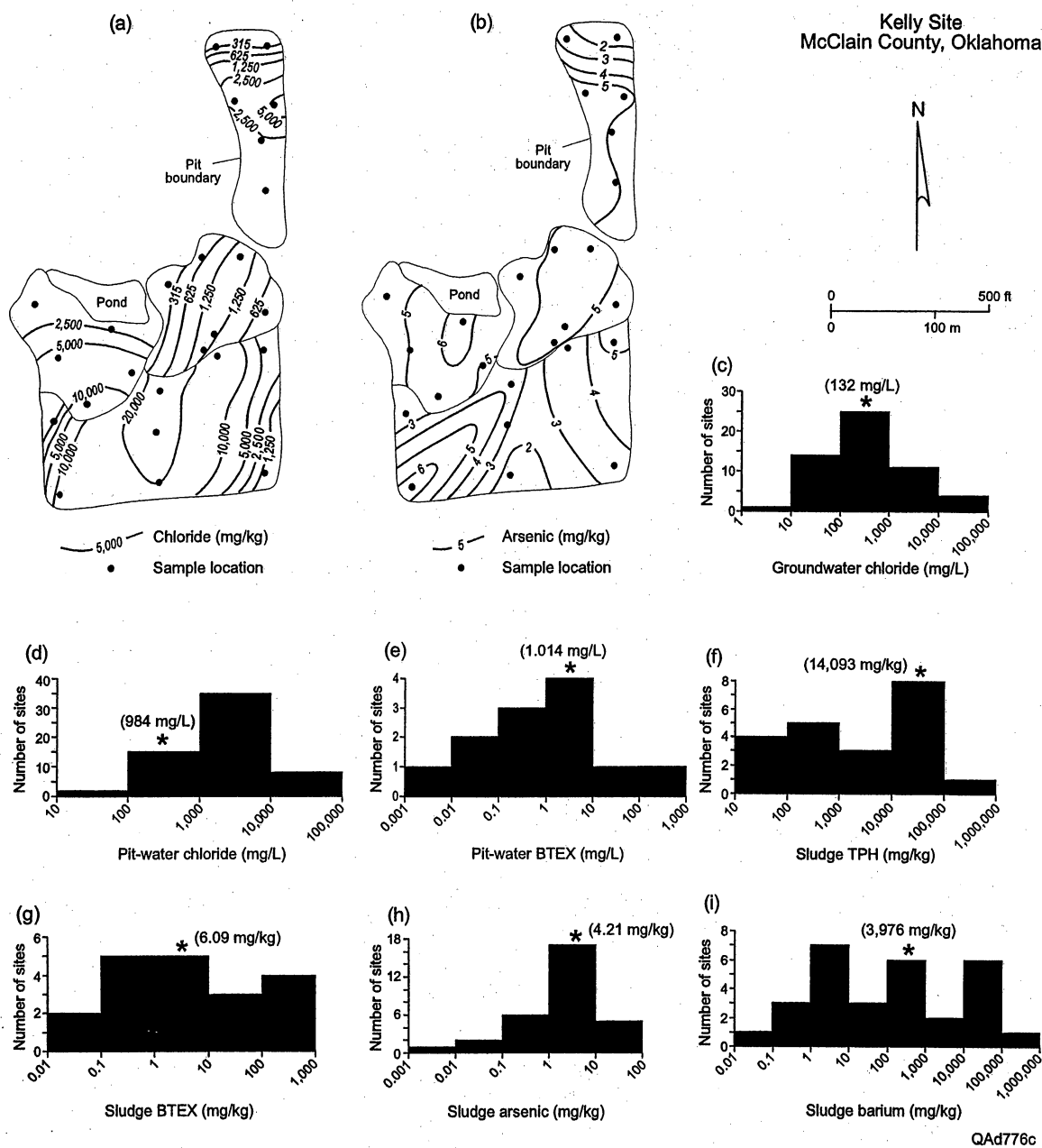


Figure 5. Kelly site, McClain County, Oklahoma: maps show (a) distribution of TPH in pit sludge, (b) Distribution of arsenic in pit sludge. Histograms show (c) mean chloride in groundwater, (d) mean chloride in pit water, (e) mean BTEX in pit water, (f) mean TPH in pit sludge, (g) mean BTEX in pit sludge, (h) mean arsenic in pit sludge, and (i) mean barium in pit sludge. Histograms in (c) to (i) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Kelly site. Mean concentration for site in parentheses.

Briggs Site
Matagorda County, Texas

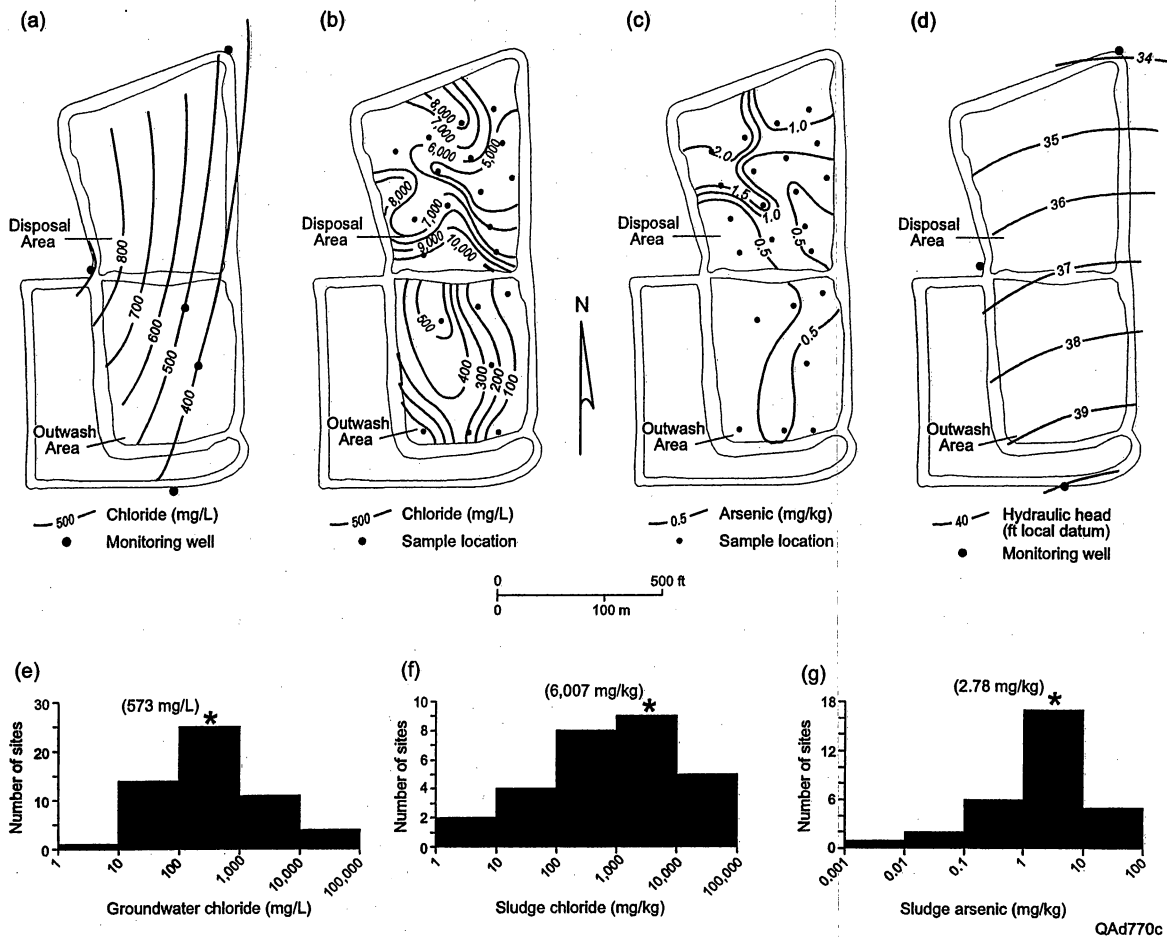
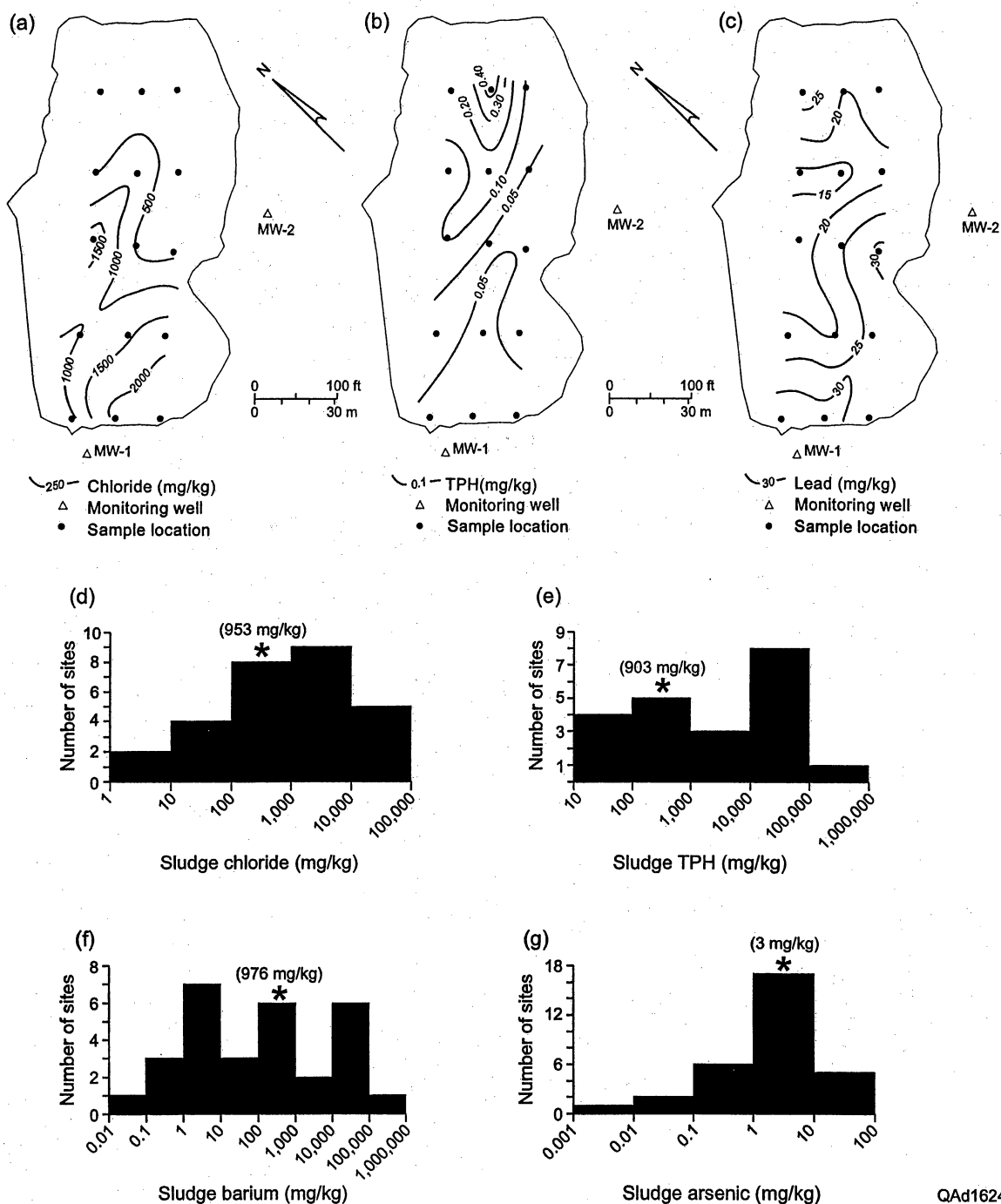


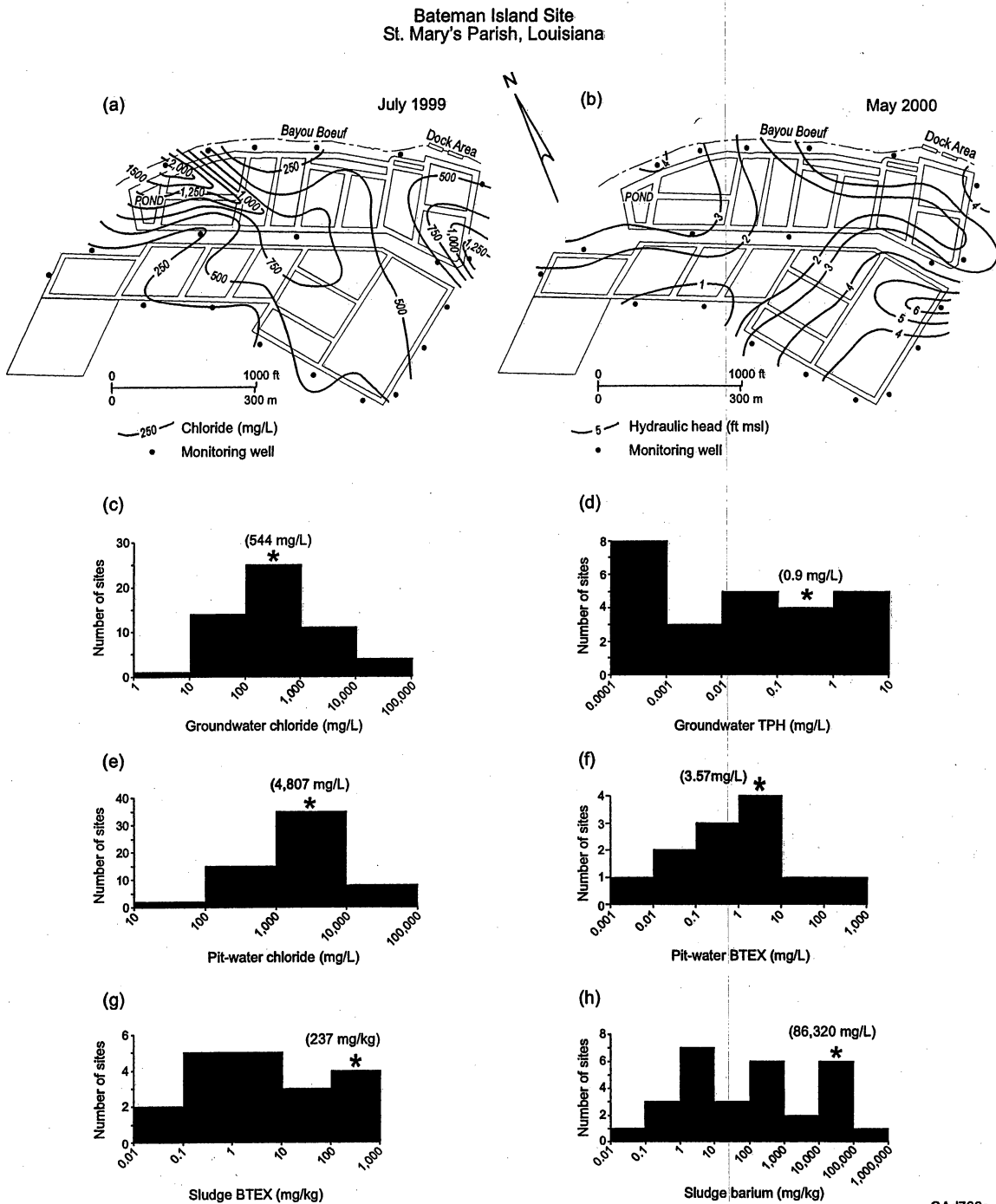
Figure 6. Vernon Briggs site, Matagorda County, Texas: maps show (a) distribution of chloride in groundwater, (b) distribution of chloride in pit sludge, (c) distribution of arsenic in pit sludge, and (d) water levels. Histograms show (e) mean chloride in groundwater, (f) mean chloride in pit sludge, and (g) mean arsenic in pit sludge. Histograms in (e) to (g) for all sites in the study sample (fig. 4). Star (*) indicates mean for Briggs site. Mean concentration for site in parentheses.

Post Oak Vacuum
Jasper County, Texas



QAAd1624c

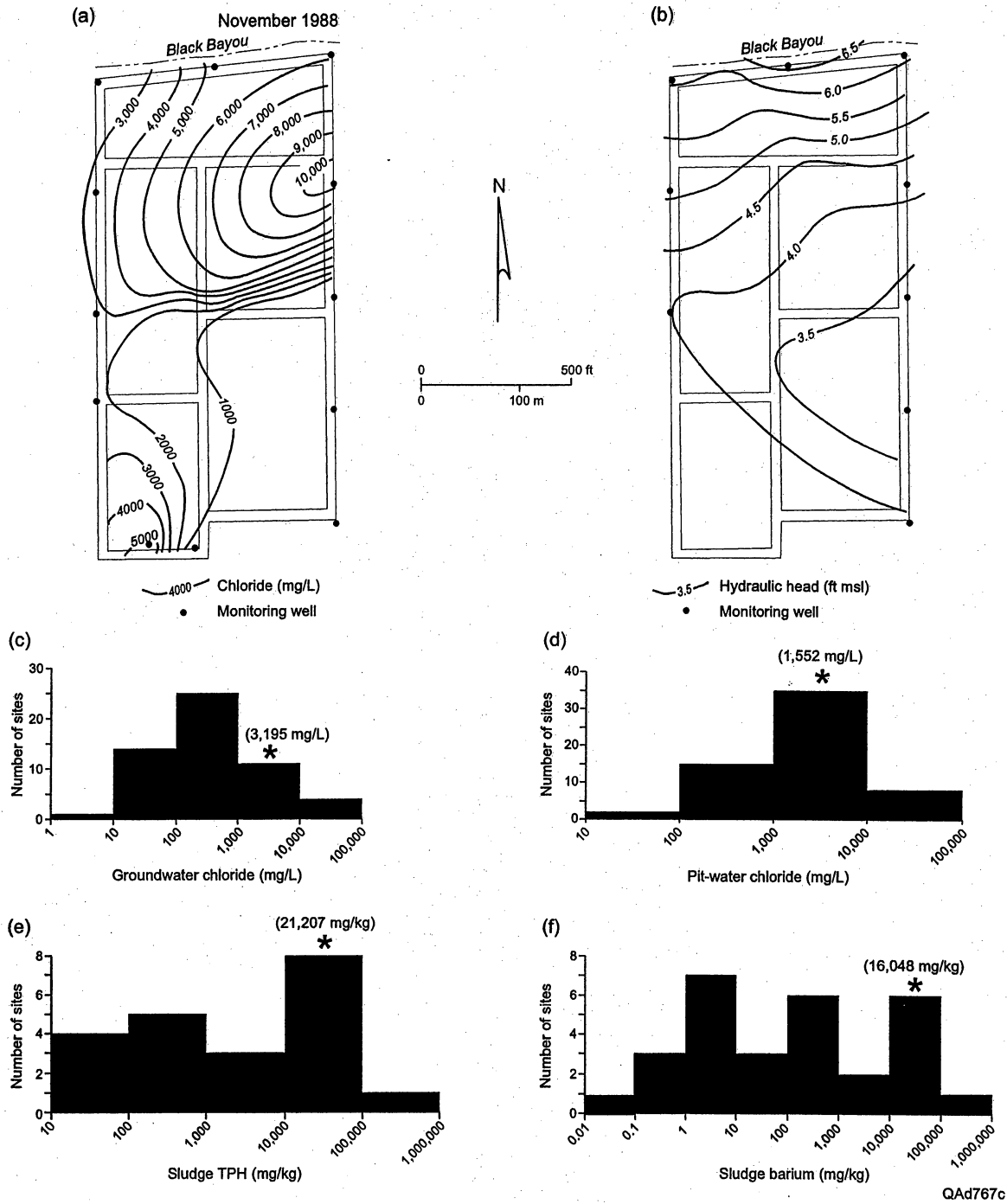
Figure 7. Post Oak site, Lee County, Texas: maps show (a) distribution of chloride in pit sludge, (b) distribution of TPH in pit sludge, and (c) distribution of lead in pit sludge. Histograms show (d) mean chloride in pit sludge, (e) mean TPH in pit sludge, (f) mean barium in pit sludge, and (g) mean arsenic in pit sludge. Histograms in (d) to (g) for all sites in the study sample. * mean for Post Oak site, mean concentration in parentheses.



QAd766c

Figure 8. Bateman Island site, St. Mary's Parish, Louisiana: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater, (d) mean total petroleum hydrocarbons in groundwater, (e) mean chloride in pit water, (f) mean BTEX in pit water, (g) mean BTEX in pit sludge, (h) mean barium in pit sludge. Histograms in (c) to (h) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Bateman Island site. Mean concentration for site in parentheses.

Big Diamond Site
Cameron Parish, Louisiana



QAd767c

Figure 9. Big Diamond site, Cameron Parish, Louisiana: maps show (a) distribution of chloride in groundwater and (b) water levels. Histograms show (c) mean chloride in groundwater, (d) mean chloride in pit water, (e) mean TPH in pit sludge, (f) mean barium in pit sludge at CCDD sites. Histograms in (c) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Big Diamond site. Mean concentration for site in parentheses.

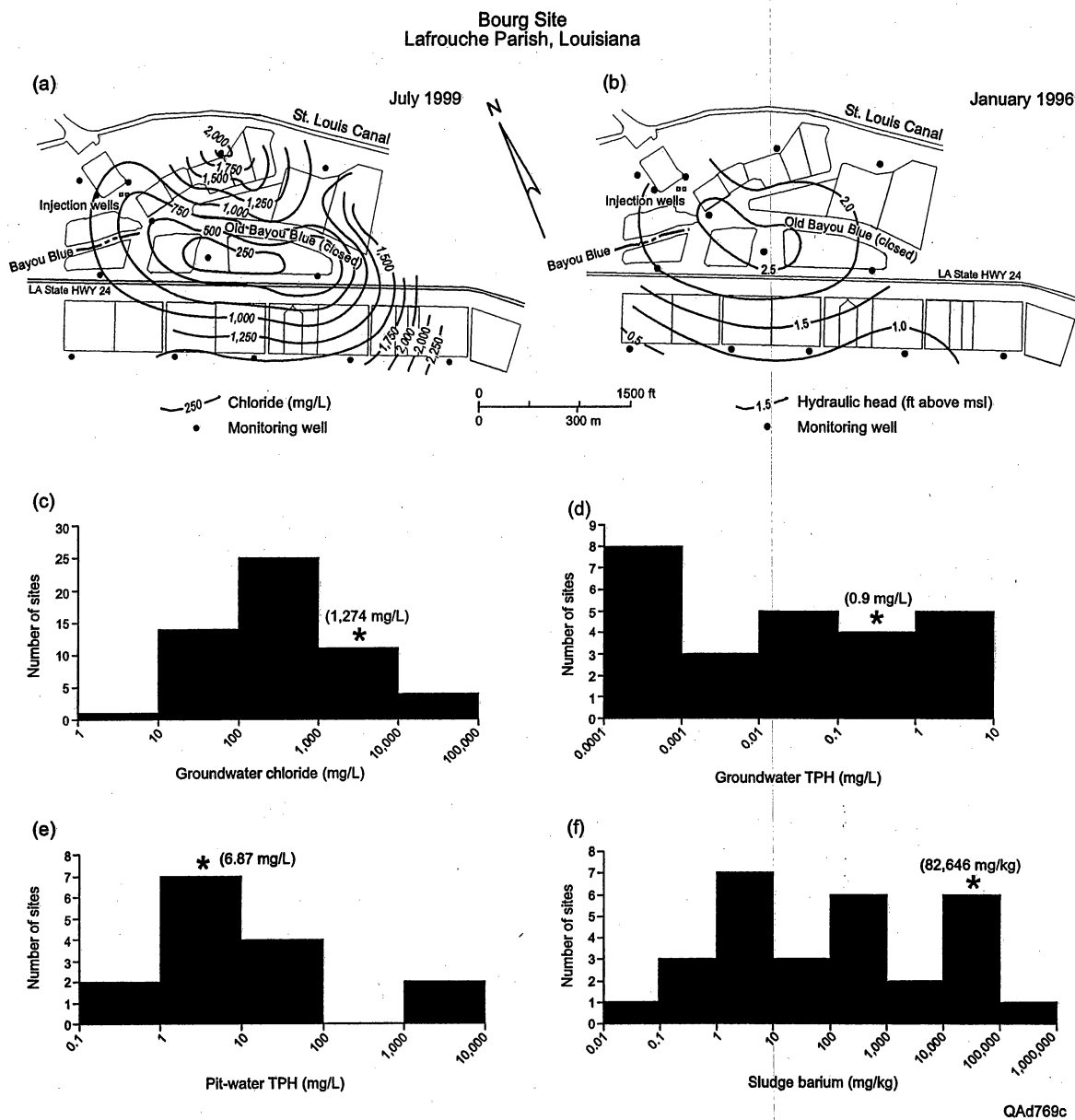


Figure 10. Bourg site, Lafrouche Parish, Louisiana: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater, (d) mean TPH in groundwater, (e) mean TPH in pit water, and (f) mean barium in pit sludge. Histograms in (c) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Bourg site. Mean concentration for site in parentheses.

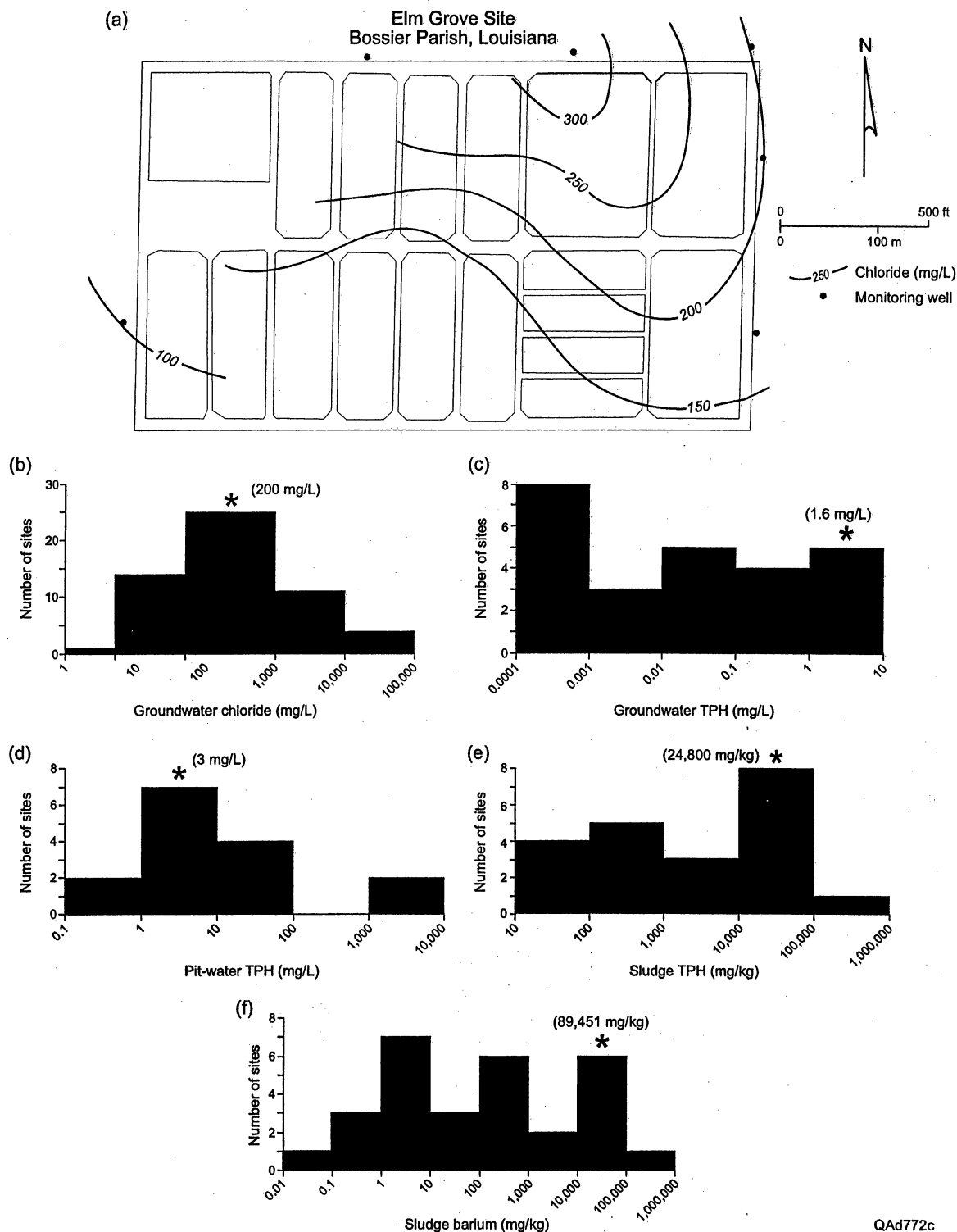


Figure 11. Elm Grove site, Bossier Parish, Louisiana: map shows (a) distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, (c) mean TPH in groundwater, (d) mean TPH in pit water, (e) mean TPH in pit sludge, and (f) mean barium in pit sludge. Histograms in (b) to (f) for all sites in the study sample (fig. 4). * mean for the Elm Grove site, mean concentration in parentheses.

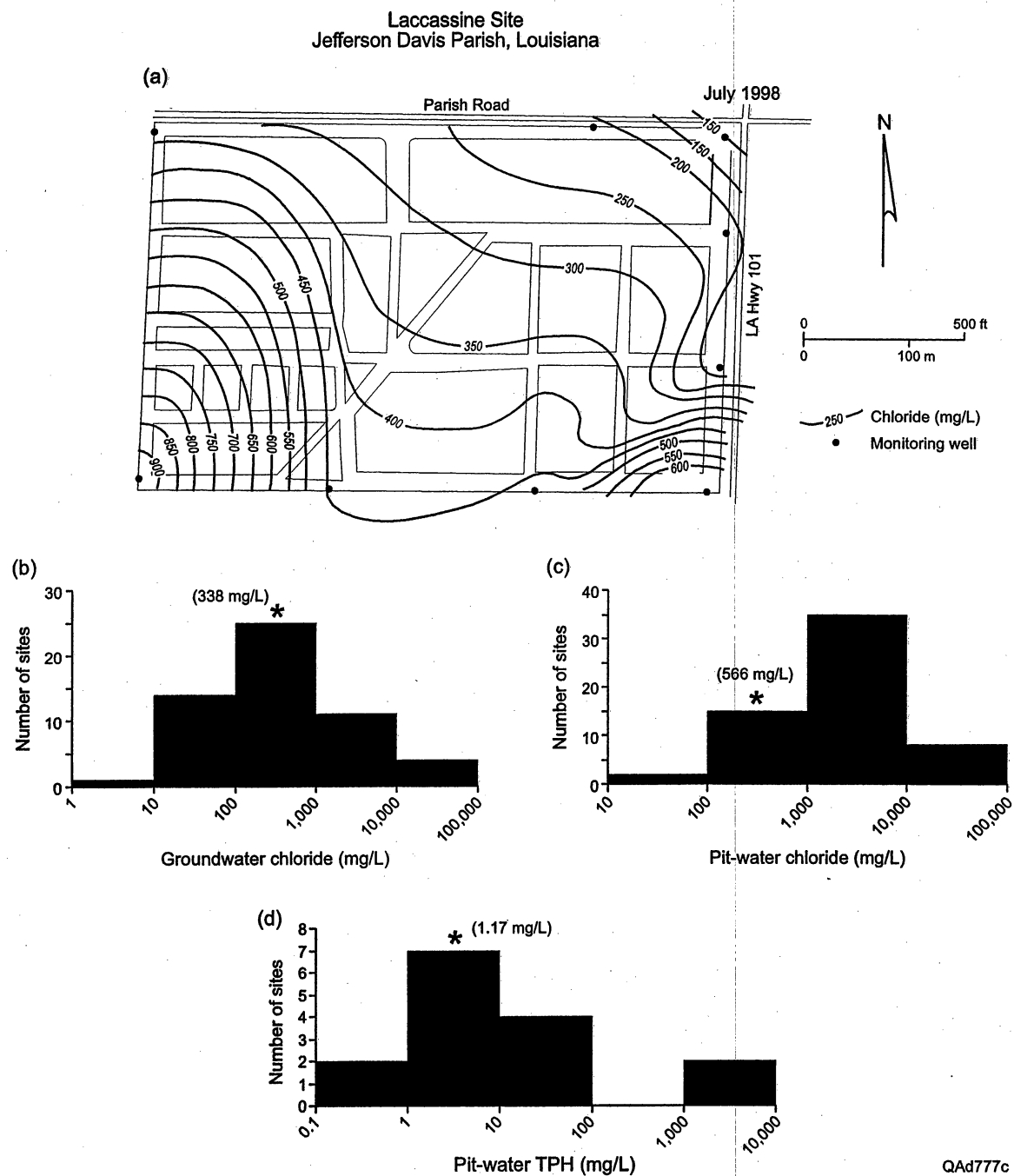


Figure 12. Laccassine site, Jefferson Davis Parish, Louisiana: map shows (a) distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, (c) mean chloride in pit water, and (d) mean TPH in pit water. Histograms in (b) to (d) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Laccassine site. Mean concentration for site in parentheses.

Lafourche Site
Lafourche Parish, Louisiana

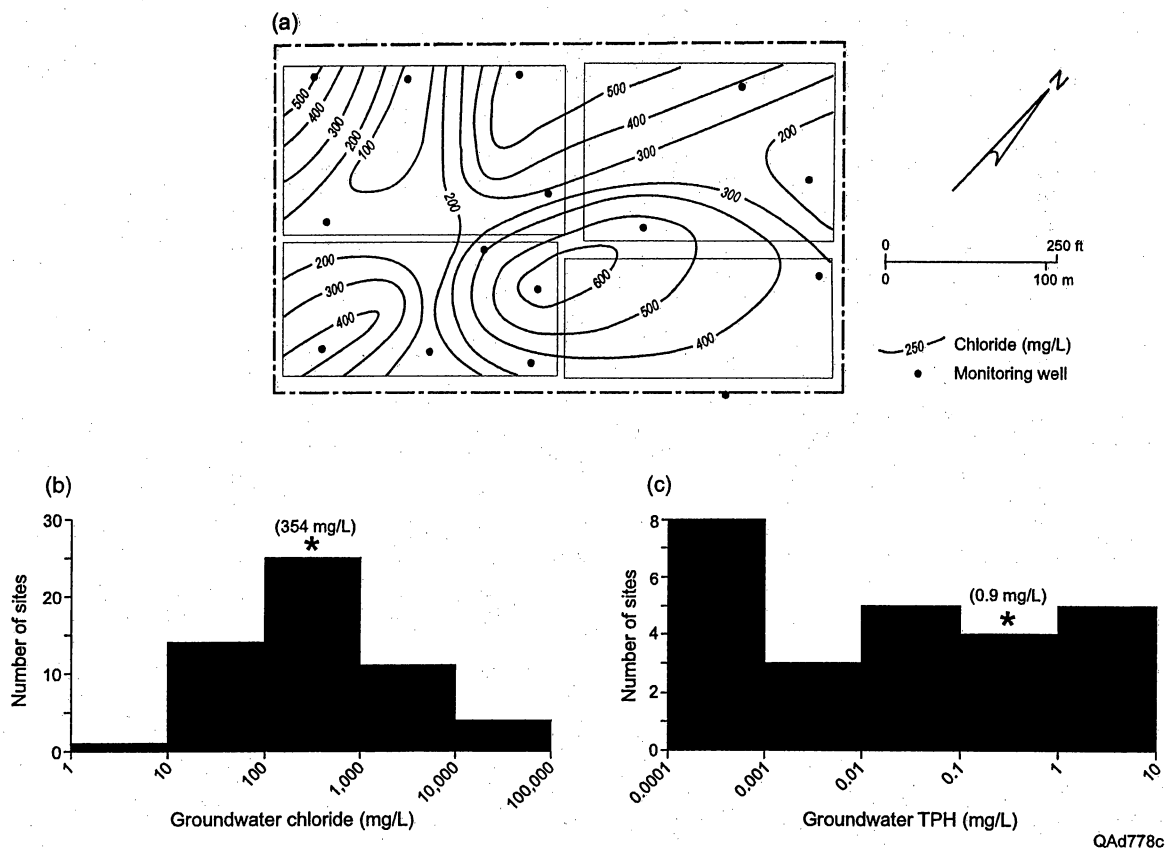
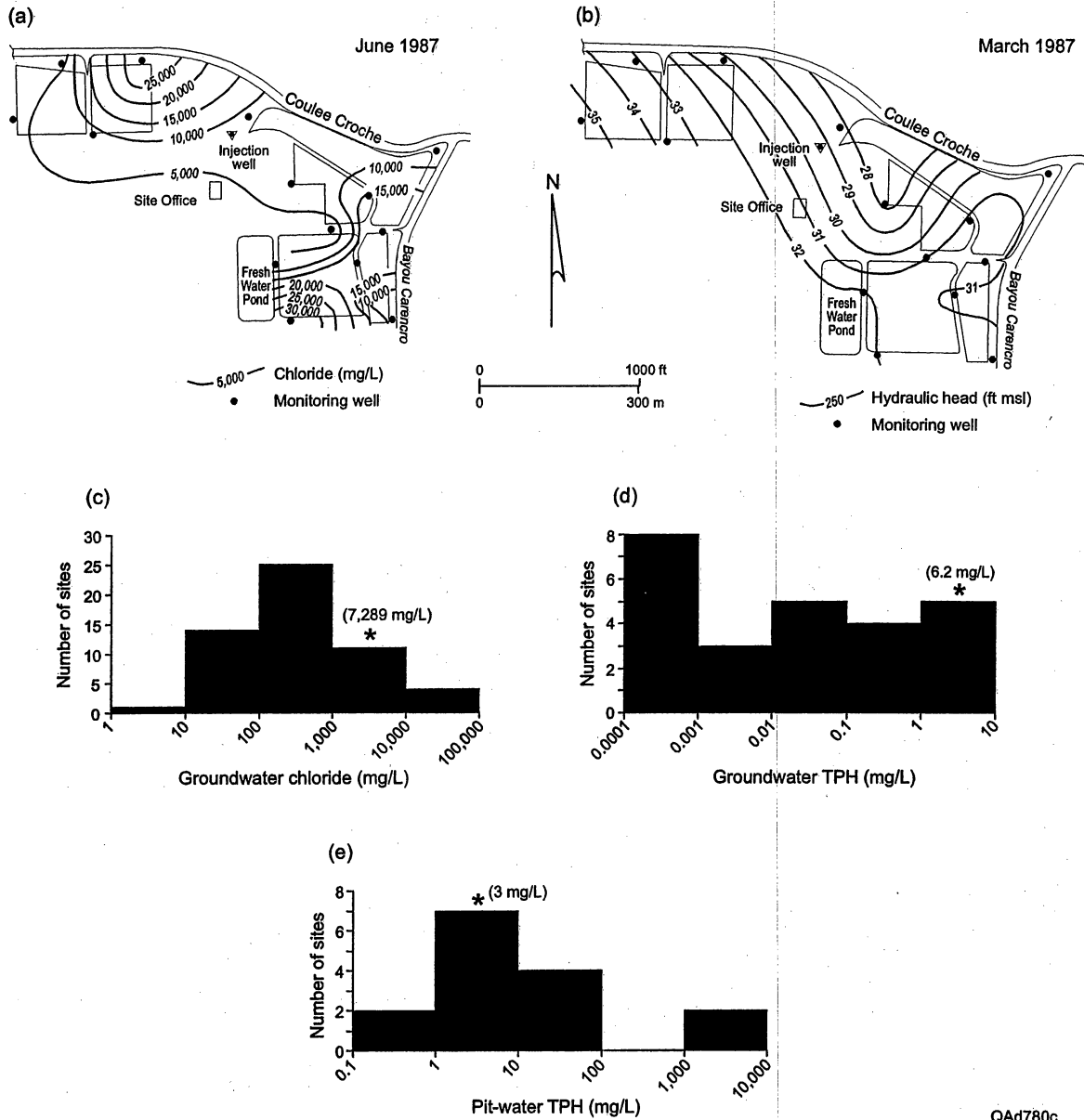


Figure 13. Lafourche site, Lafourche Parish, Louisiana: map shows (a) distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, and (c) mean TPH in groundwater. Histograms in (b) and (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Lafourche site. Mean concentration for site in parentheses.

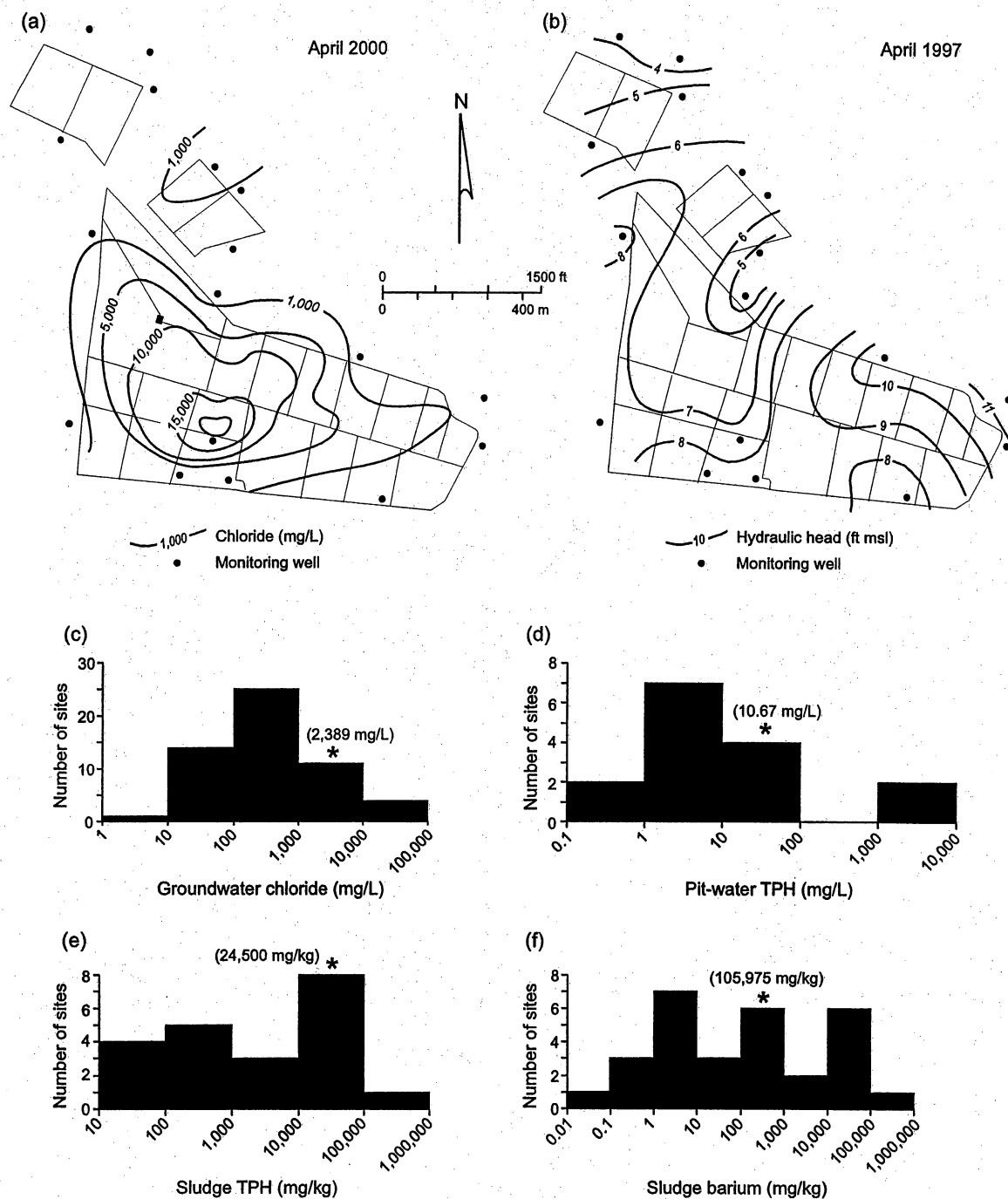
MAR Site,
St. Landry Parish, Louisiana



QAd780c

Figure 14. Mar site, St. Landry Parish, Louisiana: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater, (d) mean TPH in groundwater, and (e) mean TPH in pit water. Histograms in (c) to (e) for all sites in the study sample (fig. 4). Star (*) indicates mean for the MAR site. Mean concentration for site in parentheses.

Mermentau Site
Jefferson Davis Parish, Louisiana



QAd782c

Figure 15. Mermentau site, Jefferson Davis Parish, Louisiana: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater, (d) mean TPH in pit water, (e) mean TPH in pit sludge, and (f) mean barium in pit sludge. Histograms in (c) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Mermentau site. Mean concentration for site in parentheses.

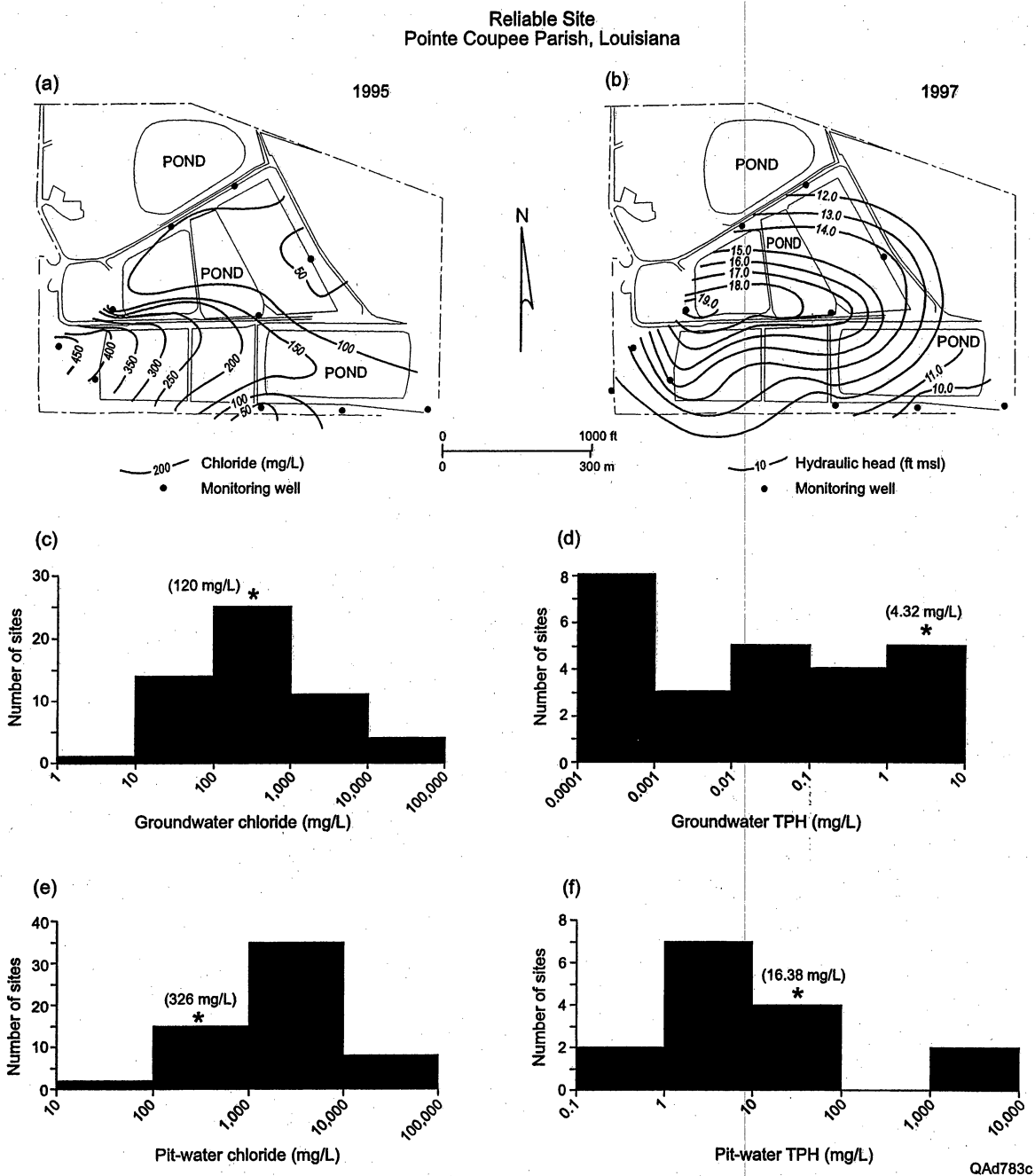


Figure 16. Reliable site, Pointe Coupee Parish, Louisiana: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater, (d) mean TPH in groundwater, (e) mean chloride in pit water, and (f) mean TPH in pit water. Histograms in (c) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Reliable site. Mean concentration for site in parentheses.

Waguespack Site
Iberia Parish, Louisiana

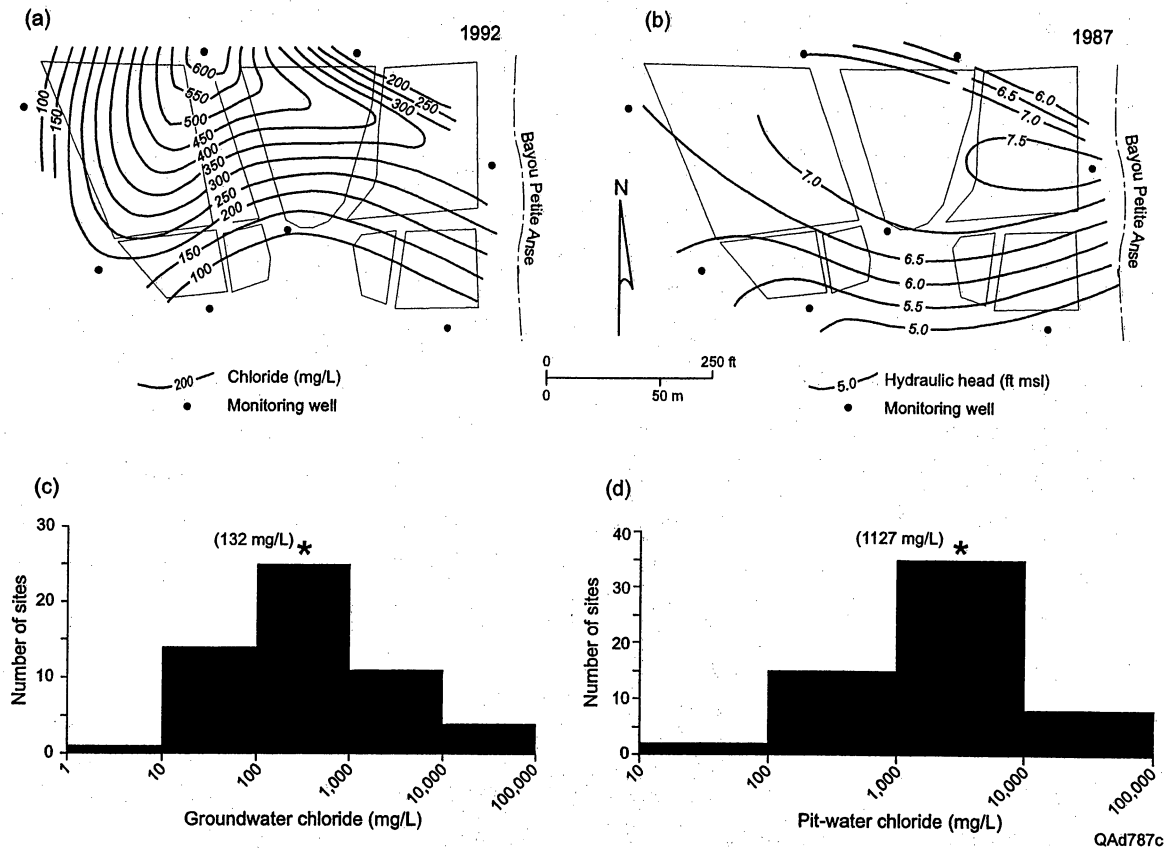
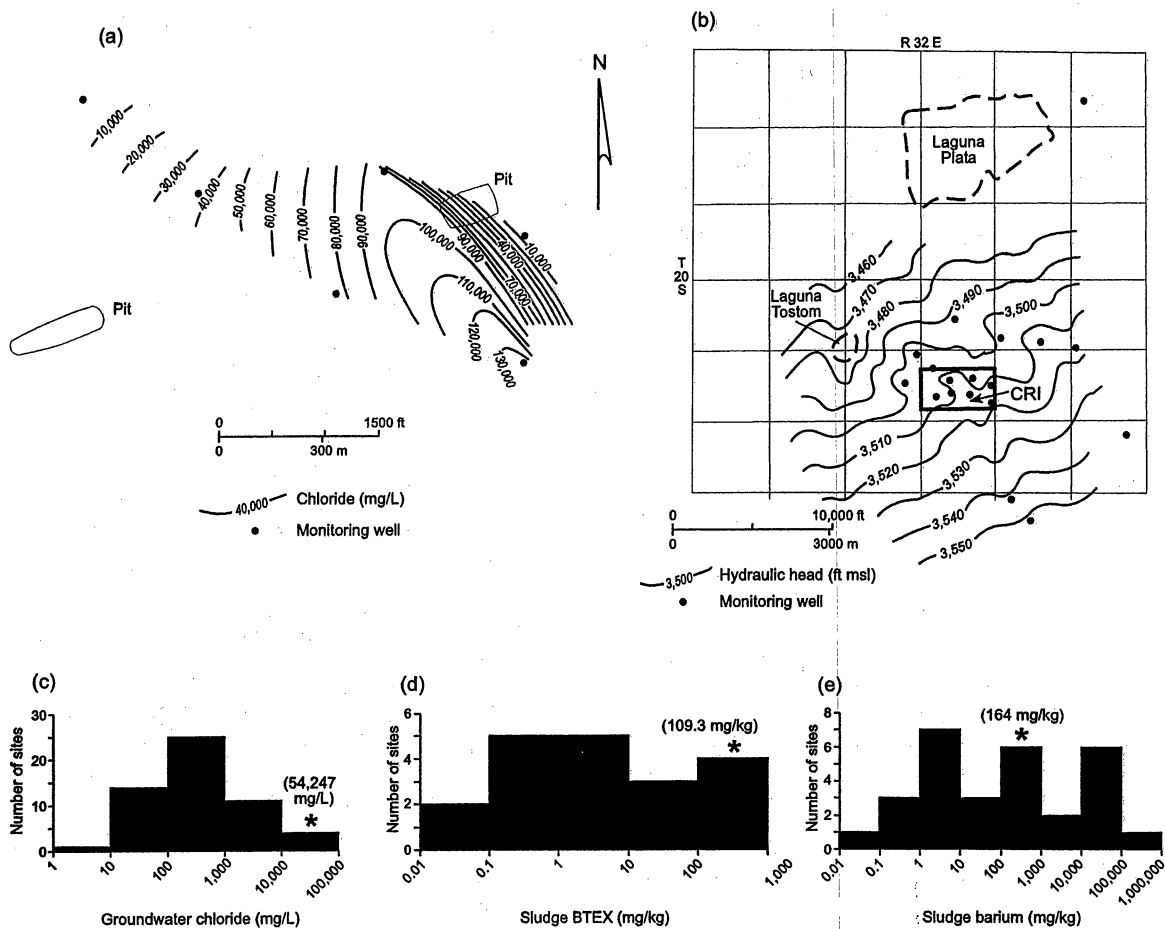


Figure 17. Waguespack site, Iberia Parish, Louisiana: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater, and (d) mean chloride in pit water. Histograms in (c) and (d) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Waguespack site. Mean concentration for site in parentheses.

CRI Halfway Site
Lea County, New Mexico



QAd771c

Figure 18. CRI Halfway site, Lea County, New Mexico: maps show (a) distribution of chloride in groundwater, and (b) water levels (map from agency files). Maps show (c) mean chloride in groundwater, (d) mean BTEX in pit sludge, and (e) mean barium in pit sludge. Histograms in (c) to (e) for all sites in the study sample (fig. 4). Star (*) indicates mean for the CRI Halfway site. Mean concentration for site in parentheses.

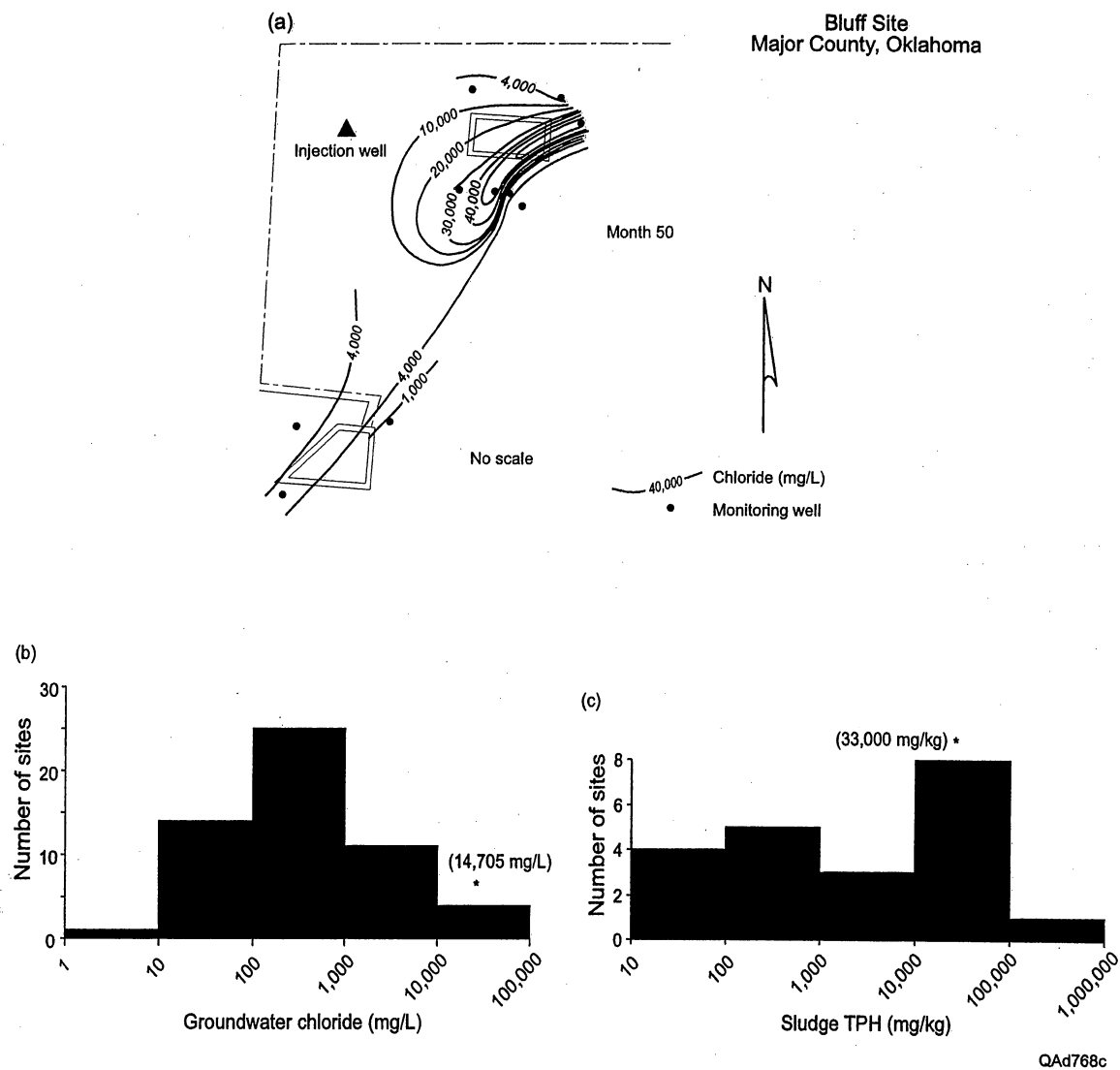


Figure 19. Bluff site, Major County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, and (c) mean TPH in pit sludge at CCDD sites. Histograms in (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Bluff site. Mean concentration for site in parentheses.

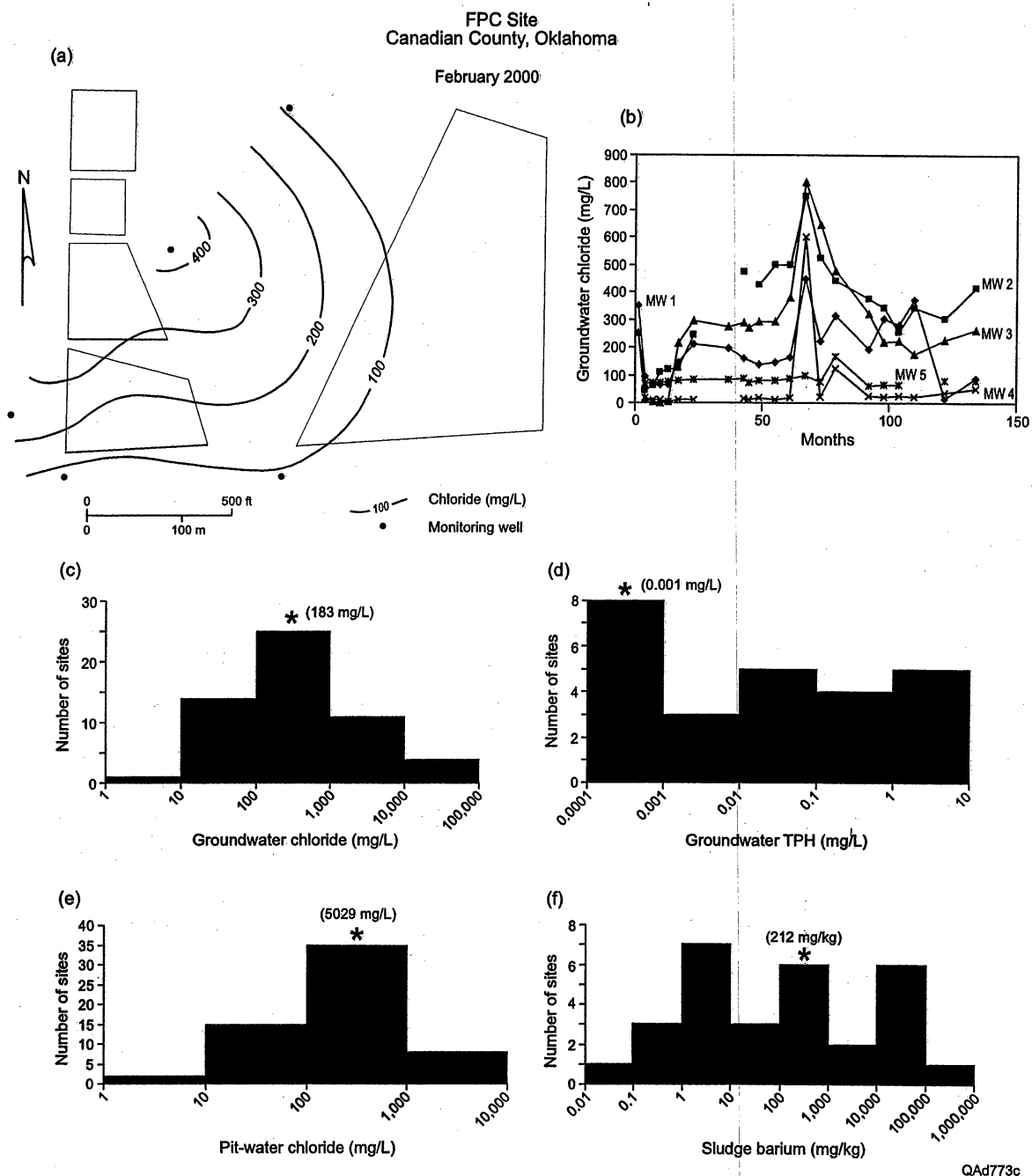
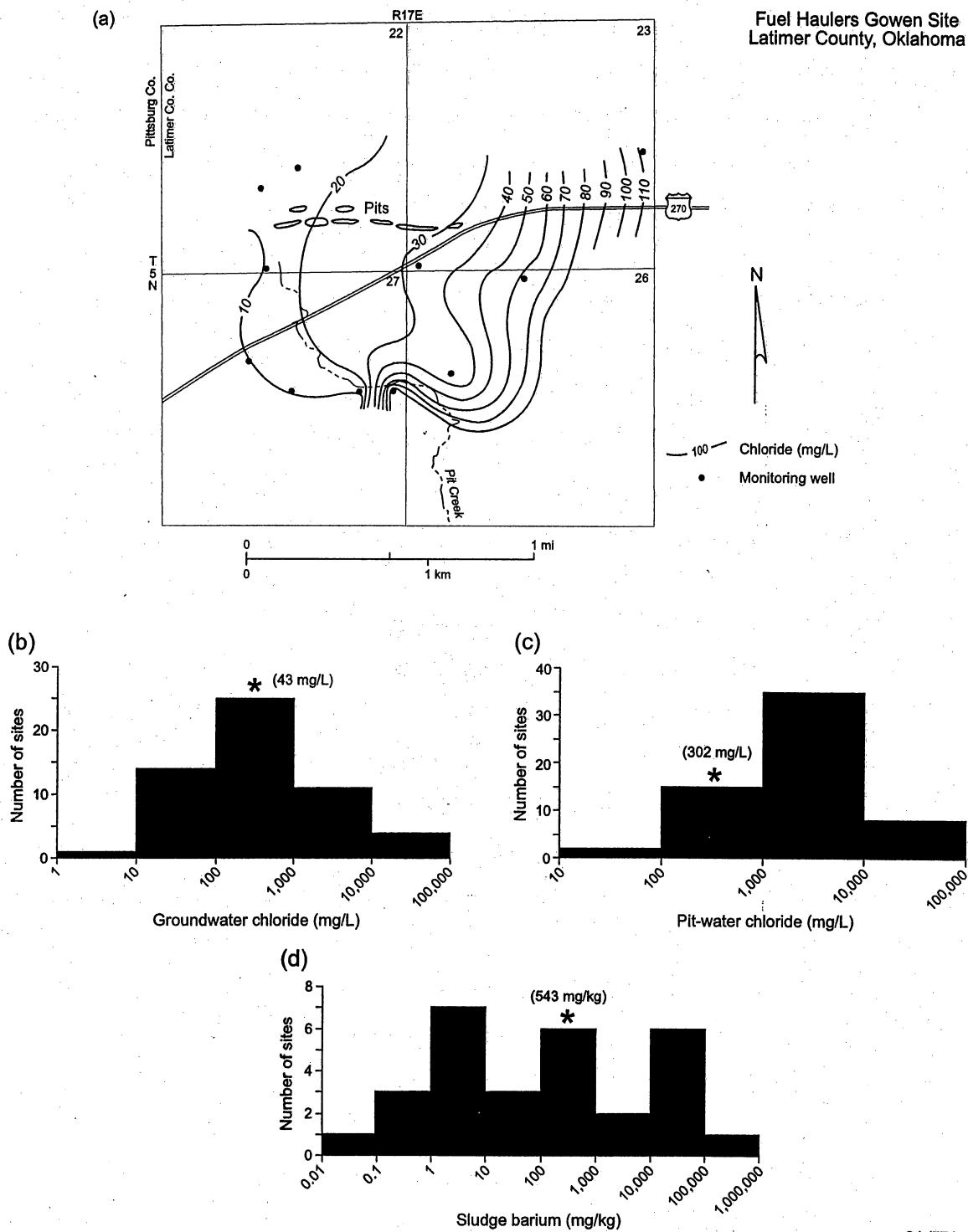


Figure 20. FPC site, Canadian County, Oklahoma: map shows (a) distribution of chloride in groundwater. (b) Time-series plot of chloride in groundwater by monitoring wells. Histograms show (c) mean chloride in groundwater, (d) mean TPH in groundwater, (e) mean chloride in pit water, and (f) mean barium in pit sludge. Histograms in (c) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for the FPC site. Mean concentration for site in parentheses.



QAd774c

Figure 21. Gowen site, Latimer County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, (c) mean chloride in pit water, and (d) mean barium in pit sludge. Histograms in (b) to (d) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Gowen site. Mean concentration for site in parentheses.

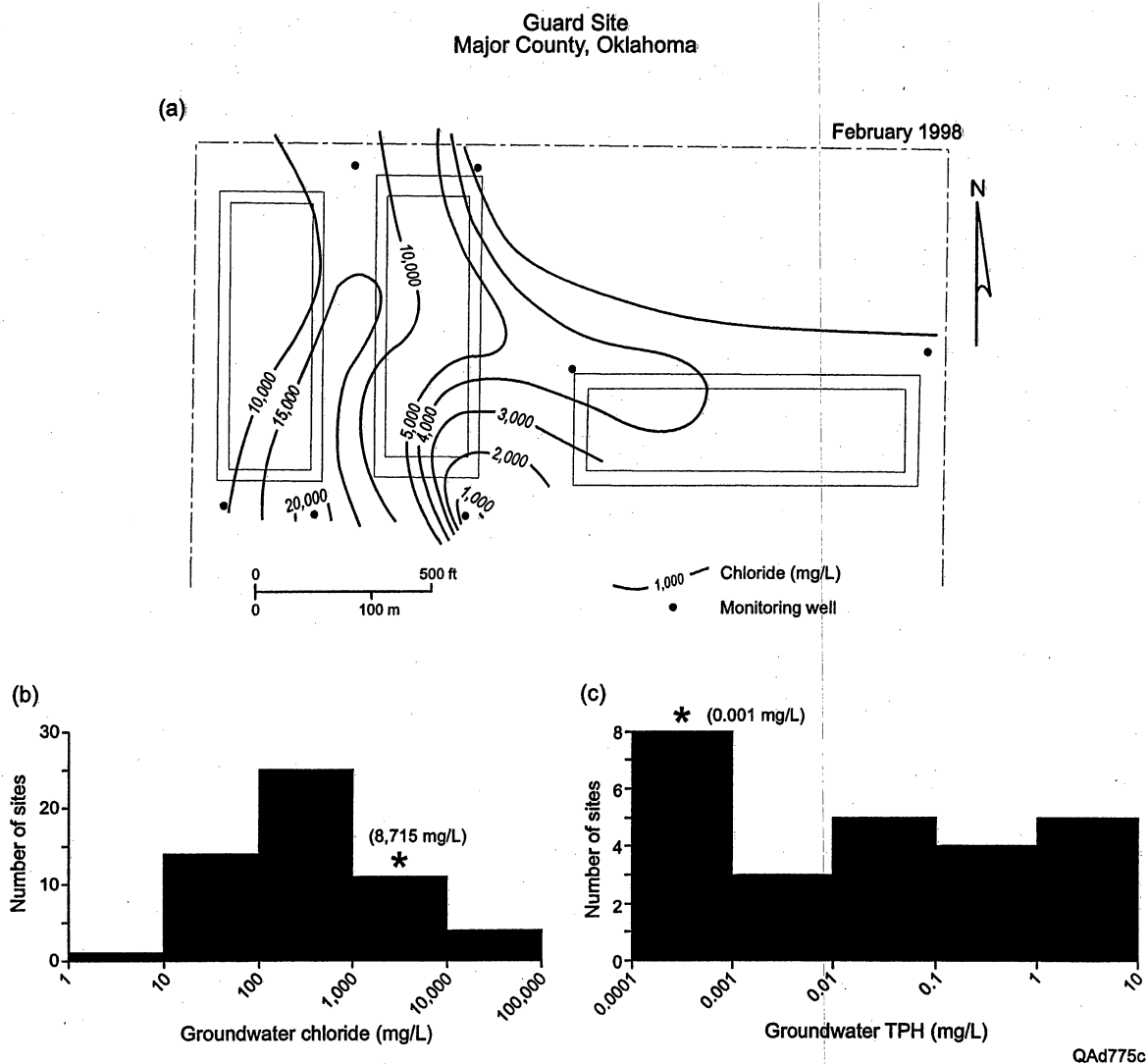
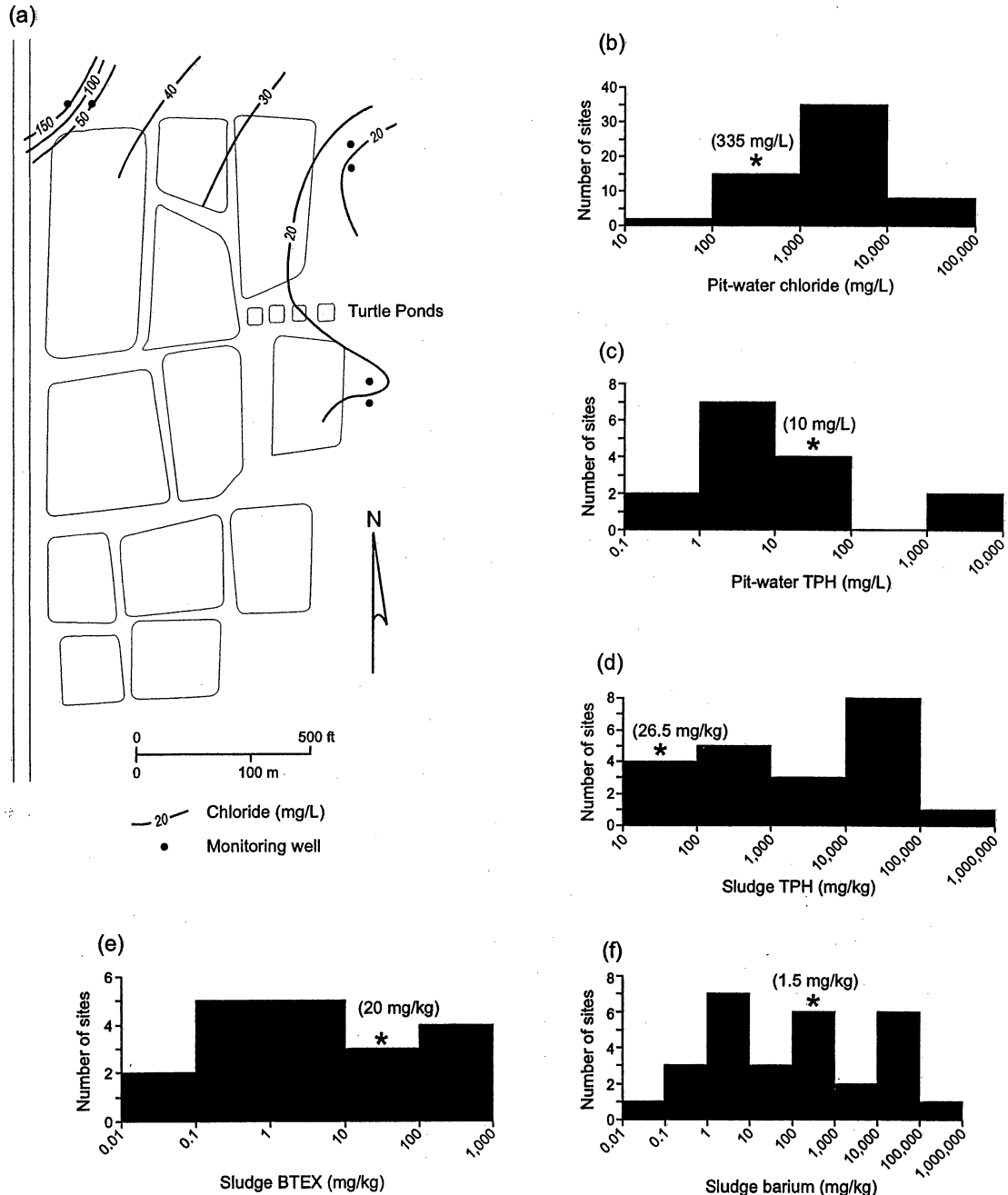


Figure 22. Guard site, Major County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, and (c) mean TPH in groundwater. Histograms in (b) and (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Guard site. Mean concentration for site in parenthesis.

**Merkle Site
Pottawatomie County, Oklahoma**



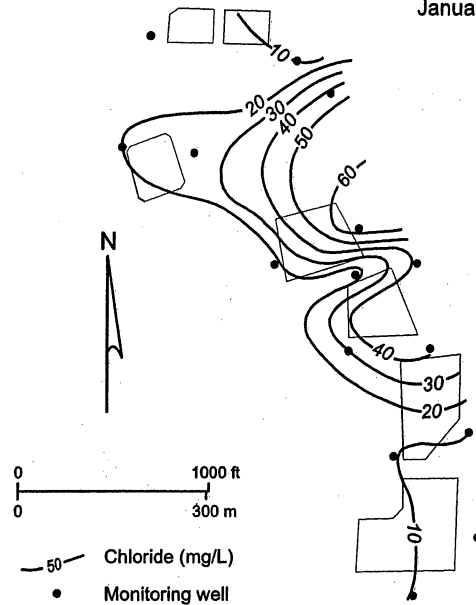
QAd781c

Figure 23. Merkle site, Pottawatomie County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in pit water, (c) mean TPH in pit water, (d) mean TPH in pit sludge, (e) mean BTEX in pit sludge, and (f) mean barium in pit sludge. Histograms in (b) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Merkle site. Mean concentration for site in parentheses.

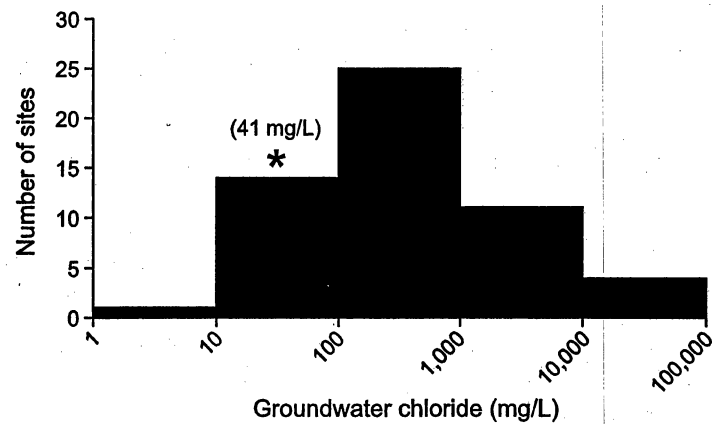
Safe Earth Site
Roger Mills County, Oklahoma

(a)

January 1999

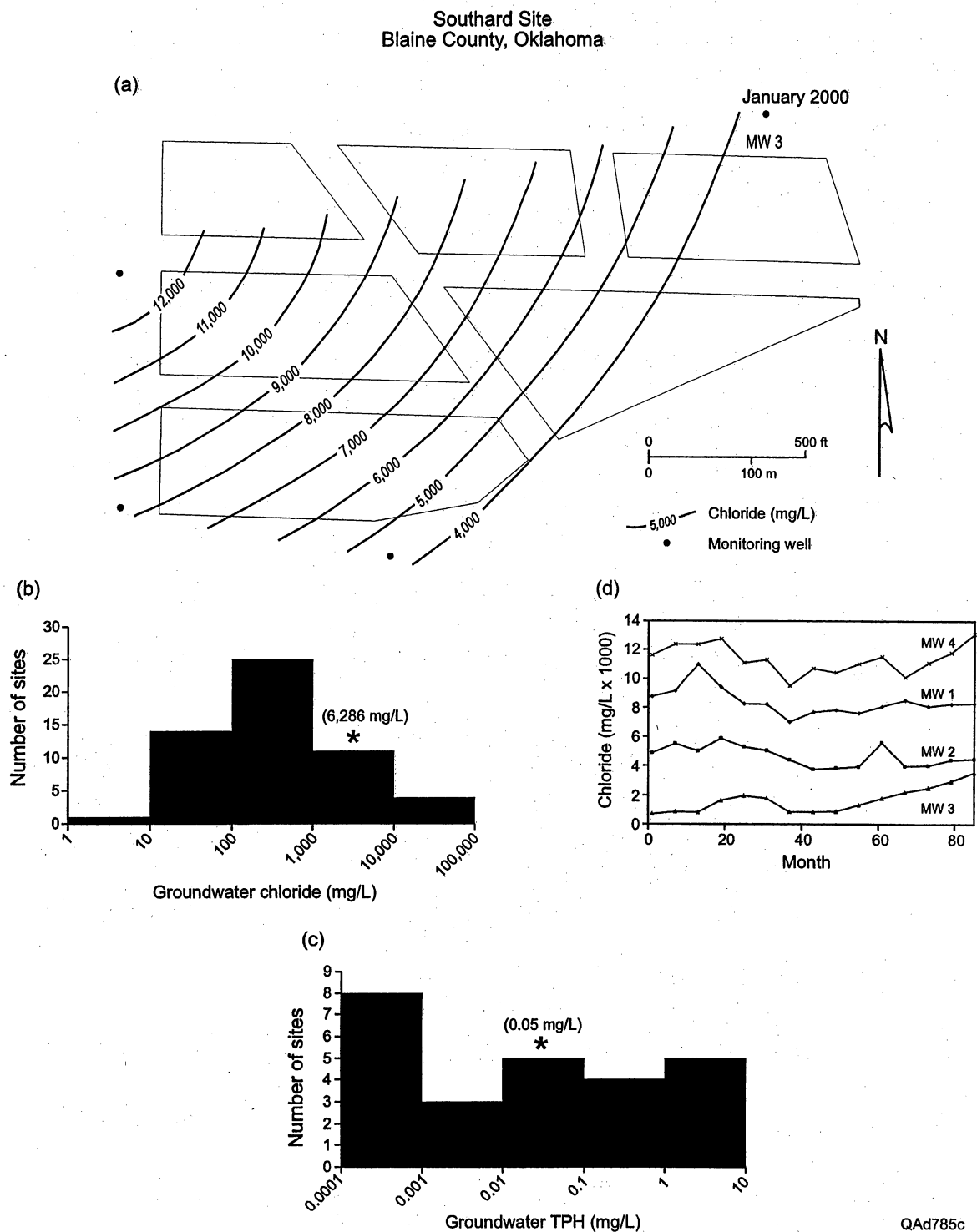


(b)



QAd784c

Figure 24. Safe Earth site, Roger Mills County, Oklahoma: maps show (a) distribution of chloride in groundwater, and (b) water levels. Histograms show (c) mean chloride in groundwater. Histograms in (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Safe Earth site. Mean concentration for site in parentheses.



QAd785c

Figure 25. Southard site, Blaine County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, and (c) mean TPH in groundwater. (d) Time-series plot of chloride in groundwater by monitoring wells. Histograms in (b) and (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Southard site. Mean concentration for site in parentheses.

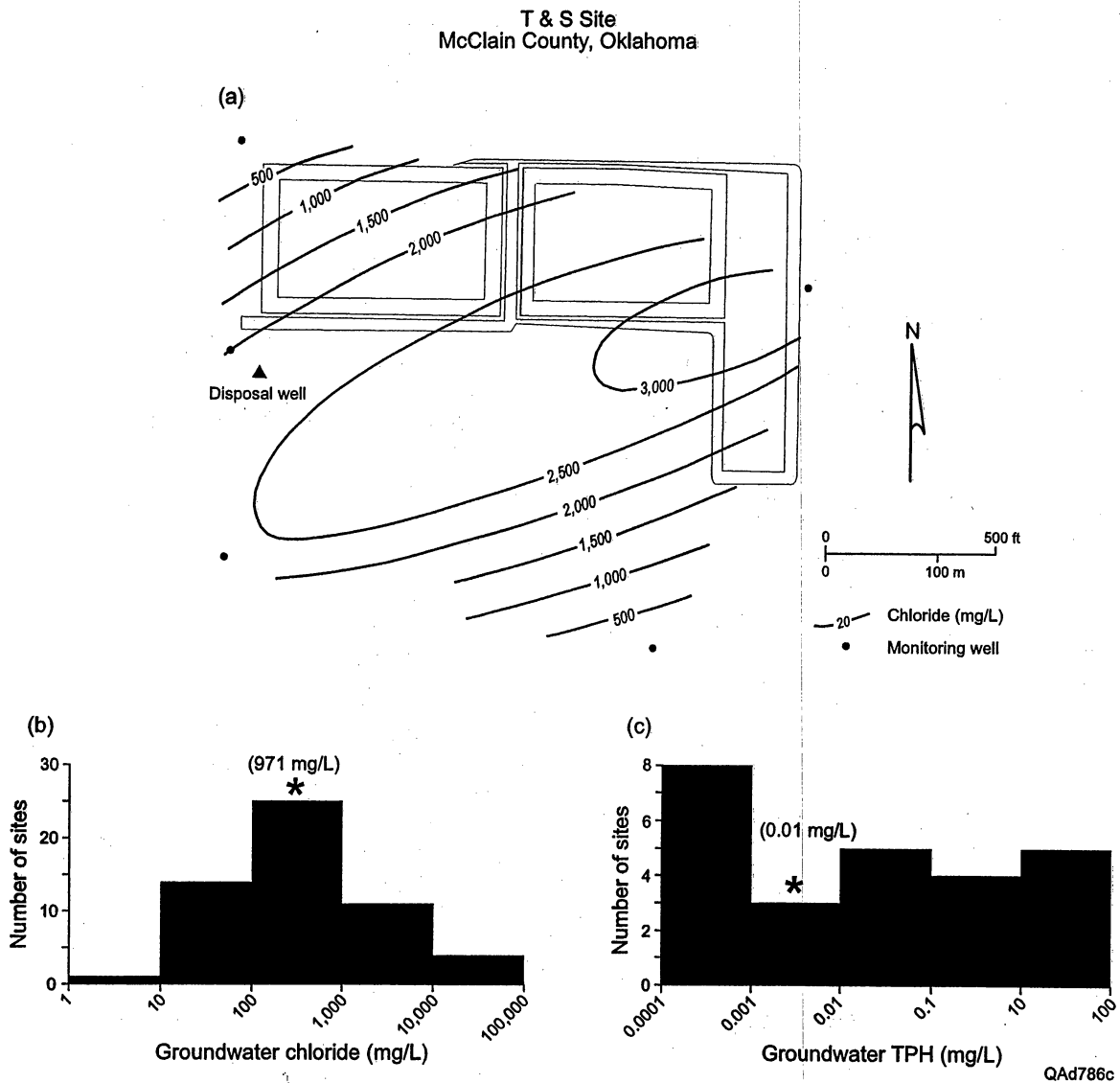


Figure 26. T & S site, McClain County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, and (c) mean TPH in groundwater. Histograms in (b) and (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for the T & S site. Mean concentration for site in parentheses.

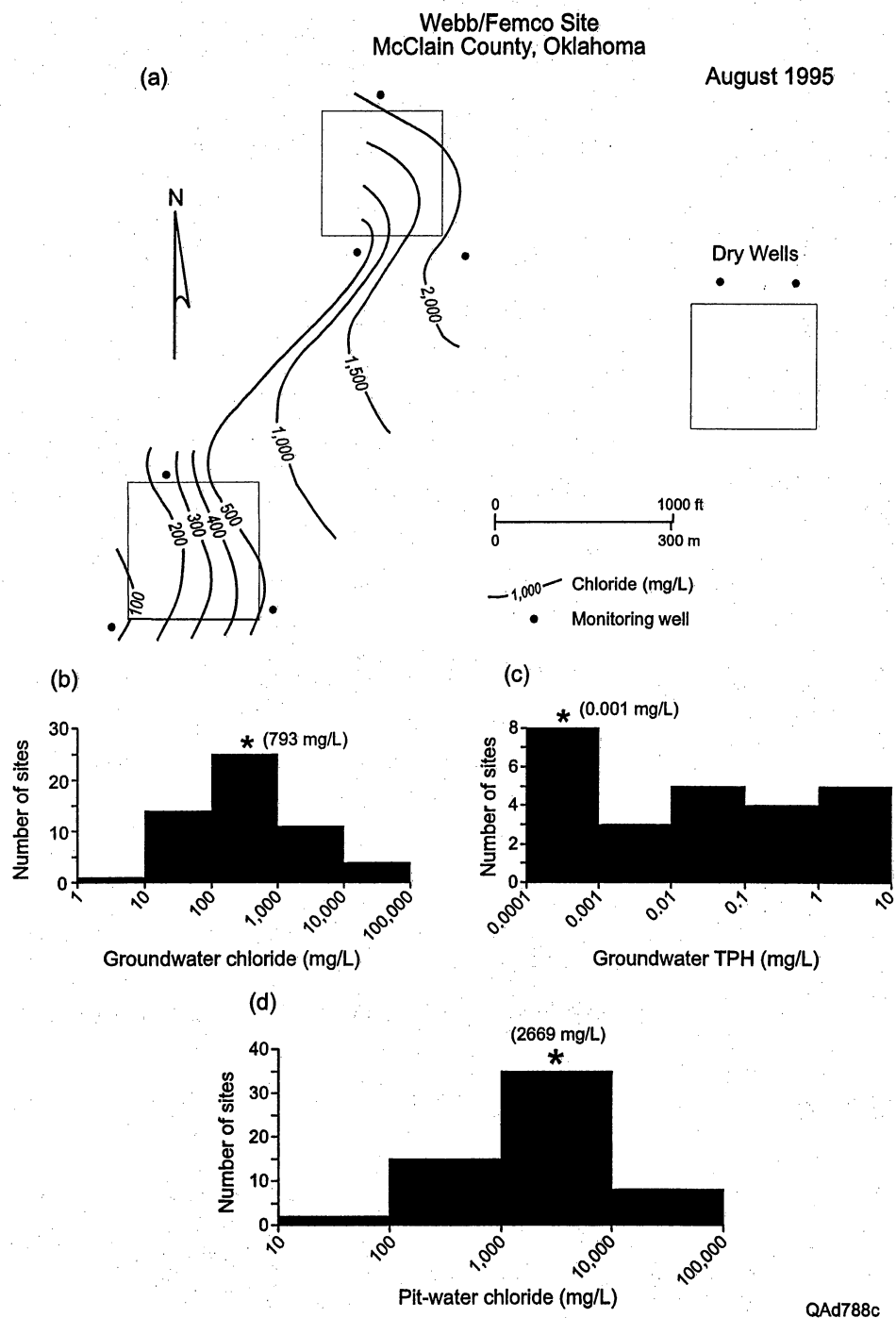


Figure 27. Webb/Femco site, McClain County, Oklahoma: (a) map shows distribution of chloride in groundwater. Histograms show (b) mean chloride in groundwater, (c) mean TPH in groundwater, and (d) mean chloride in pit water. Histograms in (b) to (d) for all sites in the study sample (fig. 4). Star (*) indicates mean for the Webb/Femco site. Mean concentration for site in parentheses.

Manvel Site
Brazoria County, Texas

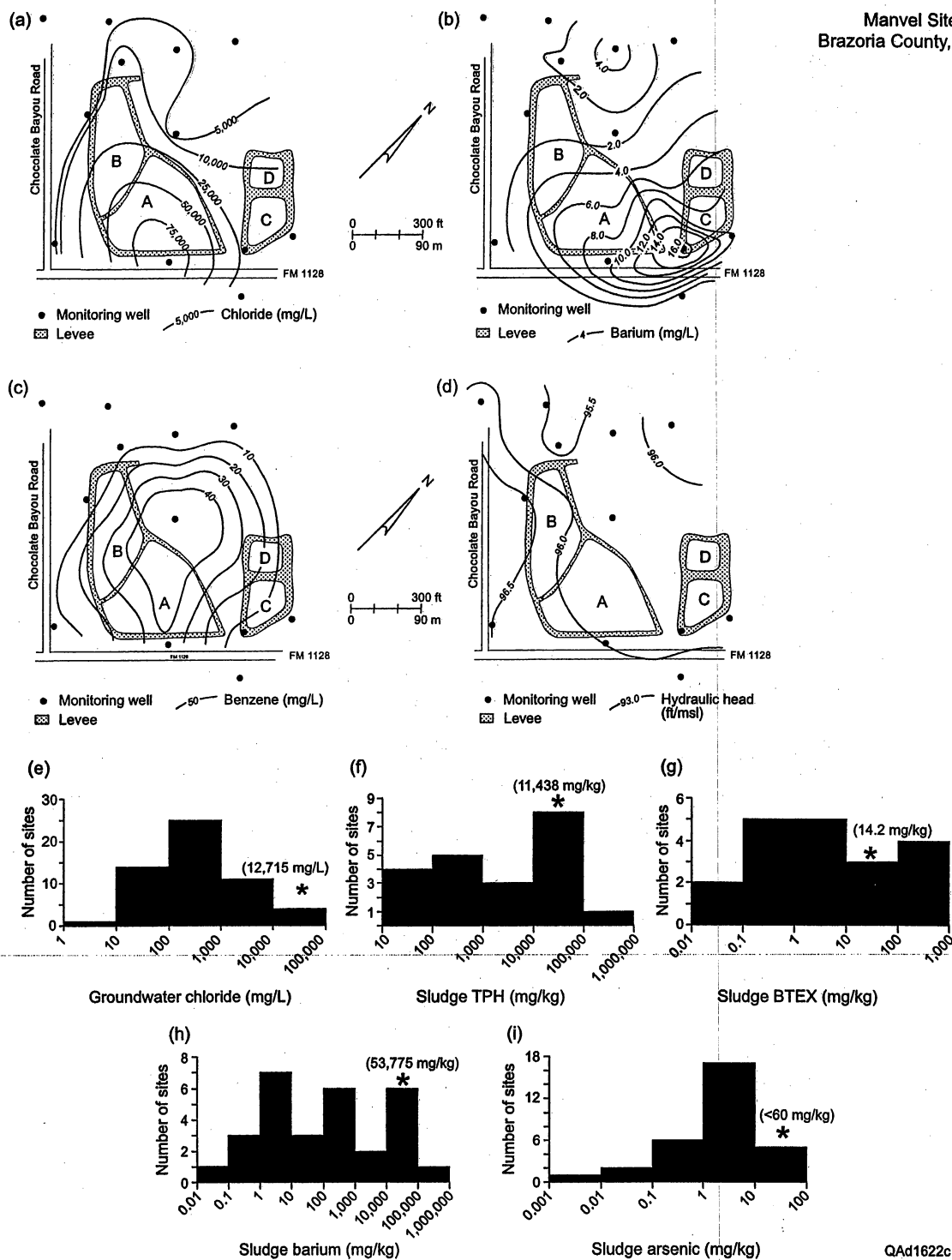
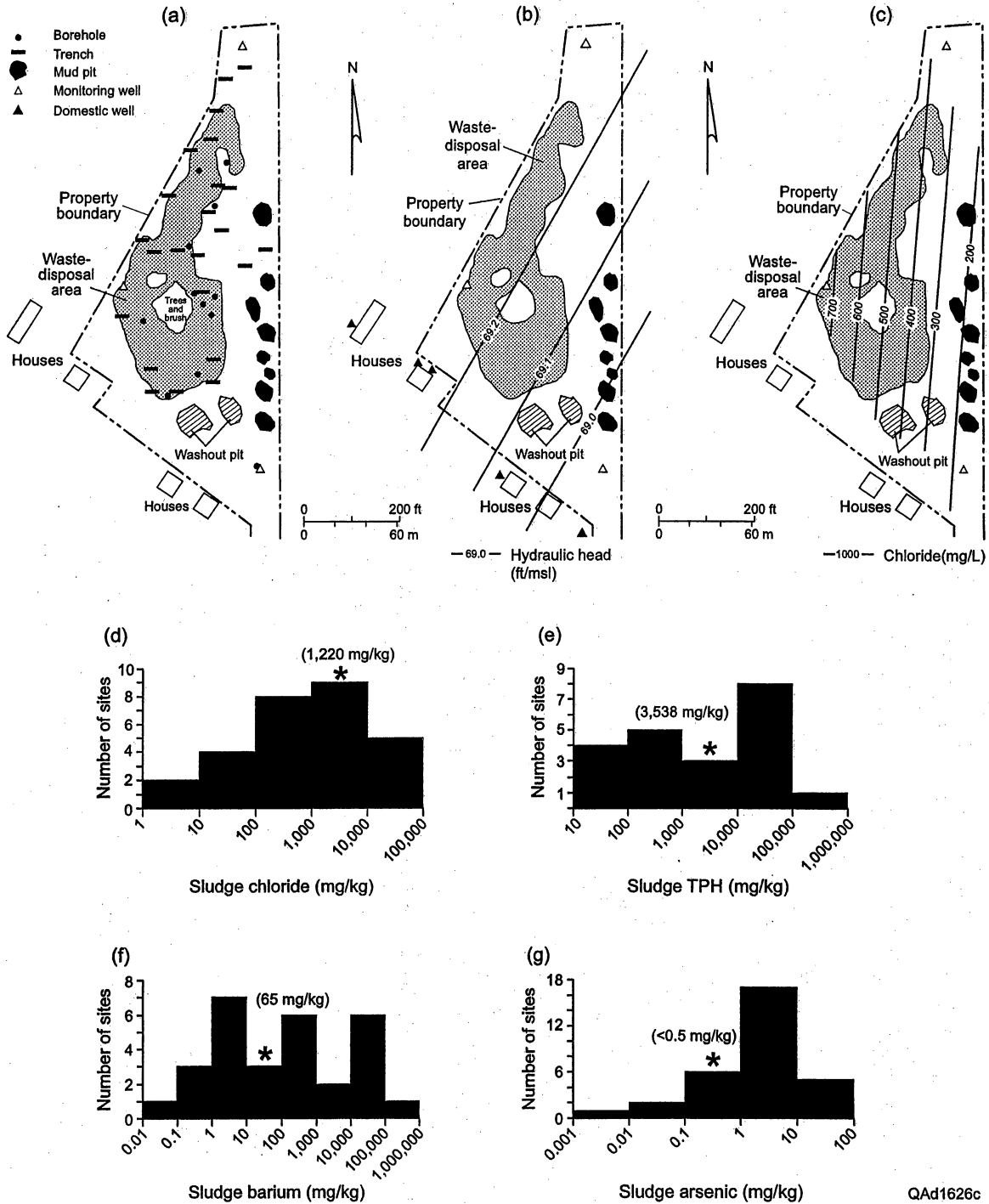


Figure 28. Manvel Saltwater Disposal site, Brazoria County, Texas: maps show (a) distribution of chloride in groundwater, (b) barium in groundwater, (c) benzene in groundwater, and (d) water levels. Histograms show (e) mean chloride in groundwater, (f) mean TPH in pit sludge, (g) mean BTEX in pit sludge, (h) mean barium in pit sludge, and (i) mean arsenic in pit sludge. Histograms in (e) to (i) for all sites in the study sample (fig. 4). Star (*) indicates mean for site. Mean concentration for site in parentheses.

Roeling Vacuum Site
Liberty County, Texas



QAd1626c

Figure 29. Roeling Vacuum site, Liberty County, Texas: maps of distribution of pits, sample locations, and other site elements, (b) water levels, and (c) chloride in groundwater. Histograms of (d) mean chloride in pit sludge, (e) mean TPH in pit sludge, (f) mean barium in pit sludge, and (g) mean arsenic in pit sludge; (d) to (g) for all sites in the study sample. * mean for Roeling Vacuum site; mean concentration in parentheses.

Steve's Oilfield Services
Kleberg County, Texas

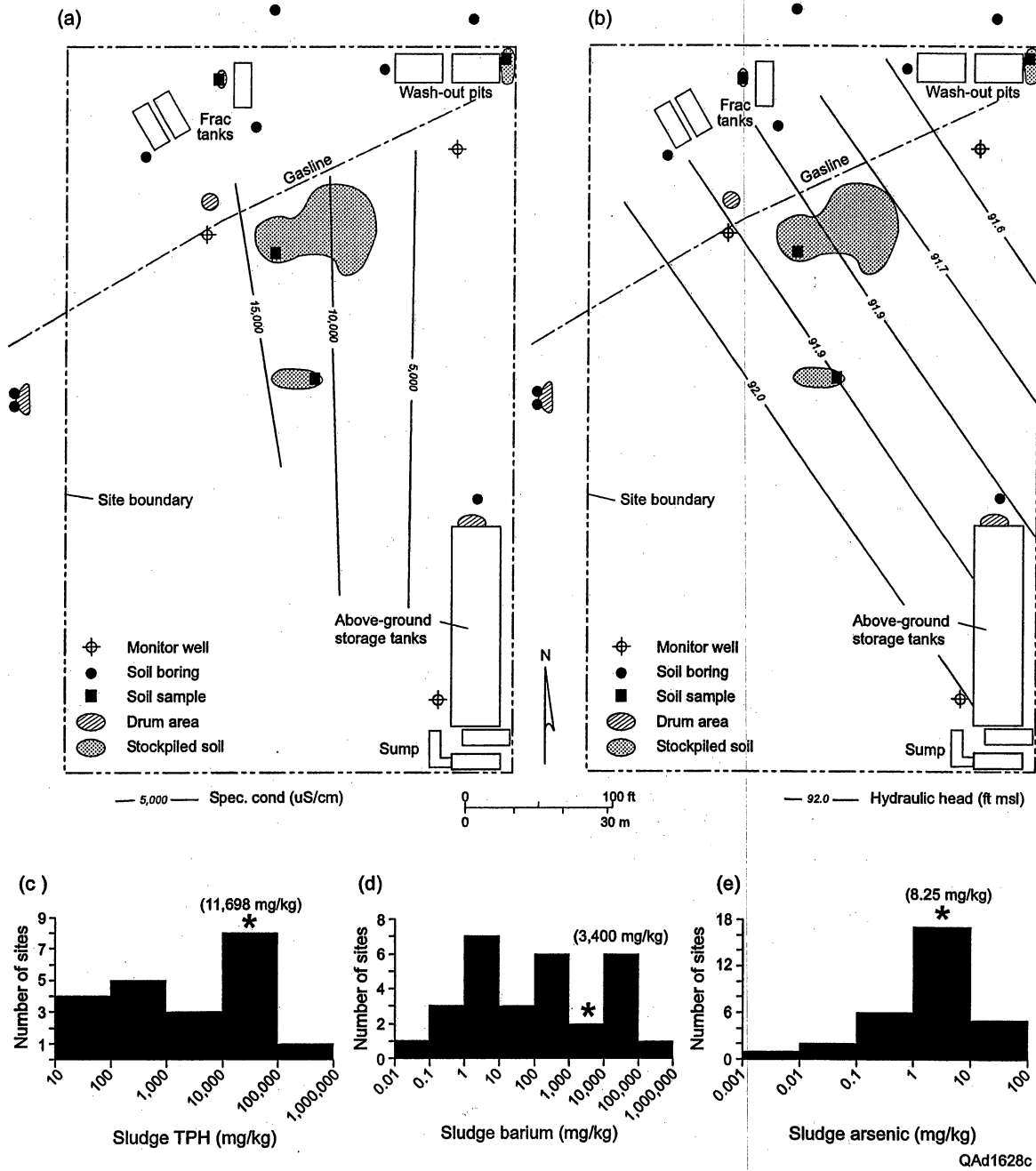


Figure 30. Steve's Oilfield Services site, Kleberg County, Texas: maps show (a) distribution of specific conductance in groundwater, and (b) water levels. Histograms show (c) mean TPH in sludge, (e) mean arsenic in pit sludge, (f) mean barium in pit sludge, and (g) mean arsenic in pit sludge. Histograms in (c) to (g) for all sites in the study sample (fig. 4). Star (*) indicates mean for Steve's site. Mean concentration for site in parentheses.

Rule Tank Trucks
Haskell County, Texas

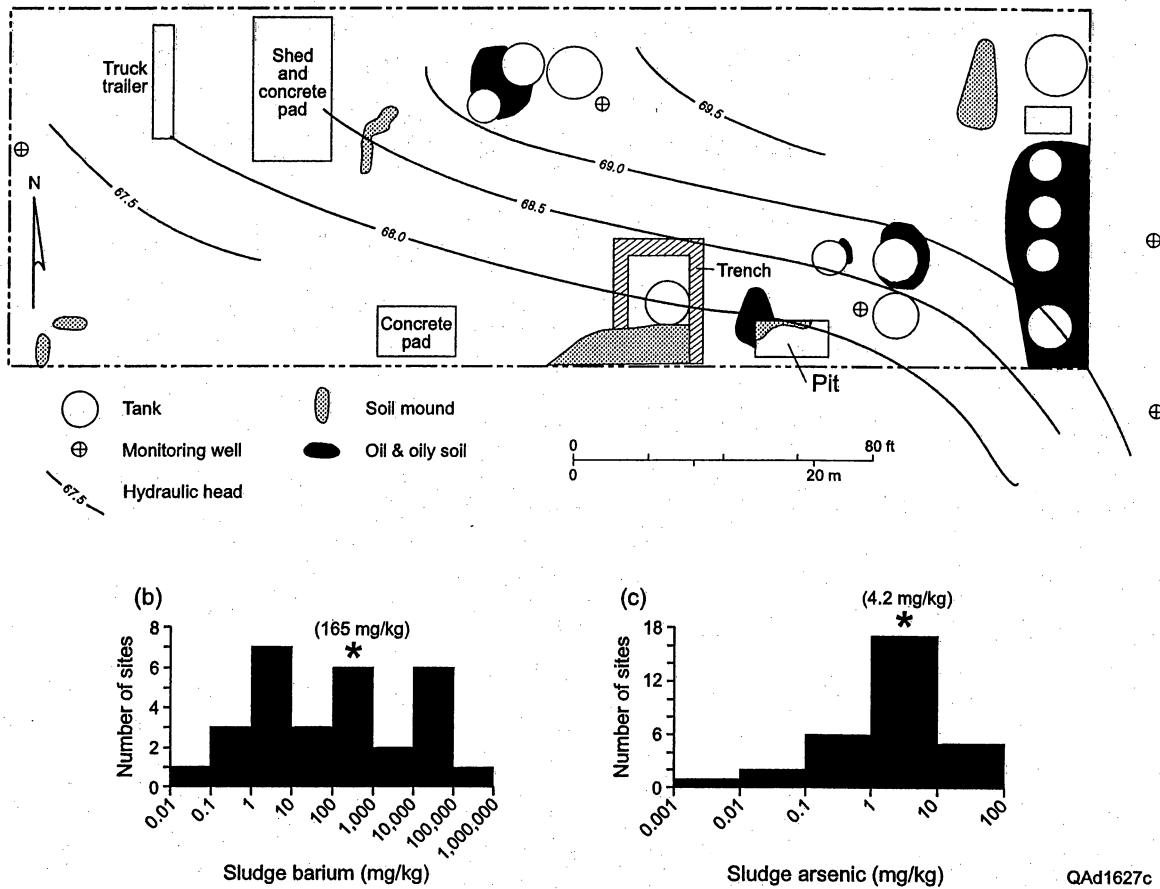


Figure 31. Rule Tank Trucks site, Haskell County, Texas: (a) map shows distribution of pits, oil-contaminated surface areas, water levels, and other site elements. Histograms show (b) mean barium in pit sludge and (c) mean arsenic in sludge. Histogram in (b) and (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for site. Mean concentration for site in parentheses.

Albany Tank Yard
Shackelford County, Texas

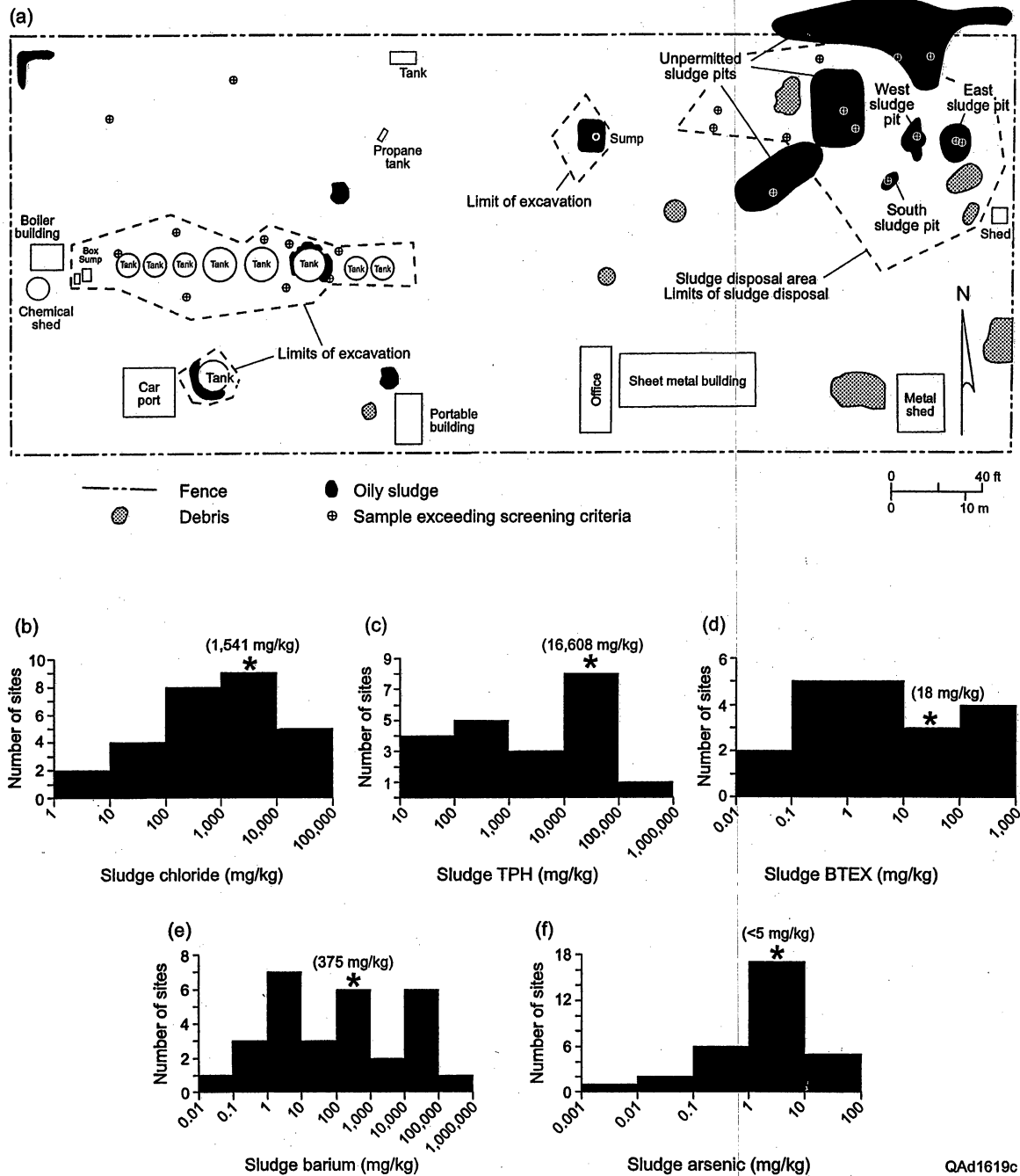


Figure 32. Albany Tank Yard site, Shackelford County, Texas: (a) map shows distribution of various elements of the facility, including pits and hydrocarbon contamination at the surface. Also shown are limits of remedial excavation of contaminated soils. Histograms show (b) mean chloride in sludge, (c) mean TPH in sludge, (d) mean BTEX in sludge, (e) mean barium in sludge, and (f) mean arsenic in sludge. Histograms in (b) to (f) for all sites in the study sample (fig. 4) Star (*) indicates mean for site. Mean concentration for site in parentheses.

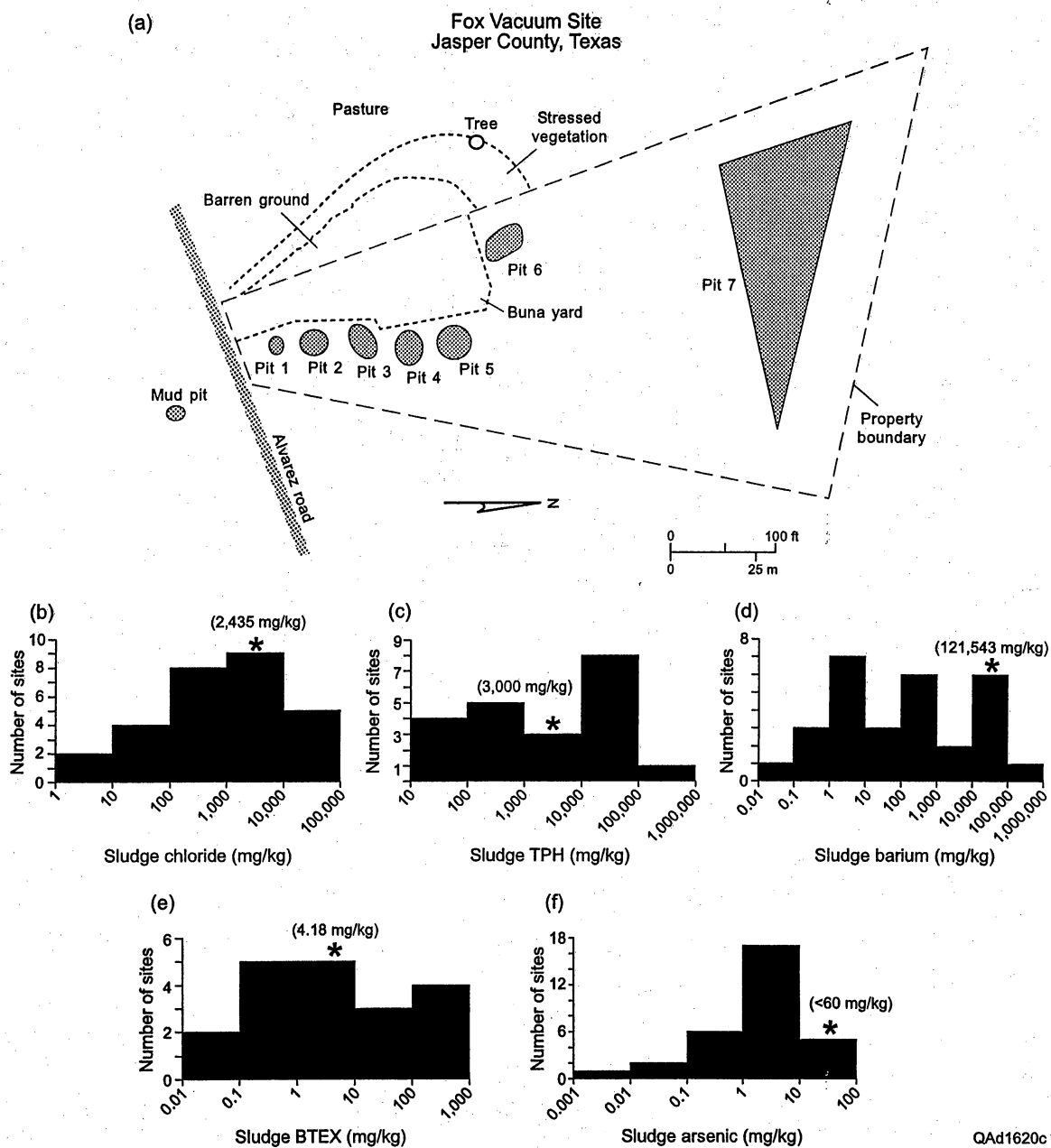
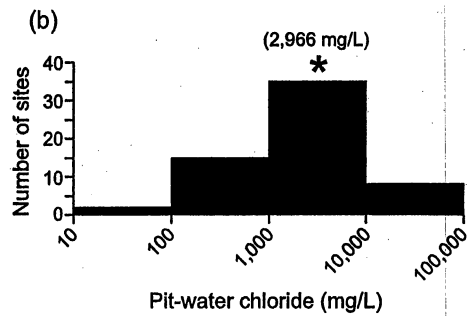
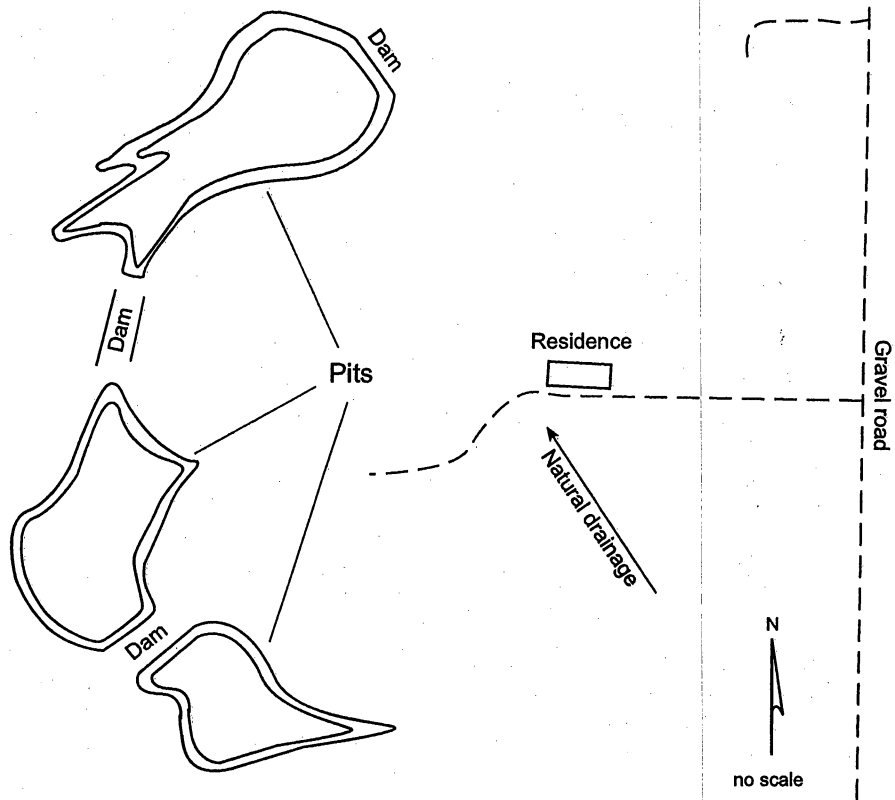


Figure 33. Fox Vacuum site, Jasper County, Texas: (a) map shows distribution of pits and area of barren soil. Histograms show (b) mean chloride in pit sludge, (c) mean TPH in pit sludge, (d) mean barium in pit sludge, (e) mean BTEX in pit sludge, and (f) mean barium in pit sludge. Histograms in (b) to (f) for all sites in the study sample (fig. 4). Star (*) indicates mean for site. Mean concentration for site in parentheses.

Gober Disposal Site
Wise County, Texas

(a)



QAd1621c

Figure 34. Gober Disposal site, Wise County, Texas: (a) map shows distribution of pits and natural direction of drainage. Histogram shows (b) mean chloride in pit water. Histogram in (b) for all sites in the study sample (fig. 4). Star (*) indicates mean for site. Mean concentration for site in parentheses.

Robert Munson Site
Burleson County, Texas

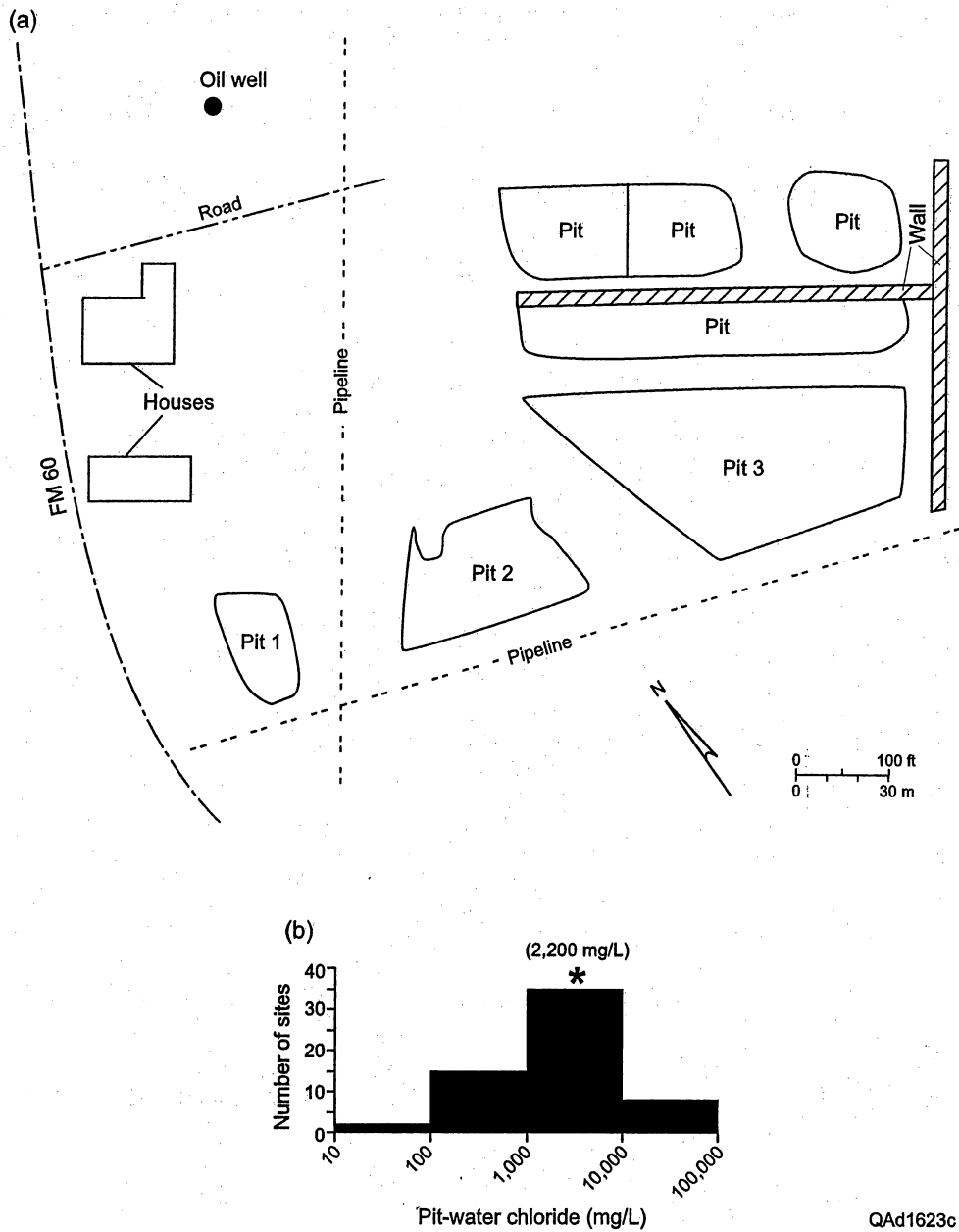


Figure 35. Robert Munson site, Burleson County, Texas: (a) map shows distribution of permitted pits (1, 2, and 3), non-permitted pits, and other site elements. Histogram shows mean chloride in pit water (b). Histogram in (b) for all sites in the study sample (fig. 4) Star (*) indicates mean for site. Mean concentration for site in parentheses.

Red River Oilfield Services
Wilbarger County, Texas

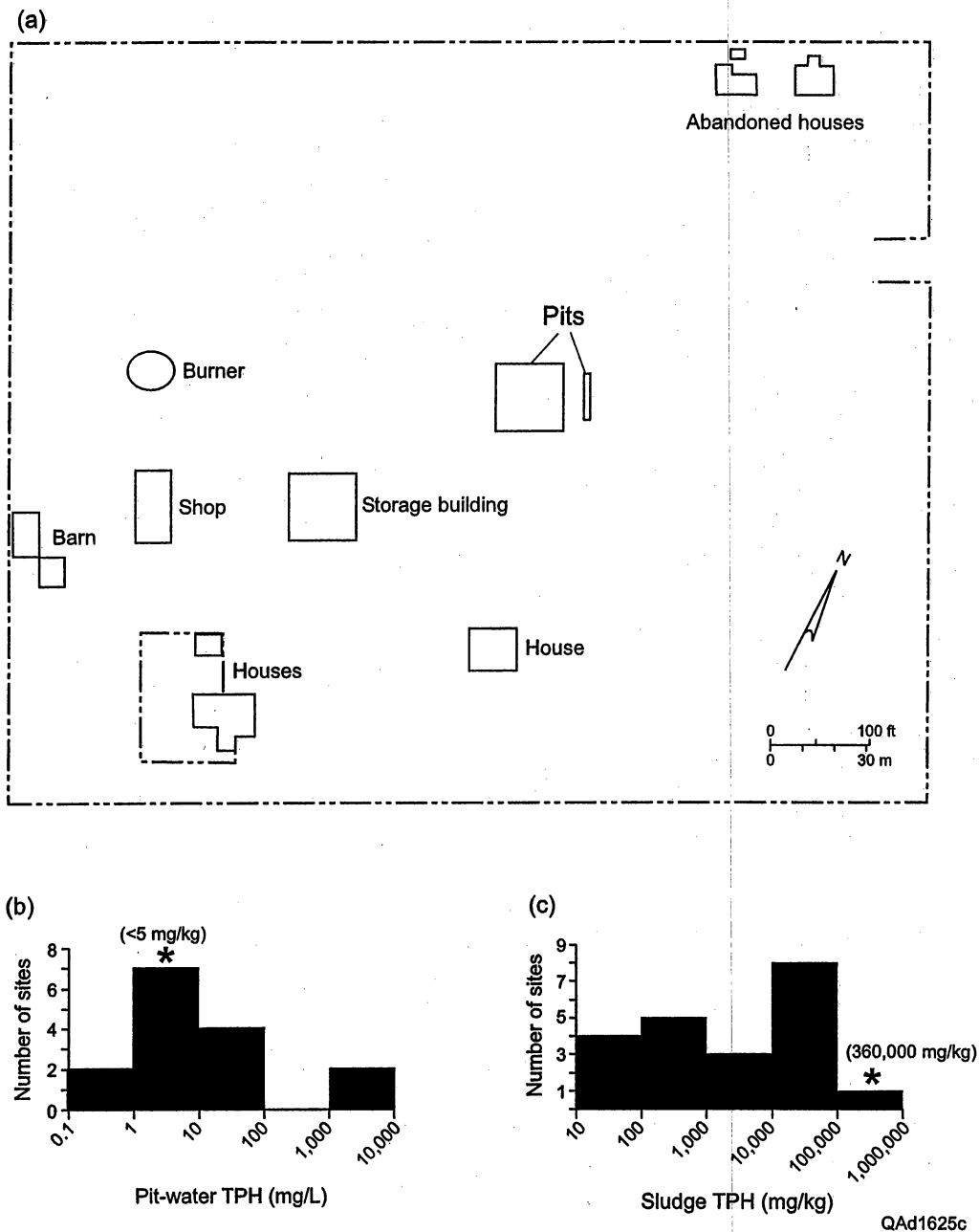


Figure 36. Red River Oilfield Services site, Wilbarger County, Texas: (a) map shows distribution of pits and other site elements. Histograms show (b) mean TPH in pit water and (c) mean TPH in sludge. Histogram in (b) and (c) for all sites in the study sample (fig. 4). Star (*) indicates mean for site. Mean concentration for site in parentheses.

Table 1. Data availability for drilling-fluid disposal sites in Louisiana, New Mexico, Oklahoma, and Texas.

Site summary

Number of sites in database:	286
Active as of January 2002:	55
Inactive as of January 2002:	197
Abandoned:	34
Disposal-pit facilities:	274
Land-treatment facilities:	12

Data summary

Data type	No. of sites providing data
No. of pits or no. of cells per site	218
Area of pits or cells	215
Site map	34
Monitor-well map	21
Pit or cell sludge analyses	62
Pit or cell (sump) water analyses	75
Analyses of chemical composition of groundwater	64
Groundwater level measurements	15
Monitoring-well time series data*	24
Waste volume received**	21
Geotechnical data (liner permeability)	16
Analytical methods specified	41
Abandoned-site assessment data	22
Abandoned-site remediation data	3

* Monitor-well time-series data include records collected for ≥ 2 yr

** Generally continuous record over several years

Table 2. Number of sites in database with records on chemical analyses of sludge, pit water, or groundwater. Listed by medium and constituent.

Constituent	Pit Sludge	Pit Water	Groundwater
Aluminum	4	3	2
Antimony	7	3	3
Arsenic	42	30	27
Barium	34	31	28
Beryllium	8	3	3
Bicarbonate	6	14	17
Boron	3	13	15
Cadmium	34	23	15
Calcium	18	20	22
Carbonate	6	12	12
Chloride	30	64	57
Chromium	42	33	26
Cobalt	2	3	2
Copper	10	3	4
Fluoride	1	1	1
Iron	9	10	5
Lead	40	25	28
Lithium	2	1	0
Magnesium	17	29	22
Manganese	8	7	5
Mercury	33	23	11
Molybdenum	2	1	0
Nickel	9	3	3
Nitrogen	3	15	17
Palladium	1	1	0
Phosphorus	2	1	0
Potassium	11	15	16
Rubidium	1	1	0
Selenium	33	17	11
Silver	31	22	9
Sodium	17	26	35
Strontium	2	1	1
Sulfate	10	18	22
Thallium	5	2	2
Thorium	1	1	0
Tin	2	3	1
Titanium	2	1	1
Uranium	1	1	0
Vanadium	4	3	2
Zinc	25	20	21
Zirconium	1	1	0
TPH	22	16	5
BTEX	3	0	2
Benzene	23	17	14
Toluene	22	17	14
Ethylbenzene	23	17	13
Xylene	20	16	13
VOC, SVOC	8	7	0
TOC	1	5	5
O&G	10	11	14
NORM	3	0	3
pH	NA	43	54
TDS	NA	35	44
Specific conductance	NA	17	28

Table 3. Comparison between authorized and abandoned sites for site-average concentrations of constituents in pit sludge and groundwater. Boldface type indicates average is greater than maximum average for active and inactive sites.

<u>Pit Sludge (mg/kg except pH)</u>						
	Active and inactive sites			Abandoned sites		
	No.	Range	Max Ave	No.	Range	Max Ave.
COC	-	NA	NA	-	NA	NA
pH	-	NA	NA	-	NA	NA
TDS	-	NA	NA	-	NA	NA
Arsenic	23	ND-49.3	49.3	19	ND-15.5	15
Barium	15	0.05-105,975	105,975	19	0.5-162,750	162,750
Cadmium	15	ND-11.27	11.27	19	ND-4.5	4.5
Chloride	18	4-41,504	41,504	11	36-6,007	6,007
Chromium	22	ND-139.7	139.7	20	ND-286	286
Lead	20	ND-145.4	145.40	20	ND-176.2	176.2
Mercury	17	ND-271	271	15	ND-2.1	2.1
Selenium	15	ND-68.01	68.01	18	ND-39.7	39.7
Silver	16	ND-1.913	1.913	15	ND-5.5	5.5
Zinc	10	ND-1,382	1,382	15	ND-842	842
TPH	7	<0.0002-3.246	3.246	16	ND-40,329	40,329
BTEX	1	0.158	0.158	3	6.5-25.1	25.1
Benzene	13	<0.0002-14.6	14.6	9	ND-2.1	2.1
Toluene	13	ND-46.6	46.6	8	ND-1,071	1,071
Ethylbenzene	13	ND-22.4	22.4	9	ND-3.1	3.1
Xylene	9	0.0002-28	28	12	ND-15.5	15.5

<u>Groundwater (mg/L except pH)</u>						
	Active and inactive sites			Abandoned sites		
	No.	Range	Max Ave	No.	Range	Max Ave.
COC	-	NA	NA	-	NA	NA
pH	45	6.7-12.2	12.2	9	6.2-8.1	8.1
TDS	35	9-33,658	33,658	9	130-18,730	18,730
Arsenic	18	ND-0.14	0.14	9	<0.005-0.02	0.02
Barium	19	0.22-2.4	2.4	9	0.073-3.6	3.6
Cadmium	6	0.003-5	5	9	<0.005-0.025	0.025
Chloride	47	7-54,247	54,247	10	125-13,859	13,859
Chromium	18	ND-16	16	8	<0.005-0.235	0.235
Lead	19	ND-0.49	0.49	9	<0.005-0.24	0.24
Mercury	3	<0.0001-0.09	0.09	8	<0.0005-0.002	0.002
Selenium	3	ND-0.104	0.104	8	<0.001-<0.1	<0.1
Silver	2	<0.002-0.003	0.003	7	<0.005-<0.02	<0.02
Zinc	16	0.01-95.6	95.6	5	0.04-0.24	0.24
TPH	3	0.043-0.138	0.138	2	ND-0.138	0.138
BTEX	0	NA	NA	2	ND-0.025	0.025
Benzene	11	ND-0.926	0.926	3	ND-0.019	0.019
Toluene	11	ND-0.557	0.557	3	ND-0.031	0.031
Ethylbenzene	11	ND-0.194	0.194	2	ND-0.004	0.004
Xylene	11	ND-0.082	0.082	2	ND-0.023	0.023

No. - Number of sites in database for which indicated analyses were available

NA - Not available

ND - Not detected

Table 4. Comparison of site-averages of waste and groundwater constituents to regulatory guidelines or limits (LAC, 1999; NMOCD, 1993; USEPA, 2000).

Constituent	LA	Solid E&P Waste (mg/kg)				
		No.*	NM**†	No.*	OK**††	No.*
pH	6 - 9	0	-	-	-	-
TDS	-	-	-	-	-	-
Chloride	-	-	-	-	-	-
Arsenic	10	4	-	-	-	-
Barium	20,000	6	-	-	-	-
Cadmium	10	2	-	-	-	-
Chromium	500	0	-	-	-	-
Iron	-	-	-	-	-	-
Lead	500	0	-	-	-	-
Manganese	-	-	-	-	-	-
Mercury	10	1	-	-	-	-
Selenium	10	2	-	-	-	-
Silver	200	0	-	-	-	-
Zinc	500	1	-	-	-	-
TPH	-	-	100-5,000‡	-	50	11
Benzene	-	-	10	2	0.5	9
Ethylbenzene	-	-	-	3	15	0
Toluene	-	-	-	4	40	1
Xylenes	-	-	-	1	200	0
BTEX	-	-	50	-	-	-

* Total number of sites in four-state study area for which data show results exceeding various standards

** For hydrocarbon-contaminated soils

† Target levels

†† Action levels

‡ Depends on proximity to water table, water sources, and surface water bodies.

Table 4 (cont.). Comparison of site-averages of waste and groundwater constituents to regulatory guidelines or limits

Constituent	EPA MCL	No.	<u>Groundwater (mg/L)</u>									
			EPA secondary standard	No.*	EPA USDW	No.*	LA	No.*	NM [†]	No.*	OK	No.*
pH	-	-	6.5 - 8.5	0	-	-	-	-	6 - 9	1	-	-
TDS	-	-	500	34	10,000	7	-	-	1,000	28	-	-
Chloride	-	-	250	26	-	-	-	-	250	18	-	-
Arsenic	0.05	1	-	-	-	-	0.05	1	0.1	1	-	-
Barium	2.0	3	-	-	-	-	2.0	3	1.0	7	-	-
Cadmium	0.005	3	-	-	-	-	0.005	3	0.01	3	-	-
Chromium**	0.1	3	-	-	-	-	0.18	3	0.05	2	-	-
Iron	-	-	0.3	5	-	-	-	-	1.0	4	-	-
Lead	0.015	3	-	-	-	-	0.015	3	0.05	6	-	-
Manganese	-	-	0.05	5	-	-	-	-	0.2	5	-	-
Mercury	0.002	1	-	-	-	-	0.002	1	0.002	1	-	-
Selenium	0.05	0	-	-	-	-	-	-	0.05	0	-	-
Silver	0.1	0	0.1	0	-	-	-	-	0.05	0	-	-
Zinc	-	-	5.0	2	-	-	1.1	3	10	1	-	-
TPH	-	-	-	-	-	-	-	-	-	-	2	0
Benzene	0.005	3	-	-	-	-	0.005	3	0.01	2	0.005	3
Ethylbenzene	0.7	0	-	-	-	-	0.7	0	0.75	0	0.7	0
Toluene	1.0	0	-	-	-	-	1.0	0	0.75	0	1.0	0
Xylenes	10	0	-	-	-	-	10	0	0.62	0	10.0	0

* Total number of sites in four-state study area for which data show results exceeding various standards

† Cleanup levels

** For Louisiana, 37 mg/L for Cr⁺³ and 0.18 for Cr⁺⁶. For New Mexico, 0.05 for total chromium

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Louisiana

Parish	Site	No. Pits	Pit Area (acres)	Pit Area (ft ²)	Status
Acadia	Chaddick	1	no data	no data	inactive
Acadia	Guillary	no data	no data	no data	inactive
Bossier	Folse Farms	no data	no data	no data	inactive
Cameron	Big Diamond	5	32.60	1,420,000	abandoned
Iberia	Waguespack	7	10.25	446,516	inactive
Jeff Davis	Castex	11	4.89	213,125	abandoned
St. Mary	Marine Vacuum	no data	no data	no data	inactive
St. Mary	Oil Base	1	no data	no data	inactive
St. Mary	Tidrow	1	no data	no data	inactive
Vermilion	Baudoin	1	no data	no data	inactive
Vermilion	Castex	11	4.89	213,125	abandoned
Vermilion	Gulf Coast Vacuum	no data	no data	no data	inactive
Vermilion	Leleux	no data	no data	no data	abandoned
Vermilion	Nunez	1	0.34	15,000	abandoned
Vermilion	PAB	4	9.37	408,000	abandoned
Vermilion	Tower	no data	no data	no data	abandoned
Vermilion	Fontenot	no data	no data	no data	abandoned
Vermilion	Pine	no data	no data	no data	abandoned
Vermilion	Simon	2	no data	no data	abandoned
Pointe Coupee	Romero	no data	no data	no data	inactive

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Louisiana (continued)

Land Treatment Facilities

Parish	Site	No. Cells	Cell Area (acres)	Cell Area (ft2)	Status
Bossier	Elm Grove	10	30.99	1,350,000	active
Bossier	Bossier Parish	10	no data	no data	active
Jeff Davis	Mermentau	25	107.90	4,700,000	active
Jeff Davis	Laccassine	11	136.59	5,950,000	inactive
Lafrouche	Bourg	23	79.43	3,460,000	active
Lafourche	Lafourche Constrn.	5	est 30.07	1,310,000 (est)	inactive
Pt. Coupee	Western Reliable	4	25.25	1,100,000	inactive
St. Landry	Mar Services	6	est 30.1	1,310,000	abandoned
St. Mary	Bateman Island	15	78.51	3,420,000	active

New Mexico

County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
Eddy	Laguna Quatro	4	2.50	108,900	inactive
Lea	Parabo	8	50.28	2,190,000	active
Lea	CRI Halfway	2	259.87	11,320,000	active
San Juan	Basin	18	6.17	268,800	inactive

Land Treatment Facilities

Lea	C & C Landfarm	9	217.63	9,480,000	active
Rio Arriba	TNT	6	no data	no data	active
San Juan	Tierra Crouch Mesa	14	72.08	3,140,000	active

Oklahoma

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
2	Blaine	BDK	4	22.96	1,000,000	inactive
2	Blaine	Southard	6	4.02	175,000	active
2	Blaine	Blehm	12	no data	no data	active
2	Bryan	Mitchell	no data	no data	no data	inactive
2	Canadian	Arrow 10-14-5	no data	no data	no data	inactive
2	Canadian	Arrow Tank Trucks	no data	no data	no data	active

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Oklahoma (continued)

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
2	Canadian	Courtney/Briggett	4	21.69	945,000	active
2	Canadian	FPC	5	10.23	445,625	active
2	Canadian	Scott, J.	3	9.80	427,000	active
2	Canadian	Samples	5	6.03	262,725	active
2	Canadian	Arrow/Calumet	7	2.59	112,750	inactive
2	Dewey	Richardson	4	4.39	191,250	inactive
2	Dewey	Day	2	0.69	30,000	inactive
2	Dewey	Day	2	0.69	30,000	active
2	Garfield	Gray Farms	7	12.72	554,000	inactive
2	Garfield	Gray	7	12.51	545,000	abandoned
2	Kingfisher	Great Basin	1	1.38	60,000	inactive
2	Major	Guard	3	28.01	1,220,000	active
2	Major	Bluff	3	14.08	613,320	active
2	Roger Mills	Trout	8	44.77	1,950,000	active
2	Roger Mills	Safe Earth	1	2.41	105,000	active
2	Woods	Lojo	no data	0.36	15,625	inactive
2	Woodward	Highfill	1	13.77	600,000	inactive
3	Beckham	Stowers 27-8-21	1	0.57	25,000	inactive
3	Beckham	Pettitt	no data	no data	no data	inactive
3	Beckham	Stowers 16-8-21	no data	no data	no data	inactive
3	Caddo	H. T. S.	1	2.37	103,125	abandoned
3	Caddo	Meeks	2	1.38	60,000	inactive
3	Caddo	Grenard	1	1.03	45,000	inactive
3	Caddo	Big Pasture	no data	no data	no data	inactive
3	Caddo	Big Pasture	no data	no data	no data	active
3	Caddo	Holderman	no data	no data	no data	inactive
3	Caddo	Triple S/Big Pastures	3	no data	no data	inactive
3	Carter	Suttles	2	51.65	2,250,000	abandoned
3	Carter	Walker	3	7.75	337,500	inactive
3	Carter	Hertzler 3-5-2	2	1.76	76,500	inactive

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Oklahoma (continued)

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
3	Carter	Hertzler 31-5-3	3	1.03	44,750	inactive
3	Carter	Hull 1-6-3	2	0.58	25,300	inactive
3	Carter	Hull 20-5-2	2	0.27	11,750	inactive
3	Carter	Kirk	5	no data	no data	inactive
3	Comanche	Shiflett	1	1.95	85,000	inactive
3	Comanche	Sullivan	no data	no data	no data	inactive
3	Garvin	Ball Ranch	4	9.37	408,000	inactive
3	Garvin	Peek & OMT	18	4.56	198,500	inactive
3	Garvin	S & M	6	1.62	70,500	abandoned
3	Garvin	Ferguson	1	0.17	7,500	inactive
3	Garvin	Pharoah	no data	no data	no data	inactive
3	Garvin	Eola	18	no data	no data	active
3	Garvin	Sable Mar	18	no data	no data	active
3	Grady	Giles	2	15.61	680,000	active
3	Grady	Gray	7	8.49	369,875	inactive
3	Grady	Washita	6	5.98	260,500	inactive
3	Grady	Bullard 28-3-7	4	1.86	80,900	inactive
3	Grady	Roadrunner	1	1.32	57,500	inactive
3	Grady	Falcon Ridge	no data	no data	no data	inactive
3	Grady	Moore	no data	no data	no data	inactive
3	Grady	Phelps	no data	no data	no data	inactive
3	Grady	Tash/Chitwood	6	no data	no data	inactive
3	Love	Scott, L.	2	3.96	172,500	inactive
3	Love	Bone 23-6-1	1	1.03	45,000	inactive
3	Love	Bone 15-7-2	1	0.69	30,250	inactive
3	Love	Banks	2	0.63	27,500	inactive
3	Love	Banks	2	0.63	27,500	active
3	Love	Smith, G.	1	0.52	22,500	active
3	Love	Buck	no data	no data	no data	inactive
3	Love	Ricketts	no data	no data	no data	inactive

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Oklahoma (continued)

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
3	McClain	Kelly	5	41.32	1,800,000	abandoned
3	McClain	Webb/Femco	5	11.94	520,000	active
3	McClain	S & K	3	11.08	482,500	inactive
3	McClain	York	6	7.49	326,250	abandoned
3	McClain	T&S	2	4.10	178,500	active
3	McClain	Hamilton	8	3.50	152,461	abandoned
3	McClain	A & A	2	no data	no data	inactive
3	McClain	Bebout & Albrect	no data	no data	no data	inactive
3	Stephens	Poteet	8	9.44	411,000	active
3	Stephens	Bullard 25-2-7	4	2.07	90,000	inactive
3	Stephens	Wright	1	1.43	62,500	inactive
3	Stephens	Getty	no data	no data	no data	inactive
4	Atoka	BC	5	7.85	342,100	inactive
4	Atoka	Mabray	4	1.72	74,750	inactive
4	Atoka	McAlister	no data	no data	no data	inactive
4	Haskell	Eastern Tank	1	2.20	96,000	inactive
4	Haskell	Bullard 21-8-22	1	0.75	32,500	inactive
4	Haskell	McCurtain	no data	no data	no data	inactive
4	Johnston	Stallings	no data	no data	no data	inactive
4	Latimer	Fluid Haulers 22-5-17	1	0.28	12,250	inactive
4	Leflore	Quick Lay Pipe	1	0.50	21,875	inactive
4	Marshall	Lee/Triple L	3	4.13	180,000	inactive
4	Marshall	Bullard 2-8-5	?	no data	no data	inactive
4	Pittsburg	Parent/Casey	3	7.23	315,000	inactive
4	Pittsburg	Smith & Williams	4	2.41	105,000	inactive
4	Pittsburg	Fluid Haulers 35-6-13	1	1.43	62,500	abandoned
2	Victoria	Superior Vacuum	1	0.31	13,600	inactive
4	Pittsburg	Fike	3	1.38	60,000	inactive
4	Pittsburg	Arrow 3-5-15	2	0.69	30,000	inactive
4	Pittsburg	Oilfield Services	3	0.46	19,875	inactive

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Oklahoma (continued)

	District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
4		Pittsburg	Sweetin & McAlister	no data	no data	no data	inactive
4		Pontotoc	Sutton	no data	no data	no data	inactive
4		Pottawatomie	O'Daniel	7	15.56	678,000	active
4		Pottawatomie	Merkel	12	6.71	292,500	abandoned
4		Pottawatomie	Little River Express	9	1.70	74,100	inactive
4		Seminole	Carr City	4	4.42	192,500	inactive

Texas

	District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
1		Dimmit	Wms Ranch/ Big Wells	1	0.08	3,500	inactive
1		Frio	Graham	1	0.03	1,350	inactive
2		Bee	Dahl	3	11.02	480,000	inactive
2		Burleson	Munson	5	1.89	82,300	abandoned
2		DeWitt	Koenig	1	2.48	108,000	inactive
2		Goliad	Curtis	1	0.92	40,000	inactive
2		Live Oak	R & L	1	0.26	11,500	inactive
2		Victoria	Superior Vacuum	1	0.31	13,600	inactive
3		Austin	A & R Lease	no data	no data	no data	inactive
3		Austin	Hardin-Raccoon Bend	1	0.06	2,800	inactive
3		Brazoria	Allstate Vacuum	no data	2.75	120,000	inactive
3		Brazoria	Amoco	no data	no data	no data	inactive
3		Brazoria	Bloodworth	no data	no data	no data	inactive
3		Brazoria	Industrial Vacuum	1	0.23	10,000	inactive
3		Brazoria	K-Mac Vacuum	no data	1.38	60,000	inactive
3		Brazoria	K-Mac Vacuum	no data	1.38	60,000	inactive
3		Brazoria	Lesiker	2	5.05	220,000	inactive
3		Brazoria	Manvel	4	4.17	181,448	abandoned
3		Brazoria	Miles	1	0.66	28,750	inactive
3		Brazoria	Mudx	4	7.18	312,595	inactive
3		Brazoria	Reid Vacuum	3	0.04	1,800	abandoned
3		Brazoria	Salt Water	2	0.11	4,968	inactive
3		Brazoria	Yelderman	1	0.67	29,200	inactive

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Texas (continued)

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
3	Brazos	Kurten Vacuum	2	0.04	1,600	inactive
3	Burleson	Groce	1	0.22	9,500	inactive
3	Burleson	Hayton	no data	no data	no data	inactive
3	Burleson	Hopkins	no data	0.92	40,000	inactive
3	Burleson	McDaniel	no data	no data	no data	inactive
3	Burleson	Munson	5	6.43	280,000	inactive
3	Burleson	Palestine Contractors	7	2.75	120,000	inactive
3	Burleson	Porter No. 1	1	0.25	11,000	inactive
3	Burleson	Porter No. 2	1	0.25	11,000	inactive
3	Burleson	S.A.P. Vacuum	2	0.09	3,900	inactive
3	Burleson	Vollentine	no data	no data	no data	inactive
3	Chambers	Dalley Vacuum	1	0.01	600	inactive
3	Chambers	Ogden	no data	no data	no data	inactive
3	Chambers	Trant	1	9	399,360	
3	Colorado	Lundy Vacuum	no data	no data	no data	active
3	Fayette	Donco Vacuum	1	no data	no data	inactive
3	Fayette	Leuders	2	no data	no data	inactive
3	Fayette	Mica	6	3.35	146,140	inactive
3	Ft. Bend	Payne	no data	4.13	180,000	inactive
3	Ft. Bend	Subterranean	no data	no data	no data	inactive
3	Galveston	Gulf Vacuum	no data	8.26	360,000	inactive
3	Hardin	National Vacuum	no data	no data	no data	inactive
3	Hardin	Silsbee Vacuum	no data	no data	no data	inactive
3	Hardin	Smart	no data	0.34	15,000	inactive
3	Hardin	Teffoil	1	0.05	2,000	inactive
3	Harris	House	2	22.96	1,000,000	inactive
3	Harris	Vaca	no data	no data	no data	inactive
3	Jasper	L & H	4	0.002	100	inactive
3	Jefferson	Environmental	1	3.49	152,100	inactive
3	Jefferson	Hendon	9	12.24	533,000	inactive
3	Jefferson	T & L Vacuum	1	0.06	2,500	inactive
3	Lee	Roeling Vacuum	8	0.02	760	abandoned

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Texas (continued)

	District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
3		Liberty	Johnston	no data	3.10	135,000	inactive
3		Liberty	Liberty Petroluem	8	0.08	3,560	inactive
3		Madison	Donoho	no data	no data	no data	inactive
3		Matagorda	Briggs	1	7.17	312,500	abandoned
3		Matagorda	Fox Vacuum	7	3.49	152,233	abandoned
3		Matagorda	Sidney	no data	no data	no data	inactive
3		Matagorda	Steve's	1	0.01	240	inactive
3		Newton	Hendon	1	12.05	525,000	inactive
3		Newton	Longhorn	1	0.34	15,000	active
3		Tyler	Bilco	no data	0.23	10,000	inactive
3		Waller	Richter	no data	no data	no data	inactive
3		Washington	Mo-Vac	no data	no data	no data	inactive
3		Wharton	Loise Vacuum	2	0.02	654	inactive
4		Cameron	West-Stinchcomb	1	19.61	854,208	active
4		Duval	Rancho Nuevo	1	1.93	84,000	active
4		Duval	Rancho Nuevo	1	1.17	50,960	active
4		Duval	S. R.	2	2.1	91,500	abandoned
4		Duval	S. Texas Disposal	3	7.09	308,750	inactive
4		Hidalgo	Cactus Land	1	0.23	10,000	inactive
4		Hidalgo	Evins	1	1.38	60,000	inactive
4		Hidalgo	Freeman	1	no data	no data	inactive
4		Hidalgo	Ganaway	2	12.02	523,750	active
4		Hidalgo	Garza	1	8.26	360,000	inactive
4		Hidalgo	Mo-Vac	1	1.03	45,000	inactive
4		Hidalgo	Mo-Vac	1	0.09	4,000	inactive
4		Hidalgo	Pool	1	6.20	270,000	inactive
4		Hidalgo	Smith	1	6.00	261,352	inactive
4		Hidalgo	Texan	1	0.21	9,216	inactive
4		Jim Hogg	MIR-TEX	2	0.20	8,800	inactive
4		Jim Wells	Alice	1	2.05	89,500	active
4		Jim Wells	Alice	1	0.34	15,000	inactive

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Texas (continued)

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
4	Jim Wells	Cadena Ranch	1	4.52	196,800	active
4	Jim Wells	Cadena Ranch	1	0.23	10,000	inactive
4	Jim Wells	Drilling	2	32.37	1,410,000	inactive
4	Jim Wells	Garcia	1	20.00	871,203	active
4	Jim Wells	Garcia	3	0.36	15,830	active
4	Jim Wells	Gwosdz	no data	no data	no data	inactive
4	Jim Wells	Koenig	1	1.15	50,000	inactive
4	Jim Wells	Mo-Vac	1	2.05	89,500	inactive
4	Jim Wells	Stubbs	2	0.38	16,600	inactive
4	Kleberg	Circle C Vacuum	1	3.67	160,000	inactive
4	Kleberg	Steve's	3	0.02	1,050	abandoned
4	Nueces	Coastal IV	1	1.27	55,350	inactive
4	Nueces	Coastal V	1	0.36	15,750	inactive
4	Nueces	Coastal VI	1	0.70	30,600	inactive
4	San Patricio	Alice	1	2.34	102,000	inactive
4	San Patricio	Havelka	1	no data	no data	inactive
4	San Patricio	Hunt	1	no data	no data	inactive
4	San Patricio	Hunt	no data	no data	no data	inactive
4	San Patricio	Hunt	1	no data	no data	inactive
4	San Patricio	Mires	1	no data	no data	inactive
4	San Patricio	Sorenson Ranch	1	9.66	420,750	inactive
4	Webb	Canyon	1	0.77	33,750	inactive
4	Webb	Delco	2	2.30	100,000	inactive
4	Webb	Lobo	6	19.40	847,000	abandoned
4	Zapata	ARCO/Marshall	1	1.95	85,000	inactive
4	Zapata	ARCO/Marshall	1	1.87	81,250	inactive
4	Zapata	Bustamante	1	5.17	225,000	active
4	Zapata	Chihuahua	1	0.6	26,600	inactive
4	Zapata	Falcon Lake	2	5.02	218,488	inactive
4	Zapata	Fresh	5	0.56	25,500	inactive
4	Zapata	Nano Ranch No. 2	1	1.84	80,000	active
4	Zapata	Thrash	1	0.02	750	active

Appendix A. Locations, names, numbers of pits or cells, total area per site of pits or cells, and operational status of CCDD sites in the database

Texas (continued)

District	County	Site	No. Pits	Pit Area (acres)	Pit Area (ft2)	Status
6	Rusk	McNeel	2	0.17	7,500	inactive
6	Rusk	McNeel	1	0.08	3,431	inactive
7B	Fisher	T. L. Carter	5	1.77	76,931	abandoned
7B	Haskell	RLA	2	0.01	360	inactive
7B	Haskell	Rule	1	?	?	abandoned
7B	Shackelford	Albany	?	?	?	abandoned
7B	Stephens	Walker-Caldwell	1	0.92	40,000	inactive
7B	Stephens	Walker-Caldwell	1	0.46	20,000	inactive
7C	Upton	M & T	3	5.77	251,464	inactive
7C	Upton	M & T	1	0.01	225	inactive
8	Borden	Westex/Sacroc	2	1.84	80,000	active
8	Ector	Westex Notress	8	9.33	406,250	active
8	Ector	Westex Notress	1	1.55	67,600	active
9	Ector	Wright	1	1.65	71,700	inactive
8	Howard	Dorland	15	0.26	11,335	inactive
8	Winkler	Massey	2	5.74	250,000	inactive
8	Winkler	Massey	1	0.92	40,000	inactive
8A	Borden	Williams	no data	0.69	30,000	active
8A	Borden	Williams	1	2.04	89,000	active
8A	Borden	Williams	1	2.04	89,000	active
8A	Borden	Williams B "DM-2"	1	5.17	225,000	active
8A	Borden	Williams/Gail	1	1.24	54,000	active
8A	Dawson	W.E.F.	1	0.0006	24	inactive
8A	Scurry	Midwestern Vacuum	10	0.34	15,000	inactive
8A	Yoakum	Kidd	no data	0.17	7,500	inactive
9	Jack	Collie	1	0.12	5,400	inactive
9	Montague	Nunneley	3	14.30	623,000	inactive
9	Montague	QOS	1	0.09	3,900	active
9	Wilbarger	Red River	2	0.02	755	abandoned
9	Wise	Gober	3	6.89	300,000	abandoned
9	Young	Yang	1	0.25	11,070	inactive

Appendix B. Data summaries for CCDD sites in the database

Site: Baudoin
Location: Vermillion Parish, LA
Status: Inactive
No. Pits: 1
Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH	2/80	1			2/80	1	6.8	6.8				
Calcium	2/80	1			2/80	1	60	60				
Chloride	2/80	1			2/80	1	1,100	1,100				

Site: Big Diamond
Location: Cameron Parish, LA
Status: abandoned
No. Pits: 5
Area: 32.6 acres (1.42 million ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH	7/90-6/98	49	6.35-8.23	7.80					11/88-5/98	9	5.64-6.72	6.17
Conductivity (µ)	7/90-6/98	27	1,200-30,000	7,674	7/90	1	4,110	4,110	11/88-5/98	19	1,420-27,300	9,329
TDS									11/88	11	858-18,407	6,439
Arsenic	8/87-6/98	55	0.113-8.824	0.93	7/90	1	1.46	1.46	11/88	11	<0.01-0.01	<0.01
Barium	8/87-6/98	60	220-59,950	16,048	7/90	1	44,556	44,556	11/88	11	<0.01-0.57	0.17
Cadmium	8/87-6/98	42	0-1.72	0.29	7/90	1	0.28	0.28	11/88	11	<0.01	<0.01
Calcium	8/87-7/90	9	317-1,580	909								
Chloride					7/90	9	14.8-3,700	1,552	11/88-5/98	28	36.7-10,847	3,195
Chromium	8/87-6/98	55	5.86-177.9	56.2	7/90	1	156.9	156.9	11/88	11	<0.01-0.06	0.02
Copper	8/87	6	1.54-3,020	1,036								
Iron	8/87	6	520-7,270	3,533								
Lead	8/87-6/98	28	0-165.7	43.3					11/88	11	0.06-0.57	0.24
Magnesium	8/87-7/90	9	49-1,020	448								
Manganese	8/87	6	25-380	91.6								
Mercury	8/87-6/98	55	<0.0001-0.99	0.22	7/90	1	0.11	0.11	11/88	11	<0.002-0.003	0.002
Nickel	8/87	6	1.73	14.2								
Palladium	5/98	26	0.65-165.7	37	7/90	1	98.5	98.5				
Selenium	7/90-6/98	48	0.2.89	0.34	7/90	1	0.27	0.27	11/88	11	<0.001	<0.001
Silver	7/90-6/98	29	0-0.43	0.06	7/90	1	0.03	0.03	11/88	11	<0.01	<0.01
Sodium	7/90	3	836-3,256						11/88	11	144-3,000	932
Zinc	8/87-6/98	60	3.46-489.5	106.8	7/90	1	99.87	99.87	11/88	11	<0.01-2.48	0.24
O&G (%)	8/87-6/98	45	0-7.15	0.96	7/90	1	7.0	7.0	11/88-5/98	19	0.9-4	1.64
Benzene									11/88	1	<0.001	<0.001
Toluene									11/88	1	<0.005	<0.005
Bbls. Rec'd	1978-84		789,620									

Site: Castex
Location: Jefferson Davis Parish, LA
Status: abandoned
No. Pits: 11
Area: 4.9 acres (213,125 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH	9/87-11/87	7	7.69-8.08	7.85					1/86-1/87	10	6.66-7.65	7.18
Conductivity (µ)	9/87-11/87	7	3,910-78,000	29,887					1/86-1/87	10	700-64,800	32,300
TDS									1/86-1/87	10	412-37,535	18,730
Arsenic	9/87-11/87	7	9.8-13.1	11.9								
Barium	9/87-11/87	7	9,800-13,200	11,468								
Cadmium	9/87-11/87	7	1.7-4.3	2.5								
Calcium	9/87-11/87	7	346.7-3,597	1130.8								
Chloride									10/82-6/87	14	100-22,867	13,859
Chromium	9/87-11/87	7	116-325	241.8								
Lead	9/87-11/87	7	72-252	176.2								
Magnesium	9/87-11/87	7	30.4-189.6	96.4								
Mercury	9/87-11/87	7	1.7-2.3	2.1								
Potassium	9/87	1	26	26								
Selenium	9/87-11/87	7	0.4-1.1	0.6								
Silver	9/87-11/87	7	1.9-2.4	2.1								
Sodium	9/87-11/87	7	430-5,956	3,246					1/86-1/87	10	81-14,120	6,341
Zinc	9/87-11/87	7	360-1,120	842.0								
Bbls. Rec'd	1982-84		75,000									

Appendix B. Data summaries for CCDD sites in the database

Site: Chaddick
Location: Acadia Parish, LA
Status: Inactive
No. Pits: 1
Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Arsenic	1/81	1	<0.01	<0.01								
Beryllium	1/81	1	<0.005	<0.005								
Chromium	1/81	1	<0.003	<0.003								
Lead	1/81	1	<0.01	<0.01								
Zinc	1/81	1	0.3	0.3								
Benzene	1/81	1	1.5	1.5								
Ethylbenzene	1/81	1	0.1	0.1								
Toluene	1/81	1	1.06	1.06								
Other: Cyanide	1/81	1	0.07	0.07								

Site: Folse Farms
Location: Bossier Parish, LA
Status: Inactive
No. Pits: NA
Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (ppm)	Avg	Dates	n	Range (ppm)	Avg
Chloride	1/82	1			1/82	1	422.5	422.5				

Site: Gulf Coast Vacuum
Location: Vermilion Parish, LA
Status: active
No. Pits: NA
Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Arsenic									4/93	1	0.005-0.099	0.052
Barium									4/93	1	0.06-0.29	0.17
Cadmium									4/93	1	0.001	0.001
Copper									4/93	1	0.005-0.085	0.045
Iron									4/93	1	0.01-8.26	4.14
Lead									4/93	1	0.004	0.004
Manganese									4/93	1	0.01-1.07	0.54
Zinc									4/93	1	0.003-1.24	0.61

Appendix B. Data summaries for CCDD sites in the database

Site:	Marine Vacuum												
Location:	St. Mary's Parish, LA												
Status:	Inactive												
No. Pits:	NA												
Area:	NA												
Medium		Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Antimony	1/80	1	1	13.3	13.3								
Arsenic	1/80	1	1	49.29	49.29								
Beryllium	1/80	1	1	182	182								
Cadmium	1/80	1	1	11,268	11,268								
Chromium	1/80	1	1	139,667	139,667								
Copper	1/80	1	1	42,787	42,787								
Lead	1/80	1	1	84.62	84.62								
Mercury	1/80	1	1	<0.002	<0.002								
Nickel	1/80	1	1	23,042	23,042								
Selenium	1/80	1	1	68.01	68.01								
Silver	1/80	1	1	1,913	1,913								
Thallium	1/80	1	1	<0.01	<0.01								
Zinc	1/80	1	1	382,273	382,273								
Benzene	1/80	1	1	14.6	14.6								
Ethylbenzene	1/80	1	1	22.4	22.4								
Toluene	1/80	1	1	46.6	46.6								
Other: Phenol	1/80	1	1	6.4	6.4								
Naphthalene	1/80	1	1	22	22								
Methyl Chloride	1/80	1	1	9.6	9.6								
Acenaphthene	1/80	1	1	7.9	7.9								
Acenaphthylene	1/80	1	1	6.9	6.9								
Site:	Mar-Low												
Location:	Acadia Parish, LA												
Status:	Inactive												
No. Pits:	NA												
Area:	NA												
Medium		Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH													
Conductivity (u)													
TDS													
Chloride													
Site:	Mud Pits												
Location:	Lafourche Parish, LA												
Status:	Inactive												
No. Pits:	NA												
Area:	NA												
Medium		Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Arsenic	9/80	1	1	5.86	5.86								
Copper	9/80	1	1	12.5	12.5								
Lead	9/80	1	1	38.25	38.25								
Benzene						9/80	2	0.96-153.2	77				
Ethylbenzene						9/80	2	0.1-69.8	35				
Toluene						9/80	2	0.95-361.5	181				

Appendix B. Data summaries for CCDD sites in the database

Site:	Nunez												
Location:	Vermilion Parish, LA												
Status:	abandoned												
No. Pits:	1												
Area:	0.34 acres (15,000 ft²)												
Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg	
Aluminum	4/90	1	14,400	14,400									
Antimony	4/90	1	<6	<6									
Arsenic	4/90	1	283	283									
Barium	4/90	1	186	186									
Beryllium	4/90	1	<1	<1									
Cadmium	4/90	1	<1	<1									
Calcium	4/90	1	1,520	1,520									
Chromium	4/90	1	16.8	16.8									
Cobalt	4/90	1	6.4	6.4									
Copper	4/90	1	8.3	8.3									
Iron	4/90	1	13,200	13,200									
Lead	4/90	1	7	7									
Magnesium	4/90	1	2,420	2,420									
Manganese	4/90	1	222	222									
Mercury	4/90	1	<0.1	<0.1									
Nickel	4/90	1	14.5	14.5									
Potassium	4/90	1	1,530	1,530									
Selenium	4/90	1	<1	<1									
Silver	4/90	1	<2	<2									
Sodium	4/90	1	648	648									
Thallium	4/90	1	<1	<1									
Vanadium	4/90	1	26.9	26.9									
Zinc	4/90	1	35.1	35.1									
Organics	4/90	1	nd	nd								nd	nd

Oil Base											
Site:	St. Mary's Parish, LA										
Location:	Inactive										
Status:	1										
No. Pits:	NA										
Area:	NA										
Medium	Pit Sludge			Pit Water			Groundwater				
	Dates	n	Avg Range (mg/kg)	Dates	n	Avg Range (mg/L)	Dates	n	Avg Range (mg/L)	Avg	
Antimony	6/80	1	<0.01								
Arsenic	6/80	1	0								
Beryllium	6/80	1	0								
Cadmium	6/80	1	<0.001								
Chromium	6/80	1	0								
Copper	6/80	1	0								
Lead	6/80	1	0								
Mercury	6/80	1	<0.002								
Nickel	6/80	1	<0.005								
Selenium	6/80	1	0								
Silver	6/80	1	<0.002								
Thallium	6/80	1	<0.01								
Zinc	6/80	1	0								
Benzene	6/80	1	<0.01								
Ethylbenzene	6/80	1	0								
Toluene	6/80	1	0								

Appendix B. Data summaries for CCDD sites in the database

Site: PAB
 Location: Vermillion Parish, LA
 Status: abandoned
 No. Pits: 4
 Area: 9.4 acres (408,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					10/80	1	7.3	7.30	10/80	2	6.9-7.1	7.00
Aluminum					10/80	1	0.24	0.24	10/80	2	<0.05	<0.05
Antimony	10/80	2	<7.3-<9	8.15	10/80	1	<0.02	<0.02	10/80	2	<0.02	<0.02
Arsenic	10/80	2	13.1-16.2	15	10/80	1	0.026	0.026	10/80	2	<0.01	<0.01
Barium					10/80	1	4.1	4	10/80	2	0.073-0.074	0.07
Beryllium	10/80	2	<14.6-<18	16	10/80	1	<0.02	<0.02	10/80	2	<0.002	<0.002
Boron					10/80	1	3.9	3.9	10/80	2	0.14-0.3	0.22
Cadmium	10/80	2	<14.6-<18	16	10/80-3/83	3	0.0001-0.049	0.016	10/80	2	<0.005	<0.005
Calcium					10/80	1	1,500	1500	10/80	2	33-36	34.5
Chloride					3/83	2	1982-2004	1993	10/80	2	38-212	125
Chromium	10/80	2	18.9-21.2	20	10/80-3/83	3	0.006-0.093	0.031	10/80	2	<0.01	<0.01
Cobalt					10/80	1	<0.01	<0.01	10/80	2	<0.01	<0.01
Copper	10/80	2	<14.6-<18	16	10/80	1	<0.011	<0.011	10/80	2	<0.01	<0.01
Fluoride					10/80	1	4.4	4.4	10/80	2	0.98-1	1
Iron					10/80	1	1.1	1.1	10/80	2	1.9-4.3	3.1
Lead	10/80	2	<21.9-<27	24	10/80-3/83	3	0.0002-0.039	0.0196	10/80	2	<0.04	<0.04
Magnesium					10/80	1	140	140	10/80	2	13	13
Manganese					10/80	1	0.083	0.083	10/80	2	0.26	0.26
Mercury					10/80	1	<0.001	<0.001	10/80	2	<0.001-0.0016	0.0013
Nickel	10/80	2	<14.6-<18	16	10/80	1	0.02	0.02	10/80	2	<0.02	<0.02
Nitrate					10/80	1	0.73	0.73	10/80	2	0.23-0.26	0.25
Selenium					10/80	1	0.086	0.086	10/80	2	<0.01	<0.01
Silver	10/80	2	<14.6-<18	16	10/80	1	<0.02	<0.02	10/80	2	<0.02	<0.02
Sodium					10/80	1	4,600	4,600	10/80	2	58-63	61
Sulfide					10/80	1	<0.05	<0.05	10/80	2	<0.05	<0.05
Thallium	10/80	2	<3.6-<4.5	4.10	10/80	1	0.24	0.24	10/80	2	<0.01	<0.01
Tin					10/80	1	0.68	0.68	10/80	2	0.04-0.047	0.04
Vanadium					10/80	1	0.09	0.09	10/80	2	0.01	0.01
Zinc	10/80	2	18.2-58.6	38.0000	3/83	2	0.0004-0.007	0.0007	10/80	2	0.011-0.26	0.14
TOC					10/80-3/83	3	2.5-44.5	24.2	10/80-3/83	4	<1-1.3	1.1
BTEX									10/80	2	nd	nd
Cyanide									10/80	2	<0.01	<0.01
bis(2-ethylhexyl)phthalate									10/80	3	nd-0.023	<0.023
Methyl Chloride									10/80	3	nd-0.025	<0.025
1,1,1-trichloroethane									10/80	3	nd-0.26	<0.26
Naphthalene	10/80	2	230-280	255								
C1 Naph., Iso 1	10/80	2	450-500	475								
C1 Naph., Iso 2	10/80	2	380	380								
C2 Naph., Iso 1	10/80	2	450-530	490								
C2 Naph., Iso 2	10/80	2	700-710	705								
C2 Naph., Iso 3	10/80	2	240-270	255								
C3 Naph., Iso 1	10/80	2	190-220	205								
C3 Naph., Iso 2	10/80	2	440-560	500								
C3 Naph., Iso 3	10/80	2	330-360	345								
C3 Naph., Iso 4	10/80	2	230-320	275								
C3 Naph., Iso 5	10/80	2	110-160	135								
Anphatic HC	10/80	2	major									
Kv (cm/s)			2E-5 - 1E-8									
Bbbs. Rec'd.	1978-83		>99,063									

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Appendix B. Data summaries for CCDD sites in the database

Site: Waguespack
 Location: Iberia Parish, LA
 Status: inactive
 No. Pits: 7
 Area: 10.25 acres (446,516 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH									5/84-8/94	56	6.27-7.68	7.10
Conductivity (μ)									5/84-8/94	56	300-2,420	991
TDS									5/84-8/94	56	15-1,644	374.00
Arsenic									8/92	8	0-0.005	0.001
Barium									8/92	8	0.057-1.16	0.66
Chloride					8/82-1/85	11	479-2,400	1,127	5/84-8/94	56	8-654	132.00
Chromium									8/92	8	0-<0.05	<0.05
Lead									8/92	8	<0.06	<0.06
Sodium									8/92	8	83-329	164.00
Zinc									8/92	8	0.009-0.094	0.03
O&G (%)									8/87-8/92	15	<1-6.25	2.29
Kv (cm/s)			6.9E-08-5.5E-09									

Site: Bateman Island Land Treatment
 Location: St. Mary's Parish, LA
 Status: active
 No. Cells: 15
 Area: 78.1 acres (3.4 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	7/99-4/00	39	7.4-8.7	8.00	7/99-5/00	32	7.4-8.7	7.60	7/99-5/00	80	6.2-7.6	6.9
Conductivity (μ)	7/99-4/00	39	3,100-59,000	18,692	7/99-5/00	32	400-88,000	11506	7/99-5/00	80	600-6,000	1,880
TDS					7/99-5/00	32	230-75,912	6476	7/99-5/00	80	72-3,620	1,273
Arsenic	7/99-4/00	39	2-3.5	2.83	7/99-5/00	32	<0.01	<0.01	7/99-5/00	80	<0.01	<0.01
Barium	7/99-4/00	39	541-160,409	86,322	7/99-5/00	32	<0.1-43.3	9.18	7/99-5/00	80	<0.1-2.4	0.67
Cadmium	7/99-4/00	39	0-0.8	0.41								
Chloride	7/99-4/00	39	14-635	99.5					7/99-5/00	80	43-2,526	544
Chromium	7/99-4/00	39	14-150	68.2	7/99-5/00	32	<0.05	<0.05	7/99-5/00	80	<0.05	<0.05
Lead	7/99-4/00	39	10-184	72.2	7/99-5/00	32	<0.05	<0.05	7/99-5/00	80	<0.05	<0.05
Mercury	7/99-4/00	39	0-0.9	0.45								
Selenium	7/99-4/00	39	0-0.9	0.2								
Silver	7/99-4/00	39	0-0.9	0.35								
Sodium									7/99-5/00	80	35-757	193
Zinc	7/99-4/00	39	15-333	133.6	7/99-5/00	32	<0.05	<0.05	7/99-5/00	80	<0.05	<0.05
O&G (%)	7/99-4/00	39	0.3-6.7	2.4	7/99-5/00	32	<1-24	2.8	7/99-5/00	80	<1-3	<1
TOC (%)	7/99-4/00	39	0.3-8.2	2.9								

Site: Bossier Parish Land Treatment
 Location: Bossier Parish, LA
 Status: active
 No. Cells: 10
 Area: NA

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH									8/99-4/00	20	6.73-7.89	7.13
Conductivity (μ)									8/99-4/00	20	1,000-1,700	1,310
TDS									8/99-4/00	20	644-1,300	8.93
Arsenic									8/99-4/00	20	<0.005	<0.005
Barium									8/99-4/00	20	<0.05-0.84	<0.005
Lead									8/99-4/00	20	<0.02-0.25	0.49
Sodium									8/99-4/00	20	71-128	0.03
Zinc									8/99-4/00	20	<0.02-0.2	95.6
O&G									8/99-4/00	20	<5	0.07

Appendix B. Data summaries for CCDD sites in the database

Site: Bourg Land Treatment
Location: Lafourche Parish, LA
Status: active
No. Cells: 18
Area: 78.5 acres (3.42 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	7/99-4/00	36	7.4-9.8	8.00	7/99-4/00	56	6.4-8.8	7.1	7/99-4/00	52	6.5-7.9	7
Conductivity (μ)					7/99-4/00	56	100-18,100	5241	7/99-4/00	52	800-780,000	18,894
TDS					7/99-4/00	56	23-7,840	2548	7/99-4/00	52	400-4,040	2,201
Arsenic	7/99-4/00	36	0.3-3.2	2.58					7/99-4/00	39	<0.01	<0.01
Barium	7/99-4/00	36	39,643-122,763	82,646	7/99-4/00	56	0.4-12.4	2.5	7/99-4/00	51	<0.05-3.6	1.4
Bicarbonate	7/99-4/00	36	24.4-79.3	49.8								
Cadmium	7/99-4/00	36	0.2-1.00	0.458								
Calcium	7/99-4/00	36	280.6-4,128.3	1,213								
Carbonate	7/99-4/00	36	0-24.0	4.1								
Chloride	7/99-4/00	36	993-33,002	4,043.1					7/99-4/00	52	32-2,663	1,274
Chromium	7/99-4/00	36	10-271	72.11	7/99-4/00	56	<0.05	<0.05	7/99-4/00	39	<0.05	<0.05
Lead	7/99-4/00	36	9-236	65.3	7/99-4/00	56	<0.05	<0.05	7/99-4/00	39	<0.05	<0.05
Magnesium	7/99-4/00	36	97.25-206	126.5								
Mercury	7/99-4/00	36	0.1-9	0.32								
Selenium	7/99-4/00	36	0-0.3	0.15								
Silver	7/99-4/00	36	0.3-0.8	0.36								
Sodium	7/99-4/00	36	759-16,069	1,999.5					7/99-4/00	52	25-1,596	695
Sulfate	7/99-4/00	36	1,056.7-4,130.6	2,265								
Zinc	7/99-4/00	36	12-357	128.1	7/99-4/00	56	<0.05	<0.05	7/99-4/00	39	<0.05	<0.05
O&G (%)	7/99-4/00	36	0.1-7.2	2.45	7/99-4/00	56	<1-68	4.2	7/99-4/00	52	<1-1	<1
TOC (%)	7/99-4/00	36	0-9	3								

Site: Elm Grove Land Treatment
Location: Bossier Parish, LA
Status: active
No. Cells: 10
Area: 31 acres (1.35 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	4/00	5	7.71-8.85	8.04					4/00	5	7.40-7.89	7.7
Conductivity (μ)	4/00	5	12,100-81,200	16,244					4/00	5	1,200-1,700	1,360
TDS									4/00	5	800-1,300	1,038
Arsenic	4/00	5	2.8-3.0	2.9								
Barium	4/00	5	61,000-122,345	89,451					4/00	5	0.05-0.82	0.37
Bicarbonate	4/00	5	0.38-0.70	0.57								
Cadmium	4/00	5	0.31-0.42	0.36								
Calcium	4/00	5	34.4-112.7	69.3								
Carbonate	4/00	5	0.0-22	0.06								
Chloride	4/00	5	63-190	123.0					4/00	5	100-325	200
Chromium	4/00	5	60.2-182.1	105.6					4/00	5	0-0.03	0.006
Lead	4/00	5	46.6-120.7	81.2					4/00	5	0-0.03	0.014
Magnesium	4/00	5	9.3-12.0	10.4								
Mercury	4/00	5	0.263-0.886	0.435								
Selenium	4/00	5	0.11-0.18	0.13								
Silver	4/00	5	0.28-0.39	0.31								
Sodium	4/00	5	55-167	99.7					4/00	5	83-128	104
Sulfate	4/00	5	41.7-67	54.9								
Zinc	4/00	5	111.0-461.5	229.4					4/00	5	0.02-0.14	0.06
O&G (%)	4/00	5	0.67-8.89	1.80					4/00	5	1-3	1.6
TOC (%)	4/00	5	0.79-4.45	2.1								

Appendix B. Data summaries for CCDD sites in the database

Site: Lacassine Land Treatment
Location: Jeff Davis Parish, LA
Status: Inactive
No. Cells: 11
Area: 136.6 acres (5.95 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	7/97-7/98	36			7/97-7/98	36	5.78-7.58	6.81	7/97-7/98	36	6.67-7.2	6.82
Conductivity (μ)									7/97-7/98	36	404-2,144	1,198
TDS	7/97-7/98	36					384-3,348	1,770	7/97-7/98	36	700-3,300	1703
Arsenic									7/97-7/98	27	<0.005	<0.005
Barium	7/97-7/98	36					<0.5-1.2	0.6	7/97-7/98	36	<0.5-0.8	<0.5
Chloride	7/97-7/98	36					0-1,330	566	7/97-7/98	36	310-950	338
Chromium									7/97-7/98	27	<0.02	<0.02
Lead	7/97-7/98	36					<0.01-0.07	0.02	7/97-7/98	36	<0.01-0.03	0.01
Sodium	7/97-7/98	36					86-739	355	7/97-7/98	36	78-401	183
Zinc	7/97-7/98	36					<0.02-0.6	0.06	7/97-7/98	36	<0.02-0.29	0.08
O&G (%)	7/97-7/98	36					<5	<5	7/97-7/98	36	<5	<5
Ra226 (pCi/l)									7/97-7/98	36	0-1.47	0.16
Ra228 (pCi/l)									7/97-7/98	36	0-1.11	0.10
Pb210 (pCi/l)									7/97-7/98	36	0-23	0.07

Site: Lafourche Construction (land treatment)
Location: Lafourche Parish, LA
Status: Inactive
No. Pits/Cells: 3/2
Area: 30.1 acres (1.31 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH									12/93	14	6.7-7.5	7.1
Conductivity (μ)									12/93	14	510-3,020	1,920
TDS									12/93	14	410-2,274	1,474
Arsenic									12/93	14	nd	nd
Barium									12/93	14	0.9-5.1	2.4
Chloride									12/93	14	42-696	354
Chromium									12/93	14	nd	nd
Lead									12/93	14	nd	nd
Sodium									12/93	14	27.5-379.3	179
Zinc									12/93	14	nd-2.32	0.29
O&G (%)									12/93	14	<1-1	<1

Site: MAR Services (land treatment)
Location: St. Landry Parish, LA
Status: abandoned
No. Cells: 6
Area: 30.1 acres (1.31 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH									10/63-12/90	251	10-9.7	7.41
TDS									10/63-12/90	229	9-73039	13,009
Cl									10/63-12/90	252	14-73,221	7,318
O&G (mg/L)									10/63-12/90	195	0.01-121	6.33
O&G (%)									10/63-12/90	195	<0.001	<0.001

Appendix B. Data summaries for CCDD sites in the database

Site: Mermentau Land Treatment
Location: Jeff Davis Parish, LA
Status: active
No. Cells: 25
Area: 107.9 acres (4.7 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	7/99-4/00	70	7.1-9.2	8.00					7/99-4/00	80	5.57-8.44	7.14
Conductivity (μ)	7/99-4/00	70	9,400-78,500	21,644					7/99-4/00	80	200-70,200	6,749
TDS									7/99-4/00	80	296-61,829	4,821
Arsenic	7/99-4/00	70	0.3-4.2	2.89					7/99-4/00	80	<0.03	<0.03
Barium	7/99-4/00	70	41,423-213,883	105,975					7/99-4/00	80	0.2-5.8	1.29
Bicarbonate	7/99-4/00	70	6.1-225.7	47.9								
Cadmium	7/99-4/00	70	0.3-0.9	0.5								
Calcium	7/99-4/00	70	220.4-8,563.1	1614.8								
Carbonate	7/99-4/00	70	0-96	7.59								
Chloride	7/99-4/00	70	1134-37,504	5,496.0					7/99-4/00	80	20-29,991	2,389
Chromium	7/99-4/00	70	16-331	105.4					7/99-4/00	80	<0.02-0.08	0.041
Lead	7/99-4/00	70	19-304	113.0					7/99-4/00	80	<0.02-0.41	0.05
Magnesium	7/99-4/00	70	77.8-899.6	175.7								
Mercury	7/99-4/00	70	0.1-2.3	0.54								
Selenium	7/99-4/00	70	0.1-3.7	0.3								
Silver	7/99-4/00	70	0.2-0.9	0.43								
Sodium	7/99-4/00	70	621-16,101	2459.5					7/99-4/00	80	18-38,119	1,856
Sulfate	7/99-4/00	70	1580-7498	2874								
Zinc	7/99-4/00	70	45-393	157.7					7/99-4/00	80	<0.02-1.14	0.26
O&G (%)	7/99-4/00	70	0.1-8.9	3.0					7/99-4/00	80	<5-5	<5
TOC (%)	7/99-4/00	70	0.1-12.2	3.1								

Site: Western Reliable Land Treatment
Location: Pointe Coupee Parish, LA
Status: inactive
No. Cells: 4
Area: 25.3 acres (1.1 million ft²)

Medium	Cell Sludge				Sump Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					3/99	4	6.8-7.0	6.90	3/99	11	6.9-7.2	7.10
Conductivity (μ)					3/99	4	2130-2640	2,235	3/99	11	677-2350	1,191
TDS					3/99	4	1160-17400	5,390	3/99	11	434-1300	689
Arsenic					3/99	4	<0.01	<0.01	3/99	11	<0.01-0.019	0.01
Barium					3/99	4	0.23-0.411	0	3/99	11	0.18-0.551	0
Chloride					3/99	4	292-372	326.0	3/99	11	10.6-399	120
Chromium					3/99	4	<0.01	<0.01	3/99	11	<0.01	<0.01
Lead					3/99	4	<0.0003	<0.0003	3/99	11	<0.003	<0.003
Sodium					3/99	4	109-250	164	3/99	11	34-87.9	51
Zinc					3/99	4	<0.02	<0.02	3/99	11	0-0.14	0.01
O&G					3/99	4	<5	<5	3/99	9	<5-8	5.50

Site: Basin
Location: San Juan Co., NM
Status: active
No. Pits: 2
Area: 6.17 acres (268,800 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					2/86-9/92	18	7.2-9.2	8.5				
TDS					2/86-9/92	9	9,615-38,000	18,939				
Arsenic					9/92	4	0.008-0.062	0.0155				
Barium					2/86-9/92	6	<0.1-2.1	0.62				
Cadmium					2/86-9/92	5	<0.1	<0.1				
Chloride					2/86-9/92	10	3,026-20,600	7998.5				
Chromium					2/86-9/92	6	<0.1	<0.1				
Lead					2/86-9/92	6	<0.1	<0.1				
Mercury					9/92	2	<0.0005	<0.0005				
Selenium					9/92	4	<0.005-<0.025	<0.005				
Silver					2/86-9/92	6	<0.1	<0.1				
Zinc					2/86-9/92	6	<0.1	<0.1				
TPH					2/86-9/92	13	700-26,700	7619				
Benzene	4/98	18	<0.05	<0.05	2/86-9/92	10	0.036-0.59	0.4274				
Ethylbenzene	4/98	18	<0.05	<0.05	2/86-9/92	8	ND-0.34	0.086				
Toluene	4/98	18	<0.05-0.09	0.04	2/86-9/92	12	0.057-5.7	1.14				
Xylene	4/98	18	<0.1-0.67	0.16	2/86-9/92	12	0.006-3.45	0.65				

Appendix B. Data summaries for CCDD sites in the database

Site:	CRI Halfway			
Location:	Lea Co., NM			
Status:	active			
No. Pits:	2			
Area:	259.9 acres (11.3 million ft ²)			
Medium	PI Sludge			
	Dates	n	Range (mg/kg)	Avg
TDS	7/00	4	<5-66	19.5
Conductivity	7/00	4	<5-410	163.3
Arsenic	7/00	4	<2-2.7	1.43
Barium	7/00	4	<5-70	21.5
Cadmium	7/00	4	8.9-155	59.7
Chloride	7/00	4	<0.19-3.37	0.84
Chromium	7/00	4	<5	<5
Lead	7/00	4	<2	<2
Mercury	7/00	4	<0.02-0.44	0.36
Selenium	7/00	4	0.14-30	8.14
Silver	7/00	4	<0.02-0.62	0.61
Benzene	7/00	4	<0.02-1.74	0.68
Toluene	7/00	4		
Ethylbenzene	7/00	4		
Xylene	7/00	4		
Site:	Laguna Quatro			
Location:	Eddy Co., NM			
Status:	Inactive			
No. Pits:	4			
Area:	2.5 acres (106,900 ft ²)			
Medium	PI Sludge			
	Dates	n	Range (mg/kg)	Avg
pH	8/91	9	1.47-5.52	3.3
TDS	8/91	9		
Arsenic	8/91	9		
Barium	8/91	9		
Cadmium	8/91	9		
Chromium	8/91	9		
Lead	8/91	9		
Mercury	8/91	9		
Selenium	8/91	9		
Silver	8/91	9		
Zinc	8/91	9		
TPH	11/95	1		
Benzene	8/91	6		
Toluene	8/91	6		
Ethylbenzene	8/91	6		
Xylene	8/91	6		
Medium	PI Water			
	Dates	n	Range (mg/L)	Avg
pH	10/91	2		
TDS	10/91	2		
Arsenic	10/91	2		
Barium	10/91	2		
Cadmium	10/91	2		
Chromium	10/91	2		
Lead	10/91	2		
Mercury	10/91	2		
Selenium	10/91	2		
Silver	10/91	2		
Zinc	10/91	2		
TPH	10/91	2		
Benzene	10/91	2		
Toluene	10/91	2		
Ethylbenzene	10/91	2		
Xylene	10/91	2		
Medium	Groundwater			
	Dates	n	Range (mg/L)	Avg
pH	2/90	2		
TDS	2/90	2		
Arsenic	2/90	2		
Barium	2/90	2		
Cadmium	2/90	2		
Chromium	2/90	2		
Lead	2/90	2		
Mercury	2/90	2		
Selenium	2/90	2		
Silver	2/90	2		
Zinc	2/90	2		
TPH	2/90	2		
Benzene	2/90	2		
Toluene	2/90	2		
Ethylbenzene	2/90	2		
Xylene	2/90	2		

Appendix B. Data summaries for CCDD sites in the database

Parabo													
Site:	Lea Co., NM												
Location:	active												
Status:	8												
No. Pits:	50.3 acres (219 million ft ²)												
Area:													
	Pit Sludge				Pit Water				Groundwater				
Medium	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg	
Arsenic	1/99	7	2.7-16.3	8.07					1/99	5	0.0238-0.222	0.14032	
Barium	1/99	7	239-2,570	951					1/99	5	0.454-3.6	1.8988	
Cadmium	1/99	7	<0.04-0.25	0.11					1/99	5	<0.0006-0.0031	0.0016	
Chloride									1/99	32	75-157,260	35,768	
Chromium	1/99	7	6.3-34	17.06					1/99	5	0.0217-0.0637	0.0474	
Lead	1/99	7	7.1-232	97.6					1/99	5	<0.0047-0.027	0.01244	
Mercury			<0.05-1.7	0.89					1/99	5	<0.0001	<0.0001	
Selenium									1/99	5	0.0389-0.175	0.10432	
Silver									1/99	5	<0.0014-0.005	0.00268	
Benzene									1/99	5	0.42-1.7	0.926	
Toluene									1/99	5	0.007-1.4	0.5574	
Ethylbenzene									1/99	5	0.12-0.29	0.194	
Xylene									1/99	5	0.14-0.59	0.0816	

C & C Landfarm			
Site:	Lea Co., NM		
Location:	active		
Status:	9		
No. Cells:	217.6 acres (9.48 million ft ²)		
Area:			

Site:	C & C Landfarm												
Location:	Lea Co., NM												
Status:	active												
No. Cells:	9												
Area:	217.6 acres (9.48 million ft ²)												
Medium	Cell Sludge					Sump Water			Groundwater				
	Dates	n	Range (mg/kg)	Avg		Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/kg)	Avg
Arsenic	5/93	1	0.003	0.003									
Barium	5/93	1	0.2	0.2									
Cadmium	5/93	1	<0.005	<0.005									
Calcium	5/93	1	56	56									
Chloride	5/93	1	20	20									
Chromium	5/93	1	<0.05	<0.05									
Lead	5/93	1	<0.1	<0.1									
Magnesium	5/93	1	44	44									
Mercury	5/93	1	<0.008	<0.008									
Selenium	5/93	1	0.003	0.003									
Silver	5/93	1	<0.01	<0.01									
Sulfate	5/93	1	55	55									
TPH	5/98	10	16.4-62.4	29.8									
Benzene	5/99	10	<0.002	<0.002									
Toluene	5/99	10	<0.002	<0.002									
Ethylbenzene	5/99	10	<0.002	<0.002									
Xylene	5/99	10	<0.006	<0.006									

Site: Tierra Crouch Mesa Land Treatment													
Location: San Juan Co./Jan Co., NM													
Status: active													
No. Cells: 14													
Area: 72.1 acres (3.14 million ft ²)													
Medium	Cell Sludge					Sump Water			Groundwater				
	Dates	n	Range (mg/kg)	Avg		Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Arsenic	6/98	14	ND	ND									
Barium	6/98	14	8.1-37.3	39.8									
Cadmium	6/98	14	ND										
Calcium	6/98	14											
Chloride	6/98	14											
Chromium	6/98	14	1.88-3.79	2.66									
Lead	6/98	14	6.37-12.1	8.56									
Magnesium	6/98	14	ND	ND									
Mercury	6/98	14	ND	ND									
Potassium	6/98	14	ND	ND									
Selenium	6/98	14	ND	ND									
Silver	6/98	14	ND	ND									
Sulfate	6/98	14											
TPH	6/98	13	ND-1.2	0.45									
BTEX	6/98	15	ND-0.047	0.158									
Benzene	6/98	18	ND	0.048									
Toluene	6/98	18	ND	0.008									
Ethylbenzene	6/98	18	ND-0.056	0.011									
Xylene	6/98	18	ND-0.452	0.065									

Appendix B. Data summaries for CCDD sites in the database

TNT Land Treatment										
Site:	Location: Rio Arriba Co., NM									
Status:	active									
No. Cells:	6									
Area:	NA									
Medium	Dates	n	Cell Sludge Range (mg/kg)	Avg	Dates	n	Sludge Water Range (mg/L)	Avg	Dates	n
pH	7/88-2/99	6		8.19	7/88-2/99	6	7.7-8.9	8.19	8/91	4
TDS	7/88-2/99	7		40,669	7/88-2/99	7	19,172-101,000	40,669	8/91	10
Conductivity	7/88-2/99	5			7/88-2/99	5	ND-0.13	0.098	8/91	4
Arsenic	7/88-2/99	6			7/88-2/99	6	0.6-1.7	0.98	8/91	1
Barium	7/88-2/99	6			7/88-2/99	6	ND-0.01	0.98	8/91	4
Bicarbonate	7/88-2/99	7			7/88-2/99	7	9,050-54,000	<0.01	8/91	10
Cadmium	7/88-2/99	6			7/88-2/99	6	ND-0.04	<0.1	8/91	3
Chloride	7/88-2/99	6			7/88-2/99	6	<0.1	ND-<0.1	8/91	4
Chromium	7/88-2/99	4			7/88-2/99	4	<0.01	ND-<0.1	8/91	3
Lead	7/88-2/99	4			7/88-2/99	4	<0.1	ND-<0.1	8/91	3
Mercury	7/88-2/99	6			7/88-2/99	6	ND-<0.1	<0.1	8/91	1
Selenium	7/88-2/99	3			7/88-2/99	3	<0.1	ND-<0.1	8/91	4
Silver	7/88-2/99	3			7/88-2/99	3	0.072-0.222	<0.1	8/91	4
Zinc	7/88-2/99	3			7/88-2/99	3	0.072-0.222	0.152666667	8/91	3
Benzene	7/88-2/99	3			7/88-2/99	3	0.082-0.45	0.302333333	8/91	3
Toluene	7/88-2/99	3			7/88-2/99	3	ND-0.028	0.009	8/91	3
Ethylbenzene	7/88-2/99	3			7/88-2/99	3	0.09-0.209	0.156	8/91	3
Xylene	7/88-2/99	3			7/88-2/99	3	0.09-0.209	0.156	8/91	3
A & A Tank Trucks										
Site:	Location: McClain Co., OK									
Status:	Inactive									
No. Pits:	2									
Area:	NA									
Bbls. Rec'd	1991-93 36,480									
Arrow 3-5-15										
Site:	Location: Pittsburg Co., OK									
Status:	Inactive									
No. Pits:	2									
Area:	>0.7 acres (>30,000ft²)									
pH	5/89	1	1849	1849	3/92	3	7-8	7.6		
TDS	3/92	1	0.02	0.02	3/92	5	442-22,819	7401		
Arsenic	3/92	1	0.6	0.6						
Barium										
Bicarbonate					3/92	5	36-402	130		
Boron	3/92	1	<0.005	<0.005	3/92	2	0.03-0.1	0.07		
Cadmium	5/89	1	69	69						
Calcium					3/92	5	29-1,223	0		
Carbonate					3/92	3	0	0		
Chloride					3/92	5	168-11,820	3,766		
Chromium	3/92	1	0.22	0.22						
Lead	3/92	1	0.032	0.032						
Magnesium	3/92	1	<0.002	<0.002						
Mercury					3/92	5	6-646	199		
Nitrogen					3/92	2	0-40	20		
Selenium	3/92	1	0.004	0.004						
Silver	3/92	1	<0.01	<0.01						
Sodium	5/89	1	565	565	3/92	5	86-5,107	1,639		
Sulfate					3/92	5	8-90	48		
Arrow/Calumet										
Site:	Location: Canadian Co., OK									
Status:	Inactive									
No. Pits:	7									
Area:	2.6 acres (112,750 ft²)									
pH	11/93	1	8.4	8.4	3/89-11/93	8	7.3-9.3	8.18	3/89-11/93	9
TDS	11/93	1	429	429	3/89-11/93	8	277-14,520	76	3/89-11/93	9
Bicarbonate	11/93	1	190	190	3/89-11/93	7	84-661	261	3/89-11/93	9
Calcium	11/93	1	57	57	3/89-11/93	8	29-1,220	296	3/89-11/93	9
Carbonate	11/93	1	0	0	3/89-11/93	8	0-285	59	3/89-11/93	9
Chloride	11/93	1	55	55	3/89-11/93	8	54-8,500	3,807	3/89-11/93	9
Magnesium	11/93	1	49	49	3/89-11/93	8	40-5,420	2,692	3/89-11/93	9
Nitrogen	11/93	1	5	5	3/89-11/93	8	5-22	14	11/93	3
Potassium	11/93	1	12	12	3/89-11/93	8	3-58	24	3/89-11/93	9
Sodium	11/93	1	61	61	3/89-11/93	8	46-3,000	1,379	3/89-11/93	9
Sulfate	11/93	1	0	0	3/89-11/93	8	0-20	3	3/89-11/93	9
TOC	11/93	1	0.03	0.03	11/93	2	0-0.19	0.1		

Appendix B. Data summaries for CCDD sites in the database

Site: Ball Ranch Location: Garvin Co., OK Status: Inactive No. Pits: 4 Area: 9.4 acres (409,000 ft ²)									
Medium			Pit Sludge						
pH	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Groundwater
TDS	8/90	5			8/90	5	6.9-8.3	7.72	1/87-1/97 36 6.4-8.4 7.8
Bicarbonate	8/90	5			8/90	5	6.344-8.527	7.746	1/87-1/97 32 391-904 576
Boron	8/90	4			8/90	4	32-156	139	1/87-1/97 31 0-790 341
Calcium	8/90	4			8/90	4	7.72-9.43	7.7	1/87-1/97 32 0-0.78 0.32
Carbonate	8/90	4			8/90	4	170-290	215	1/87-1/97 35 36-119 61
Chloride	8/90	5			8/90	5	3,100-4,900	4,240	1/87-1/97 37 8-183 6.5
Magnesium	8/90	4			8/90	4	40-60	50	1/87-1/97 33 24-64 39
Nitrogen	8/90	3			8/90	3	0-1	0.5	1/87-1/97 33 0-20 3.7
Potassium	8/90	4			8/90	4	2,010-2,700	2,435	1/87-1/97 14 1-8 4
Sodium	8/90	4			8/90	4	100-300	250	1/87-1/97 33 13-119 59
Sulfate	8/90	4			8/90	4	100-300	250	1/87-1/97 33 16-141 53
Kv (cm/s)									
Site: BC Location: Atoka Co., OK Status: Inactive No. Pits: 5 Area: 7.9 acres (342,100 ft ²)									
Medium			Pit Sludge				Pit Water		
pH	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Groundwater
Arsenic	12/94	1	<0.001	<0.001					
Barium	12/94	1	0.05	<0.005					
Cadmium	12/94	1	<0.005	<0.005					
Calcium	2/95	6	31.6-56.9	41.2					
Chloride									
Chromium	Dates	n	Range (mg/kg)	Avg	7/96-5/93	33	78-7,575	2,677	
Lead	12/94	1	0.7	0.7					
Magnesium	12/94	1	<0.1	<0.1					
Mercury	2/95	6	7.3-11.5	9.8					
Selenium	12/94	1	<0.002	<0.002					
Silver	12/94	1	<0.01	<0.01					
Sodium	2/95	6	1.8-5.3	3.4					
Site: Blahm Location: Blaine Co., OK Status: active No. Pits: 8-12 Area: 30.3 acres (1,32 million ft ²)									
Medium			Pit Sludge				Pit Water		
pH	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Groundwater
Conductivity (u)	1/89	1	5.9	5.9	1/89-1/00	139	7.02-10.21	7.96	7/88-1/00 130 5.9-9.24 7.45
TDS	1/89	1	950	950	4/96	1	10,410	10,410	10/86-3/89 6 3,530-325,000 76,362
Arsenic	1/89	1	5	5	4/96-8/98	2	6,871-140,805	73,838	7/88-3/89 10 2,330-247,000 33,658
Barium	1/89	1	185.5	185.5	4/96	1	0	0	1/89 1 185.5 185.5
Bicarbonate	1/89	1	5	5					
Cadmium	1/89	1	5	5	4/96-8/98	2	122-2,427	1,275	7/88-3/89 10 4-2,280 750
Calcium	1/89	1	4	4	4/96	1	0	0	
Chloride	1/89	1	16	16	10/89-1/00	148	65-80,890	12,393	7/88-1/00 141 78-130,000 6,123
Chromium	1/89	1	1	1					1/89 1 1 16 16
Lead	1/89	1	1	1					1/89 1 1 1 1
Magnesium					8/98	1	520	520	3/89 2 100-740 420
Manganese					4/96	1	95	95	
Nitrogen					4/96-8/98	2	<1	<1	7/88-3/89 8 0-1,200 192
Potassium					4/96-8/98	2	89-628	359	
Sodium					4/96-8/98	2	2,196-49,750	25,973	7/88-3/89 9 365-90,620 13,592
Sulfate					4/96-8/98	2	434-6,590	3,512	8 1,460-5,600 2,914
Benzene									9/92 5 <0.002-0.067 0.019
Toluene									9/92 5 <0.002-0.149 0.031
Ethylbenzene									9/92 5 <0.002-0.012 0.004
Xylene									9/92 5 <0.002-0.108 0.023
TPH									9/92 5 <0.002-0.684 0.138
Bbs. Recd.	1989-99		2.82 MM						

Appendix B. Data summaries for CCDD sites in the database

Site: Bluff
 Location: Major Co., OK
 Status: active
 No. Pits: 3
 Area: 14.1 acres (613,320 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	2/97	2	7-7.1	7.05	12/92-1/00	12	7.5-8.2	7.8	1/93-8/99	143	6.82-12.8	8.39
Conductivity (u)	2/97	2	381,000-531,000	456,000	7/95-1/00	11	22,700-167,000	75,818	1/93-8/99	137	1,600-121,900	37,339
TDS	2/97	2	251,460-350,460	300,960	10/90-1/00	30	525-181,645	45,855	10/90-8/99	160	3,379-116,787	30,039
Arsenic					8/91	1	0.00001	0.00001	2/91-8/91	7	<0.0005-0.0027	0.0004
Barium					8/91	7	0.1-1	0.34	2/91-8/91	6	0.1-4.2	0.88
Bicarbonate					2/91-8/91	14	25-460	215	2/91-1/93	19	91-630	268
Boron	2/97	2	6.37-11.37	9					1/93	9	3.92-5.86	4.78
Calcium	2/97	2	5,643-6,102	5,873	2/91-1/00	26	92.8-3,590	990.7	2/91-8/99	147	13-1,995	898
Carbonate									1/93	9	0-18	6
Chloride									10/90-8/99	160	6-67,606	14,705
Chromium					8/91	7	0.01-0.04	0.03	2/91-8/91	6	<0.05-0.04	0.04
Lead					8/91	7	<0.1	<0.1	2/91-8/91	7	<0.005	<0.005
Magnesium	2/97	2	668-954	811	2/91-1/00	26	0-5,400	593	2/91-8/99	147	0-1,680	342
Mercury					8/91	7	0.01-0.21	0.12	2/91-8/91	7	<0.0005-0.18	0.09
Nitrogen					2/95-1/00	11	0-13	1.4	1/93-8/99	137	0-8	1.9
Potassium	2/97	2	1,276-1,301	1289	2/91-1/00	24	5-510	112	2/91-8/99	147	0-1,203	166.1
Sodium	2/97	2	121,403-203,913	162658	2/91-1/00	26	23-61,670	13,001	10/90-8/99	150	130-40,070	9,424
Sulfate					2/91-1/00	25	30-26,500	4,370	2/91-8/99	148	34-9,000	3,618
Kv (cm/s)			1.1-8.5E-8									
Bbls. Rec'd	1992-97		1,000,000+									

Site: Bone 15-7-2
 Location: Love Co., OK
 Status: inactive
 No. Pits: 1
 Area: 0.7 acres (30,250 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Chloride					9/80-2/85	4	0-3,000	1,500				

Site: Bone 23-6-1
 Location: Love Co., OK
 Status: inactive
 No. Pits: 1
 Area: 1.03 acres (45,000 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Chloride					9/80-2/85	4	1,200-3,000	2,125				

Site: Buck
 Location: Love Co., OK
 Status: inactive
 No. Pits: NA
 Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH									11/85	3	6.4-7.1	6.7
Chloride									11/85	3	6.8-30.3	21

Site: Bullard 2-8-5
 Location: Marshall Co., OK
 Status: inactive
 No. Pits: NA
 Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH									4/87-9/87	4	7.3-7.9	7.6
Chloride									4/87-9/87	4	7.5-63.5	40

Appendix B. Data summaries for CCDD sites in the database

Site:	Butland 28-3-7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Appendix B. Data summaries for CCDD sites in the database

Site: Eastern Tank
Location: Haskell Co., OK
Status: Inactive
No. Pits: 1
Area: 2.2 acres (96,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	7/93-2/94	6			7/93-2/94	6	7-8	7.5	2/87-7/96	20	6.7-7.9	7.2
Chloride	7/93-2/94	6			7/93-2/94	6	3-2,411	402	2/87-7/96	20	1.5-50	15

Site: Eola
Location: Garvin Co., OK
Status: active
No. Pits: 18
Area: 47.5 acres (2.07 million ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					1/91-1/99	146	6.6-9.4	8.2	1/91-1/99	66	6.3-11.6	7.8
TDS	9/98	1	19,506	19,506	6/91-9/97	80	596-20,000	3,614	1/91-1/96	32	116-1,720	766
Arsenic	9/98	1	1.38	1.38	9/97	1	<0.05	<0.05	7/95-1/96	7	0-742	421
Bicarbonate					7/95-1/96	14	217-935	559	7/95-1/96	7	0-0.09	0.03
Boron					7/95-1/96	14	0.02-1.78	0.64	7/95-1/96	7	2-109	54
Calcium					7/95-1/96	14	23-65	41	7/95-1/96	7	0-204	47
Carbonate					7/95-1/96	14	0	0	7/95-1/96	7	0-204	47
Chloride					1/91-1/96	139	31-10,000	1,772	1/91-1/99	76	1.75-386	81
Chromium	9/98	1	34.8	34.8	7/96	1	2.06	2.06				
Magnesium					7/95-1/96	14	6-35	17.8	7/95-1/96	7	0-161	66.9
Nitrogen					7/95-1/96	14	0-1	0.71	7/95-1/96	7	0-1	0.14
Potassium					7/95-1/96	14	5-56	24.5	7/95-1/96	7	4-78	11.1
Sodium					7/95-1/96	14	148-1,808	830	7/95-1/96	7	19-122	88
Sulfate					7/95-1/96	14	20-526	170	7/95-1/96	7	16-494	187
O&G	9/98	1	8,030	8,030	9/97	1	35	35				
Benzene									10/92	7	<0.002	<0.002
Toluene									10/92	7	<0.002	<0.002
Ethylbenzene									10/92	7	<0.002	<0.002
Xylene									10/92	7	<0.002	<0.002
Bbls. Rec'd.	1990-96		1.5 MM+									

Site: Fuel Haulers 22-5-17
Location: Latimer Co., OK
Status: Inactive
No. Pits: 1
Area: 0.3 acres (12,250 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	11/82-12/82	32	4.6-8	7	11/82-8/86	30	2.9-8	5.8	11/82-8/86	22	6-7.6	6.8
TDS					11/82-12/82	28	78-8,470	2,985	11/82-12/82	21	29-1,085	371
Arsenic	11/82-12/82	32	<3-35	18	11/82-8/86	30	<0.01-<0.5	0.08	11/82-8/86	22	<0.01-0.041	0
Barium	11/82-12/82	32	39-5,015	543	11/82-8/86	30	0.18-290	12.9	11/82-8/86	22	<0.02-3.6	1
Cadmium					8/86	2	0.001-0.005	0.003	8/86	1	0.003	0
Chloride	11/82-12/82	32	540-900	1,384	11/82-12/82	26	<10-1,399	302	11/82-12/82	21	<10-142	43
Chromium	11/82-12/82	32	13-861	172	11/82-8/86	30	<0.01-3.15	0.61	11/82-8/86	22	<0.01-0.073	0.015
Iron	12/82	4	16,500-32,500	24,500	12/82	3	1.41-810	278	12/82	4	<0.1-0.53	0.31
Lead	7/86	1	48.3	48.3	8/86	2	0.03-0.9	0.47	8/86	1	<0.02	<0.02
Magnesium					11/82-12/82	28	0.17-35.5	1.3				
Manganese	11/82-12/82	32	60-515	322					11/82-12/82	21	<0.02-9.7	1.04
Mercury	11/82-12/82	4	<0.05	<0.05	11/82	3	<0.0005-0.11	0.07	8/86	1	<0.002	<0.002
Selenium					8/86	2	0.008-0.072	0.04	8/86	1	0.0095	0.0095
Silver					8/86	2	<0.02-0.7	0.36				
Sodium	11/82-12/82	32	<500-21,950	5,829	11/82-12/82	27	<10-1,103	428	11/82-12/82	21	0.01-421	85
Sulfate	11/82-12/82	32	<2000-2000	<2000	11/82-12/82	28	20-6,433	1,427	11/82-12/82	21	<20-344	69
Zinc	11/82-12/82	32	7.5-320	151	11/82-12/82	19	0.004-40	3.96	11/82-12/82	17	0.004-58	9.3
TOC					11/82-12/82	28	<5-237.6	49.2	11/82-12/82	21	<5-53.9	10

Appendix B. Data summaries for CCD sites in the database

Site:	Fuel Haulers 35-6-13
Location:	Pittsburg Co., OK
Status:	abandoned
No. Pits:	1
Area:	1.4 acres (62,500 ft ²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Arsenic	8/85-7/97	11	U-13	6.9	8/85-7/97	3	U-0.018	0.013				
Barium	8/85-7/97	13	1.78-7,690	1,104	8/85-7/97	3	1.17-3.3	2.4				
Cadmium	8/85-7/97	5	U-4.3	2	7/97	1	U-0.018	U				
Calcium	8/85	11	160-18,700	4,634	8/85	2	396-615	506				
Chloride	7/97	2	79-463	271	7/97	1	148	148				
Chromium	8/85-7/97	11	U-905	153	7/97	1	0.019	0.019				
Iron	8/85	11	4,900-61,000	30,018	8/85	2	0.215-1.49	0.85				
Lead	8/85-7/97	13	U-126	28	7/97	1	U	U				
Magnesium	8/85	11	1,800-7,640	4,057	8/85	2	308-624	466				
Manganese	8/85	11	178-960	425	8/85	2	0.761-2.22	1.49				
Mercury	8/85-7/97	6	U-0.44	0.17	7/97	1	U	U				
Potassium	8/85	10	993-3,840	2,371	8/85	2	32.2-39.2	35.7				
Selenium					7/97	1	U	U				
Silver	8/85-7/97	10	U-8.7	3.3	7/97	1	U	U				
Sodium	8/85	10	1,310-9,510	3,783	8/85	2	2,260-3,310	2,785				
Zinc	8/85-7/97	13	0.25-261	88	7/97	1	U	U				
Benzene	7/97	1	U	U	7/97	1	U	U				
Toluene	7/97	1	U	U	7/97	1	U	U				
Ethylbenzene	7/97	1	U	U	7/97	1	U	U				
Xylene	7/97	1	U	U	7/97	1	U	U				
TPH	7/97	1	U	U	7/97	1	U	U				
VOC, SVOC	7/97	1	U	U	7/97	1	U	U				
PCB					7/97	1	U	U				

Site:	FRC
Location:	Canadian Co., OK
Status:	active
No. Pits:	5
Area:	10.2 acres (445,625 ft ²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH					2/98-2/00	10	7.07-8.5	7.8	2/98-2/00	14	7.07-8.4	7.9
Conductivity (u)					2/98-2/00	6	9,930-51,100	24,255	2/98-2/00	10	644-2,740	1,878
TDS					2/98-2/00	6	6,774-42,237	18,075	2/98-2/00	13	441-2,117	1,302
Arsenic	1/88	1	2,096	2,096	2/98-2/00	6	168-454	275.3	2/98-2/00	10	185-293	225
Barium	1/88	1	212.4	212.4	2/98-2/00	6	1.08-4.24	1.84	2/98-2/00	10	0.14-0.82	0.473
Bicarbonate												
Boron	1/88	1	0.263	0.263	2/98-2/00	6	140-806	365	2/98-2/00	10	35-425	244
Calcium					2/98-2/00	6	0-14	2.3	2/98-2/00	10	0-22	4
Carbonate	1/88	1	2,749	2,749	1/88-2/00	64	355-33,100	5,029	1/879-2/00	107	1-800	183
Chloride	1/88	1	101.81		2/98-2/00	6	9-187	63	2/98-2/00	10	16-97	72
Chromium												
Magnesium	1/88	1	0.111	0.111	2/98-2/00	6	0-1	0.17	2/98-2/00	10	0-3	1.6
Mercury					2/98-2/00	6	29-118	58	2/98-2/00	10	1-4	2.9
Nitrogen					2/98-2/00	6	2,262-13,980	5,991	7/89-2/00	13	47-236	110
Potassium					2/98-2/00	6	1,320-3,584	2,289	2/98-2/00	10	21-1,092	685
Sodium									10/92	3	<0.002	<0.002
Sulfate									10/92	3	<0.002	<0.002
Benzene									10/92	3	<0.002	<0.002
Toluene									10/92	3	<0.002	<0.002
Ethylbenzene									10/92	3	<0.002	<0.002
Xylene									10/92	3	<0.002	<0.002
Kv (cm/s)			2.1-5.1E-8									
Bdis, Rec'd.	1987-99		3.9TMM									

Appendix B. Data summaries for CCDD sites in the database

Site: Giles
Location: Grady County, OK
Status: active
No. Pits: 2
Area: 15.6 acres (680,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	1/96-2/00	10	7.1-9	7.9	8/96-1/98	4	7.6-9.3	8.1	10/95-2/00	22	6.3-9.4	7.9
Conductivity (µ)	8/96-2/00	9	12,960-72,300	26,129	8/96-1/98	5	13,400-16,400	14,650	10/95-2/00	22	635-24,300	14,664
TDS	8/96-2/00	9	8,554-47,718	17,406	8/96-1/98	5	9,999-38,902	17,289	10/95-2/00	22	419-18,644	11,310
Bicarbonate	8/96	1	844	844	8/92-2/97	4	56-207	125	10/95-2/97	3	83-168	111
Boron	8/96-2/00	9	0-2.86	1.46	8/96-1/98	5	1.8-14.73	10.59	10/95-2/97	3	8.09-10.69	9.76
Calcium	8/96-2/00	9	40-873	370.3	8/96-1/98	5	107-705	537	10/95-2/00	22	64-724	568
Carbonate	8/96	1	0	0	8/92-2/97	4	0	0	10/95-2/97	3	0	0
Chloride	8/96-2/00	9	2,007-20,683	5,690	8/96-1/98	5	1,938-30,962	8,717	10/95-2/00	22	9-6,573	3,395
Magnesium	8/96-2/00	9	2-184	36	8/96-1/98	5	5-171	124.8	10/95-2/00	22	15-182	127
Nitrogen	8/96	1	0	0	8/96-2/97	4	2-12	7.5	10/95-2/00	22	0-25	10
Potassium	8/96-2/00	9	31-345	89.1	8/96-1/98	5	14-62	32.6	10/95-2/00	21	3-370	89
Sodium	8/96-2/00	9	2,332-16,182	5,579	8/96-1/98	5	2,936-3,812	762	10/95-2/00	22	20-5,730	3,146
Sulfate	8/96	1	1,814	1,814	8/96-2/97	4	3,971-4,879	4,391	10/95-2/00	22	8-5,427	3,951
Benzene	12/97	1	<0.0002	<0.0002								
Toluene	12/97	1	<0.0005	<0.0005								
Ethylbenzene	12/97	1	<0.0002	<0.0002								
Xylene	12/97	1	<0.0003	<0.0003								
TPH	12/97	1	<0.0002	<0.0002								
Kv (cm/s)			4.5E-8									
Bbls. Rec'd.	1995-99		1.08MM									

Site: Gray
Location: Grady Co., OK
Status: abandoned
No. Pits: 7
Area: 8.5 acres (369,875 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Conductivity (µ)					7/97	2	2,620-9,070	5,845				
Arsenic	7/97	4	u	u	7/97	2	u	u				
Barium	7/97	4	0.68-1.7	1.35	7/97	2	0.65-0.85	0.75				
Cadmium	7/97	4	u	u	7/97	2	u	u				
Chloride	7/97	4	19.7-926	361	7/97	2	788-2,690	1,739				
Chromium	7/97	4	u-0.072	0.018	7/97	2	0.008	0.008				
Lead	7/97	4	u-0.37	0.15	7/97	2	u	u				
Mercury	7/97	4	u	u	7/97	2	u	u				
Selenium	7/97	4	u	u	7/97	2	u	u				
Silver	7/97	4	u	u	7/97	2	u	u				
Zinc	7/97	4	u-1.08	0.88	7/97	2	0.052-0.056	0.054				
Benzene	2/97	4	u-0.084	0.032	7/97	2	u	u				
Toluene	2/97	4	u-0.118	0.048	7/97	2	u	u				
Ethylbenzene	2/97	4	u-0.157	0.06	7/97	2	u	u				
Xylene	2/97	4	u-0.374	0.147	7/97	2	u	u				
TPH	2/97	4	u-1,130	342	7/97	2	u	u				
VOC, SVOC	2/97	5	u	u	7/97	2	u	u				
Herb, Pest	2/97	5	u	u	7/97	2	u	u				
PCB	2/97	5	u	u	7/97	2	u	u				

[illegible]

Appendix B. Data summaries for CCDD sites in the database

Site: Hamilton Location: Mc Chain Co., OK Status: abandoned No. Pits: 8 Area: 3.50 acres (152,461 ft²)																									
Medium	Pit Sludge				Pit Water				Groundwater																
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg													
Arsenic	7/97	4	u	u																					
Barium	7/97	4	1.35-3.64	2.04																					
Cadmium	7/97	4	u	u																					
Chromium	7/97	4	u-0.094	0.02																					
Lead	7/97	4	0.04-0.2	0.12																					
Mercury	7/97	4	u	u																					
Selenium	7/97	4	u	u																					
Silver	7/97	4	u	u																					
Zinc	7/97	4	u-0.6	0.22																					
Benzene	7/97	4	u-0.057	0.038																					
Toluene	7/97	4	u-0.017	0.014																					
Ethylbenzene	7/97	4	u-0.216	0.14																					
Xylene	7/97	4	u-0.736	0.56																					
TPH	7/97	4	u-879	594																					
VOC, SVOC	7/97	4	u	u																					
Herb, Pest	7/97	4	u	u																					

Site: HTS Location: Caddo Co., OK Status: abandoned No. Pits: 1 Area: 2.4 acres (103,125 ft²)																									
Medium	Pit Sludge				Pit Water				Groundwater																
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg													
Arsenic	7/97	2	2-3.73	2.9	7/97	1	<0.03	<0.03																	
Barium	7/97	2	<0.005	<0.005	7/97	1	0.33	0.33																	
Cadmium	7/97	2	582-1,872	1,217	8/86-7/97	3	1,429-15,000	6,276																	
Chloride	7/97	2	<0.005	<0.005	7/97	1	<0.005	<0.005																	
Chromium	7/97	2	<0.03-0.045	0.04	7/97	1	0.03	0.03																	
Lead	7/97	2	<0.0005	<0.0005	7/97	1	<0.0005	<0.0005																	
Mercury	7/97	2	<0.04	<0.04	7/97	1	<0.04	<0.04																	
Selenium	7/97	2	<0.01	<0.01	7/97	1	<0.01	<0.01																	
Silver	7/97	2	0.24-0.71	0.48	7/97	1	<0.05	<0.05																	
Zinc	7/97	2	30-906	468	7/97	1	<1	<1																	
Benzene	7/97	2	331-1,810	1,071	7/97	1	<1	<1																	
Toluene	7/97	2	1,300-4,860	3,090	7/97	1	<1	<1																	
Ethylbenzene	7/97	2	5,610-25,300	15,455	7/97	1	<1	<1																	
Xylene	7/97	2			7/97	1	<1	<1																	
TPH	7/97	2			7/97	1	<1	<1																	
VOC, SVOC	7/97	2	980-1,015	988	7/97	1	<1	<1																	
Herb, Pest	7/97	2	u	u	7/97	1	u	u																	
	7/97	2	u	u	7/97	1	u	u																	

Site: Hightill Location: Woodward Co., OK Status: inactive No. Pits: NA Area: NA																									
Medium	Pit Sludge				Pit Water				Groundwater																
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg													
pH																									
TDS																									
Bicarbonate																									
Calcium																									
Chloride																									
Magnesium																									
Potassium																									
Sodium																									
Sulfate																									
TOC																									

Appendix B. Data summaries for CCDD sites in the database

Site:	Hull 1-6-3												
Location:	Carter Co., OK												
Status:	Inactive												
No. Pits:	2												
Area:	0.6 acres (25,300 ft²)												
Medium		Pit Sludge			Pit Water		Groundwater						
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg	
Chloride					3/81	2	600-1,200	900					
Site	Hull 20-5-2	Carter Co., OK											
	2 pits, 0.27 acres (11,750 ft²)	Inactive											
Medium		Pit Sludge			Pit Water		Groundwater						
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg	
Chloride					2/85	2	5,800-6,600	6,200					
Site:	Kelly												
Location:	Mc Clain Co., OK												
Status:	abandoned												
No. Pits:	5												
Area:	41.3 acres (1.8 million ft²)												
Medium		Pit Sludge			Pit Water		Groundwater						
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg	
pH	10/98	31			5/95	1	523	523	8/98-9/98	2	8-8.2	8.1	
TDS	10/98	31	5,230-23,400	12,426					8/98-9/98	2	1,280-4,492	2,886	
Aluminum									8/98-9/98	2	<0.35	<0.35	
Antimony					5/95	1	<0.005	<0.005	8/98-9/98	2	<0.06	<0.06	
Arsenic	10/98	23	1.47-6.38	4.21	5/95	1	<0.001	<0.001	8/98-9/98	2	0.02-0.15	0.08	
Barium	10/98	31	73.6-17,500	3,976					8/98-9/98	2	<0.01	<0.01	
Beryllium									8/98-9/98	2	171-437	304	
Bicarbonate									8/98-9/98	2	0.13-5.96	3	
Boron					5/95	1	<0.01	<0.01	8/98-9/98	2	<0.005	<0.005	
Cadmium	10/98	31	1,490-36,700	19,011					8/98-9/98	2	53-164	109	
Calcium					9/80-5/95	5	118-1,800	984	8/98-9/98	2	0	0	
Carbonate									10/92	25	7.5-527	132	
Chloride									8/98-9/98	2	<0.01	<0.01	
Chromium	10/98	31	9.29-176	43.8					8/98-9/98	2	<0.01	<0.01	
Copper	10/98	17	2.16-48.5	16.8									
Iron	10/98	31	5,880-189,000	21,593	5/95	1	0.74	0.74	8/98-9/98	2	<0.05	<0.05	
Lead	10/98	31	5.09-203	62.5	5/95	1	<0.002	<0.002	8/98-9/98	2	22-62	42	
Magnesium	10/98	31	1,770-41,000	7,943	5/95	1	98	98					
Manganese	10/98	31	81.4-1,440	378	5/95	1	<0.002	<0.002	8/98-9/98	2	123-1,226	675	
Mercury					5/95	1	1.2	1.2	8/98-9/98	2	39-2,335	1,187	
Nickel	10/98	31	9.17-43.7	22					8/98-9/98	2	<0.0005	<0.0005	
Nitrogen									8/98-9/98	2	<0.025	<0.025	
Potassium	10/98	31	1,300-6,480	2,923					8/98-9/98	2	1-27	14	
Selenium	10/98	1	1.44	1.44					8/98-9/98	2	6-36	21	
Silver					5/95	1	0.08	0.08	8/98-9/98	2	<0.07	<0.07	
Sodium	10/98	31	581-16,800	4,723					8/98-9/98	2	<0.01	<0.01	
Sulfate									8/98-9/98	2	123-1,226	675	
Titanium									8/98-9/98	2	39-2,335	1,187	
Vanadium									8/98-9/98	2	<0.2	<0.2	
Zinc	10/98	19	14.5-29.1	20.7					8/98-9/98	2	0.005-0.074	0.04	
TPH	10/98	31	14.4-173	75									
Benzene	6/98	24	70.9-24,548	5,192									
Toluene	6/98	3	u-6.3*	2.1									
Ethylbenzene	6/98	3	u-22*	7.3									
M & P Xylene	6/98	3	u-67*	22.3									
O-Xylene	6/98	3	180-940*	613									
1,2,4-Trimethylbenzene	6/98	3	u-140*	46.7									
Naphthalene	6/98	3	700*	700									
Methylchloride	6/98	3	92-920*	554									
Bbls. Rec'd	1985-98	3	9.5-1,120*	743									
			4.5MM										

Appendix B. Data summaries for CCDD sites in the database

Site: Kirk
 Location: Carter Co., OK
 Status: Inactive
 No. Pits: 5
 Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					4/83	3	9.5-9.7	9.6				
Chloride					4/83	3	429-1,446	960				
Chromium					4/83	1	0.012	0.012				
Mercury					4/83	1	13.6	13.6				
Silver					4/83	1	3.1	3.1				

Site: Lee/Triple L
 Location: Marshall Co., OK
 Status: Inactive
 No. Pits: 3
 Area: 4.1 acres (180,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					5/89-4/91	13	6.3-8.0	7	11/91	3	6.6-7.3	6.9
TDS					4/91	5	420-3,473	1,583				
Chloride					3/89-11/91	16	54-3,360	2,170	3/89-11/91	10	39.1-1,540	366
Magnesium					11/90	1	300	300	11/90	3	138-168	152
O&G					5/89	1	1.1	1.1				

Site: Little River Express
 Location: Pottawatomie Co., OK
 Status: Inactive
 No. Pits: 9
 Area: 1.7 acres (74,100 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					2/84-9/93	11	7-9.1	7.9	9/83-1/84	14	6.8-8.1	7.5
TDS					2/84-4/84	10	167-4,185	1,930	11/83-1/84	8	127-543	257
Arsenic									1/84	5	<0.01-0.01	<0.01
Barium					9/93	1	21	21	11/83	10	<0.2-0.38	0
Chloride					2/84-9/93	11	<10-2,401	825	9/83-1/84	17	<10-38	16
Chromium					2/84-9/93	5	0.02-4.3	1.3	9/83	9	<0.01-0.09	0.05
Lead									1/84	5	<0.02-0.167	0.06
Sodium					2/84-4/84	4	476-700	584				
Zinc									1/84	3	<0.004-2.72	0.93
TOC									1/84	5	<5-15.5	6.3
O&G					2/84-4/84	4	2-7	4.1	11/83	1	2.9	2.9

Site: Lojo
 Location: Woods Co., OK
 Status: Inactive
 No. Pits: NA
 Area: >0.4 acres (>15,625 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Kv (cm/s)			2.7E-7 - 5.9E-8									

Appendix B. Data summaries for CCDD sites in the database

Site: Mabray
Location: Atoka Co., OK
Status: Inactive
No. Cells: 4
Area: 1.7 acres (>74,750 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Chloride					7/89-7/94	39	850-3,200	1,878				

Site: Merkle
Location: Pottawatomie Co., OK
Status: abandoned
No. Pits: 12
Area: 6.7 acres (292,500 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH												
Arsenic	7/97	3	u	u	8/97	3	u	u				
Barium	7/97	3	1.36-1.82	1.5	8/97	3	0.15-0.24	0.19				
Cadmium	7/97	3	u	u	8/97	3	u	u				
Chloride	7/97	3	168-672	444	8/97	3	19.7-64.1	34.5				
Chromium	7/97	3	u	u	8/97	3	u-0.019	0.006				
Lead	7/97	3	u	u	8/97	3	u	u				
Mercury	7/97	3	u	u	8/97	3	u	u				
Selenium	7/97	3	u	u	8/97	3	u	u				
Zinc	7/97	3	0.1-0.22	0.14	8/97	3	u-0.055	0.02				
Benzene	7/97	3	u	u	8/97	3	u	u	7/97	6	u	u
Toluene	7/97	3	u	u	8/97	3	u	u	7/97	6	u-0.012	u
Ethylbenzene	7/97	3	u-0.005	0.002	8/97	3	u	u	7/97	6	u	u
Xylene	7/97	3	u-0.015	0.005	8/97	3	u	u	7/97	6	u	u
TPH	7/97	3	4-444	392	8/97	2	u	u	7/97	6	u	u
VOC, SVOC	7/97	2	u	u	8/97	2	u	u				
Herb, Pest	7/97	2	u	u								

Site: O'Daniel Gravel
Location: Maud, OK
Status: active
No. Pits: 7
Area: 15.6 acres (678,000 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH					5/90-3/00	55	7.19-11.8	8.71	5/90-3/00	198	4.9-12.81	7.43
Chloride					5/90-3/00	59	132.1-2,400	983	5/90-3/00	208	1-1,534	175.2
Benzene					1/97	1	<0.005	<0.005	7/92	1	<0.002	<0.002
Toluene					1/97	1	<0.005	<0.005	7/92	1	<0.002	<0.002
Ethylbenzene					1/97	1	<0.005	<0.005	7/92	1	<0.002	<0.002
Xylene					1/97	1	<0.005	<0.005	7/92	1	<0.002	<0.002
TPH					1/97	1	0.266	0.266				
Kv (cm/s)			2.1E-6-2.4E-8									
Bbls. Rec'd.	1989-98		1.59MM+									

Site: Oilfield Services
Location: Pittsburg Co., OK
Status: Inactive
No. Pits: 3
Area: 0.5 acres (19,875 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Arsenic					9/96	1	<0.005	<0.005				
Chloride					9/96	1	32	32				
Magnesium					9/96	1	16.8	16.8				
Silver					9/96	1	0.16	0.16				

Appendix B. Data summaries for CCDD sites in the database

Site: Parent/Casey
Location: Pittsburg Co., OK
Status: Inactive
No. Pits: 3
Area: 7.2 acres (315,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	5/87-10/95	3			5/87-10/95	3	6.8-7.8	7.4	5/87-10/95	5	6.9-7.8	7.2
Chloride	5/87-10/95	6			5/87-10/95	6	310-2,849	1,149	10/95	5	2.5-80	34.7
Magnesium	10/95	2			10/95	2	113-125	119	10/95	2	28-32	30
TDS	3/91-10/95	5			3/91-10/95	5	848-5,118	2,018	10/95	2	627-704	666

Site: Peek & OMT
Location: Garvin Co., OK
Status: Inactive
No. Pits: 18
Area: 4.6 acres (198,500 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH									7/85-5/90	13	6.5-7.9	7
TDS									7/85-4/88	7	177-688	472
Bicarbonate									7/85	3	320-351	335
Calcium									7/85	3	175-224	205
Chloride					1/86-1/89	3	1,360-2,400	1,929	7/85-5/90	13	3.83-131	32
Magnesium									7/85	3	119-153	132
Nitrogen									7/85	3	0-1	0
Sodium									7/85	3	61-96	77
Sulfate									7/85	3	82-265	170
Kv (cm/s)			5.8E-5 - 3.1E-8									

Site: Pharoah
Location: Garvin Co., OK
Status: Inactive
No. Pits: NA
Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
TDS					3/93	1	1860	1860				
Chloride					1/85-3/93	2	972-2,274	1,623				
Chromium	3/93	1	<0.119	<0.119								
Iron	3/93	1	<0.904	<0.904								
Manganese	3/93	1	<0.0006	<0.0006								
Mercury	3/93	1	271	271								
Silver	3/93	1	0.135	0.135								

Site: Poteet Oil Ltd
Location: Stephens Co., OK
Status: active
No. Pits: 8
Area: 9.4 acres (411,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					1/96-3/00	32	7.26-8.77	7.93	9/95-12/99	30	6.9-8.28	7.42
Arsenic					3/00	2	u-0.032	0.016				
Barium					3/00	1	u	u				
Cadmium					3/00	2	u-3.64	1.82				
Chloride					9/95-3/00	40	292-4,900	1,062	9/95-12/99	30	2.25-450	84.2
Chromium					3/00	1	u	u				
TOC					3/00	1	18	18				
Kv (cm/s)			1.40E-08									
Bbls. Rec'd.	1988-99		1.81MM									

Appendix B. Data summaries for CCDD sites in the database

Site: Ricketts
Location: Love Co., OK
Status: Inactive
No. Pits: NA
Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
TDS	12/95	2			12/95	2	70-75	73				
Chloride	12/95	3			12/95	3	6-325	113				
Magnesium	12/95	3			12/95	3	4-273	94				

Site: S & M
Location: Garvin Co., OK
Status: abandoned
No. Pits: 6
Area: 1.6 acres (70,500 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Arsenic	12/96	1	u	u	3/96	4	0.005-0.808	0.206				
Barium	12/96	1	0.92	0.92	3/96	4	0.31-1.04	0.6				
Cadmium	12/96	1	u	u	3/96	4	<0.002	<0.002				
Chloride					7/83-9/86	6	277-3,000	1,222				
Chromium	12/96	1	u	u	3/96	4	0.023-0.029	0.1				
Lead	12/96	1	u	u	3/96	4	<0.043-<0.43	0.14				
Mercury	12/96	1	u	u	3/96	4	<0.00018-0.004	0.0018				
Nitrogen					3/96	4	0.05-0.099	0.07				
Selenium	12/96	1	u	u	3/96	4	<0.002	<0.002				
Silver	12/96	1	u	u	3/96	4	<0.008	<0.008				
Zinc	12/96	1	u	u	3/96	4	0.04-0.07	0.05				
Benzene	12/96	3	u-0.01	u	3/96	4	<0.002	<0.002	9/92	5	<0.002-0.087	0.019
Toluene	12/96	3	0.01-0.087	0.05	3/96	4	<0.002	<0.002	9/92	5	<0.002-0.149	0.031
Ethylbenzene	12/96	3	0.018-0.44	0.17	3/96	4	<0.002	<0.002	9/92	5	<0.002-0.012	0.004
Xylene	12/96	3	0.084-0.869	0.387	3/96	4	<0.002	<0.002	9/92	5	<0.002-0.108	0.023
TPH	12/96											
TPH	12/96	3	25.5-34	30.4	3/96	4	<1	<1				
VOC, SVOC	12/96	1	u	u	3/96	4	u	u				
Bbls. Rec'd.	1989-99		2.82MM									

Site: Sable Mar
Location: Garvin Co., OK
Status: inactive
No. Pits: 18
Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH					2/89-7/94	11	7.44-8.75	8.09	4/86-1/93	6	7.4-8.3	7.9
TDS					1/91-1/95	2	4,095-5,800	4,948	4/86	2	380-440	410
Arsenic					2/95	1	0.02	0.02				
Calcium									4/86	5	34-51	39
Chloride					3/89-2/95	12	1,440-3,500	2,439	4/86-1/93	7	2-1,577	58
Chromium					2/95	1	0.59	0.59	4/86	5	<0.01-0.01	0.01
Lead									4/86	5	<0.01-0.1	0.1
Sodium									4/86	2	13-46	30
Zinc									4/86	5	<0.01-0.1	0
O&G					1/91-2/95	2	4-6	5				
Benzene									1/93	1	<0.002	<0.002
Toluene									1/93	1	<0.002	<0.002
Ethylbenzene									1/93	1	<0.002	<0.002
Xylene									1/93	1	<0.002	<0.002

Appendix B. Data summaries for CCDD sites in the database

Site: Safe Earth
Location: Roger Mills Co., OK
Status: active
No. Pits: 7
Area: 2.4 acres (>105,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	1/97-1/99	16	7.31-11.28	8.83	1/96-1/00	24	6.71-10.3	7.81	1/96-1/00	102	7.01-8.1	7.53
Cadmium					7/95	1	1.01	1.01				
Chloride	1/97-1/99	19	2,220-35,900	11,630					10/93-1/00	132	7.63-261	41
Bbls. Rec'd	1995-98		>850,000		1/95	37	1,140-159,000	20,033				

Site: Samples
Location: Canadian Co., OK
Status: active
No. Pits: 5
Area: 6.0 acres (262,725 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					4/81-2/83	3	7.2-7.7	7.47				
TDS					2/83	1	2,429	2,429	3/83	3	6.5-9.3	7.7
Arsenic					9/81-2/83	5	<0.01-<0.02	<0.01	3/83	4	<0.01-<0.1	<0.1
Barium					9/81-2/83	7	0.48-13.59	3.39	3/83-6/83	6	0.15-6.64	1.5
Boron					9/81	1	0.68	0.68				
Cadmium					5/81-2/83	5	0.003-<0.02	<0.02				
Chloride	6/93-8/93	4	<1000-15,504	5,151	4/81-12/95	24	273-6,767	2,125	3/83-4/92	13	22-2,847	912
Chromium					9/81-2/83	8	0.287-0.86	0.56	3/83-6/83	6	<0.1-0.11	<0.1
Lead					9/81	3	<0.02-0.029	<0.02	3/83	4	<0.2	<0.2
Magnesium					2/83	1	7,589	7,589				
Mercury					9/81	3	0.0005-<0.005	<0.005				
Zinc					2/83	2	<0.04	<0.04	3/83	2	<0.04-2.39	1.2
Benzene	6/93-8/93	4	<0.008-<0.333	0.09					9/92	3	<0.002	<0.002
Toluene	6/93-8/93	4	<0.008-26.4	6.6					9/92	3	<0.002	<0.002
Ethylbenzene	6/93-8/93	4	<0.08-12.2	3.1					9/92	3	<0.002	<0.002
Xylene	6/93-8/93	4	<0.008-114	28					9/92	3	<0.002	<0.002
TPH	3/83	4	3.35-4,170	1,048					3/83	4	<0.1	<0.1

Site: Scott, J.
Location: Canadian Co., OK
Status: active
No. Pits: 3
Area: 9.8 acres (427,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					9/95-1/00	6	7.8-8.5	8.1	7/97-1/00	20	7.3-8.2	7.8
TDS					9/95-1/00	6	2,071-17,505	9,677	7/97-1/00	20	1,423-7,719	3,300
Conductivity (µ)					9/95-1/00	6	2,410-23,900	13,740	7/97-1/00	20	1,750-8,530	3,782
Bicarbonate					9/95-1/00	6	222-681	393	7/97-1/00	20	66-559	293
Boron					9/95-1/00	6	0.52-6.87	2.65	7/97-1/00	20	0.42-8.15	3
Calcium					9/95-1/00	6	145-598	301	7/97-1/00	20	154-636	348
Carbonate					9/95-1/00	6	0-12	2	7/97-1/00	20	0	0
Chloride					9/95-1/00	6	64-7,299	4,076	7/97-1/00	20	47-1,587	244
Magnesium					9/95-1/00	6	19-179	77	7/97-1/00	20	75-174	99
Nitrogen					9/95-1/00	6	0	0	7/97-1/00	20	0-12	2.8
Potassium					9/95-1/00	6	19-166	66	7/97-1/00	20	0-14	4.8
Sodium					9/95-1/00	6	252-6,029	3,114	7/97-1/00	20	132-1,913	531
Sulfate					9/95-1/00	6	1,023-2,963	1,638	7/97-1/00	20	615-4,833	1,799
Benzene					12/97	1	<0.0005	<0.0005				
Toluene					12/97	1	<0.0005	<0.0005				
Ethylbenzene					12/97	1	<0.0005	<0.0005				
Xylene					12/97	1	<0.0005	<0.0005				
TPH					12/97	1	<0.1	<0.1				
Kv (cm/s)			1.8E-6 - 6.7E-8									

Appendix B. Data summaries for CCDD sites in the database

Site: Scott, L.
Location: Love Co., OK
Status: Inactive
No. Pits: 2
Area: 4.0 acres (172,500 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
TDS	5/95	1			5/95	1	523	523				
Arsenic	5/95	1			5/95	1	<0.005	<0.005				
Barium	5/95	1			5/95	1	<0.001	<0.001				
Cadmium	5/95	1			5/95	1	<0.01	<0.01				
Chloride	9/80-5/95	5					118-1,800	984				
Iron	5/95	1			5/95	1	0.74	0.74				
Lead	5/95	1			5/95	1	<0.002	<0.002				
Magnesium	5/95	1			5/95	1	98	98				
Manganese	5/95	1			5/95	1	<0.002	<0.002				
Mercury	5/95	1			5/95	1	1.2	1.2				
Silver	5/95	1			5/95	1	0.08	0.08				

Site: Shillett
Location: Comanche Co., OK
Status: Inactive
No. Pits: 1
Area: 2.0 acres (85,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride					11/82	1	3000	3000				

Site: Smith, G.
Location: Love Co., OK
Status: active
No. Pits: 1
Area: 0.5 acres (22,500 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					2/91-1/00	18	7.04-10.29	8.8	1/90-1/00	77	5.8-8.72	7.33
Arsenic									9/92	3	<0.002	<0.002
Barium									9/92	3	<0.002	<0.002
Chloride					1/89-1/00	52	550-2,625	1,289	1/90-1/00	80	15-744	110
Chromium									9/92	3	<0.002	<0.002
Silver									9/92	3	<0.002	<0.002
O&G									9/92	3	<0.002	<0.002
Bbls. Rec'd	1988-99		157,160									

Site: Southard
Location: Blaine Co., OK
Status: active
No. Pits: 6
Area: >4.0 acres (>175,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					2/91-7/00	24	5.36-8.8	7.55	2/91-7/00	67	6.81-7.84	7.19
TDS					2/91	1	2,991	2,991	2/91	1	4,319	4,319
Conductivity (μ)					2/91	1	4,600	4,600	2/91	1	6,600	6,600
Bicarbonate					2/91	1	174	174	2/91	1	860	860
Boron									2/91	1	860	860
Calcium					2/91	1	602	602	2/91-7/00	70	608-13,100	6,376
Carbonate					2/91	1	0	0				
Chloride					2/91-7/00	37	340-25,300	16,207				
Magnesium					2/91	1	69	69				
Nitrogen									2/91	1	372	372
Potassium									2/91	1	82	82
Sodium					2/91	1	221	221	2/91	1	1,992	1,992
Sulfate					2/91	1	1,585	1,585	2/91	1	0	0
Benzene					2/91	1	<0.0005	<0.0005	2/92	3	<0.002-0.014	0.006
Toluene					2/91	1	<0.0005	<0.0005	2/92	3	<0.002	<0.002
Ethylbenzene					2/91	1	<0.0005	<0.0005	2/92	3	<0.002	<0.002
Xylene					2/91	1	<0.0005	<0.0005	2/92	3	<0.002	<0.002
TPH					2/91	1	<0.1	<0.1	2/92	3	<0.002-0.126	0.043
Bbls. Rec'd	1992-99		>934,927									

Appendix B. Data summaries for CCDD sites in the database

Site: Suttles
Location: Carter Co., OK
Status: abandoned
No. Pits: 2
Area: 51.7 acres (2.25 million ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Arsenic	7/97	6	<0.03	<0.03								
Barium	7/97	6	0.32-4.81	1.67								
Cadmium	7/97	6	<0.005	<0.005								
Chloride	8/86-7/97	6	20-2,686	807								
Chromium	7/97	6	<0.005-0.18	0.037								
Lead	7/97	6	<0.03-0.59	0.17								
Mercury	7/97	6	<0.0005	<0.0005								
Selenium	7/97	6	<0.04	<0.04								
Silver	7/97	6	<0.01	<0.01								
Zinc	7/97	6	<0.05-1.78	0.48								
Benzene	7/97	6	<0.001-0.224	0.05								
Toluene	7/97	6	<0.001-0.345	0.07								
Ethylbenzene	7/97	6	<0.001-0.25	0.07								
Xylene	7/97	6	<0.001-1.1	0.36								
TPH	7/97	6										
TPH	7/97	6	<0.001-1.01	0.32								
VOC, SVOC	7/97	6	u	u								
Herb, Pest	7/97	6	u	u								

Site: T & S
Location: Mc Clain Co., OK
Status: active
No. Pits: 2
Area: 4.1 acres (178,500 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	1/00	1	10.91						12/96-1/00	7	10.42-12.8	12.2
TDS									12/96-7/97	3	2,343-10,296	6,064
Conductivity (µ)									12/96-7/97	3	3,550-15,600	9,033
Bicarbonate									12/96-1/00	3	0	0
Boron									12/96-7/97	3	0.26-2.28	1
Calcium									12/96-7/97	3	140-462	294
Carbonate									12/96-1/00	3	744-4,344	1,993
Chloride	2/98-1/00	2	2,000-7,050	4,525					12/96-1/00	12	u-3,320	971
Magnesium									12/96-1/00	3	1-8	3
Nitrogen									12/96-1/00	3	1-5	3
Potassium									12/96-1/00	3	107-1,025	640
Sodium									12/96-1/00	3	199-948	568
Sulfate									12/96-1/00	3	43-2,499	863
Benzene					12/97-6/98	2	0.0009-<0.01	<0.01				
Toluene					12/97-6/98	2	0.0012-<0.01	<0.01				
Ethylbenzene					12/97-6/98	2	<0.0002-<0.01	<0.01				
Xylene					12/97-6/98	2	0.002-<0.01	<0.01				
TPH					12/97	1	<0.00002	<0.00002				
Bbls Rec'd	1988-1998		6.69MM									

Site: Tash/Chitwood
Location: Grady Co., OK
Status: inactive
No. Pits: 6
Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	8/89	11	5.8-7.9	6.8	9/84-6/93	34	6.3-8.6	7.7	12/87-12/97	24	7-8.2	7.4
TDS	8/89	11	60.8-4,256	1,074								
Arsenic	8/89	11	0.45-1.4	0.99	9/84	1	<0.05	<0.05				
Calcium					9/84	1	137	137				
Chloride	8/89	11	24.3-6,654	925	9/84-6/93	35	10.1-5,548	1,404	12/87-1/00	25	11.6-81	32
Chromium	8/89	11	2.6-779	103	9/84	1	1.45	1.45				
Lead					9/84	1	<0.1	<0.1				
Potassium					9/84	1	159.5	159.5				
Sodium					9/84	1	3,050	3,050				
O&G	8/89	11	<5-13,309	1,467								

Appendix B. Data summaries for CCDD sites in the database

Site: Triple S/Big Pasture
Location: Caddo Co., OK
Status: Inactive
No. Pits: 3
Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH									11/83-6/87	27	4.3-8	7.4
TDS									10/83-6/84	34	289-8,812	1,456
Arsenic									10/83	6	<0.001-<0.02	<0.001
Barium									10/83-6/87	32	<0.14-2.3	0
Boron									10/83	1	<0.03	<0.03
Cadmium									10/83	6	<0.006-0.025	0
Calcium									4/84	1	26.8	27
Chloride									10/83-6/87	38	3-2,598	320
Chromium									10/83-6/87	30	<0.06-1.3	0.2
Iron									10/83	5	<0.03-16.6	4.8
Lead									10/83	5	<0.05	<0.05
Manganese									10/83	6	<0.02-0.8	0.21
Sodium									10/83-6/84	30	6-2,176	269
Sulfate									10/83	4	108-580	308
Zinc									10/83	4	<0.032-0.036	0.02
Kv (cm/s)			1E-6									

Site: Trout
Location: Roger Mills Co., OK
Status: active
No. Pits: 8
Area: 44.8 acres (1.95 million ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH	11/92-7/99	11	7.09-12.37	9.9	3/93-1/00	50	5.9-8	6.9	2/89-1/00	182	5.2-12.84	7.51
TDS					8/98	1	7,166	7,166	2/89	1	2,726	2,726
Conductivity (μ)					8/98	1	8,680	8,680				
Bicarbonate					8/98	1	95	95				
Boron					8/98	1	0.9	0.9	2/89	1	4,130	4,130
Calcium					8/98	1	729	729				
Carbonate					8/98	1	0	0				
Chloride	11/92-7/99	10	<1000-17,500	11,010	1/89-1/00	87	180-53,600	15,497	2/89-1/00	245	u-3,150	114
Magnesium					8/98	1	287	287				
Nitrogen					8/98	1	0	0	2/89	1	55	55
Potassium					8/98	1	36	36	2/89	1	322	322
Sodium					8/98	1	1,201	1,201	2/89	1	10	10
Sulfate					8/98	1	2,704	2,704	2/89	1	227	227
TOC									2/89	1	370	370
Benzene					8/98	1	<0.0005	<0.0005				
Toluene					8/98	1	0.0535	0.0535				
Ethylbenzene					8/98	1	<0.0005	<0.0005				
Xylene					8/98	1	<0.0005	<0.0005				
TPH					8/98	1	0.16	0.16				

Site: Walker
Location: Carter Co., OK
Status: Inactive
No. Pits: 3
Area: 7.8 acres (337,500 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH												
Chloride					8/83-8/85	2	180-7,500	3,840				

Site: Washita
Location: Grady Co., OK
Status: Inactive
No. Pits: 6
Area: 6.0 acres (260,500 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Chloride					2/85	1	1,500	1,500				

Site: Webb/Femco
Location: Mc Clain Co., OK
Status: active
No. Pits: 5
Area: 11.9 acres (520,000 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH					1/91-1/00	61	6.95-9.39	8.14	4/90-7/96	67	6.8-8.39	7.48
Chloride					4/90-1/00	71	15-10,895	2,669	Apr-90	69	5-2,600	793
Bbls. Rec'd	1990-99		453,533									

Appendix B. Data summaries for CCDD sites in the database

Site: York
 Location: Mc Clain Co., OK
 Status: abandoned
 No. Pits: 6
 Area: >7.5 acres (>326,250 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Arsenic	1/97-2/97	3	<0.001-<0.03	0.01	1/97	3	u-<0.03	<0.03				
Barium	1/97-2/97	3	<0.001-1.49	0.5	1/97	3	0.29-1.49	0.88				
Cadmium	1/97-2/97	3	<0.005-<0.01	0.006	1/97	3	u-<0.01	<0.01				
Chloride	1/97	1	36	36	1/97-2/97	22	4-53	34				
Chromium	1/97-2/97	2	<0.01-0.2	0.11	1/97	3	u-<0.01	<0.01				
Iron					1/97	3	0.73-1	0.86				
Lead	1/97-2/97	2	<0.03-0.1	0.07	1/97	3	u-<0.03	<0.03				
Mercury	1/97	1	<0.0005	<0.0005	1/97	3	u-<0.0005	<0.0005				
Potassium												
Selenium	1/97	1	<0.04	<0.04	1/97	3	u-<0.04	<0.04				
Silver	1/97	1	<0.01	<0.01	1/97	3	u-<0.01	u-<0.01				
Zinc	1/97	1	0.12	0.12	1/97	5	0.022-0.12	0.05				
Benzene					1/97	2	<0.001	<0.001				
Toluene					1/97	2	<0.001	<0.001				
Ethylbenzene					1/97	2	<0.001	<0.001				
Xylene					1/97	2	<0.001	<0.001				
TPH					1/97							
TPH					1/97	2	<1-757	379				
VOC					1/97	2	u	u				
Herb, Pest					1/97	2	u	u				

Site: Albany Tank Cleaning Yards
 Location: Shackelford Co., TX
 Status: abandoned
 No. Pits: 6
 Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Arsenic	12/00	9	<5-8.2	4.50								
Barium	12/00	10	60-1,300	3.75								
Cadmium	12/00	10	<0.5-9.4	4.50								
Chloride	12/00	17	23-4,490	1,541								
Chromium	12/00	9	12.2-114	30.70								
Lead	12/00	10	5.1-240	14.30								
Mercury	12/00	10	<2-0.3	0.93								
Selenium	12/00	10	<5	<5								
Silver	12/00	10	<5-9.9	5.50								
TPH	12/00	17	<50-139,000	16,605								
Benzene	12/00	12	<0.005-0.014	<0.005								
Toluene	12/00	12	<0.005-0.009	<0.005								
Ethylbenzene	12/00	12	<0.005-0.45	<0.005								
Xylene	12/00	12	<0.010-0.669	<0.01								

Appendix B. Data summaries for CCDD sites in the database

Briggs Location: Matagorda Co., TX Status: abandoned No. Pits: 1 Area: 7.2 acres (312,500 ft ²)									
Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Groundwater n Range (mg/L) Avg
pH	6/96	16	0.4-7.7	2.80	6/96	3	5.94-6.74	6.36	6/96 3 5.94-6.74 6.36
Conductivity	6/96	16	68-1,500	606.00	6/96	3	1.2-3.8	2.4	6/96 3 1.2-3.8 2.4
TDS	6/96	16	<0.5-0.86	0.51	6/96	3	760-2541	1100	6/96 3 760-2541 1100
Arsenic	6/96	16	1,300-10,000	6007.00	6/96	3	<0.005-0.013	0.01	6/96 3 <0.005-0.013 0.01
Barium	6/96	16	138-354	206.00	6/96	3	0.5-0.93	0.69	6/96 3 0.5-0.93 0.69
Cadmium	6/96	16	<0.5-82	22.00	6/96	3	0.016-0.027	0.02	6/96 3 0.016-0.027 0.02
Chloride	6/96	16	<0.02-0.1	<0.02	6/96	3	360-910	573.00	6/96 3 360-910 573.00
Chromium	6/96	16	<0.1-0.5	<0.1	6/96	3	<0.005	<0.005	6/96 3 <0.005 <0.005
Lead	6/96	16	<0.1-0.5	<0.1	6/96	3	<0.002-0.001	0.00	6/96 3 <0.002-0.001 0.00
Mercury	6/96	16	<0.1-0.5	<0.1	6/96	3	<0.005-0.1	<0.005	6/96 3 <0.005-0.1 <0.005
Selenium	6/96	16	<0.1-0.5	<0.1	6/96	3	<0.005	<0.005	6/96 3 <0.005 <0.005
Silver	6/96	16	<0.1-0.5	<0.1	6/96	3	18-110	54	6/96 3 18-110 54
Sulfate	6/96	16	0.1-2.1	0.90					
TPH	6/96	16	0.1-2.1	0.90					
TPH (%)	6/96	16	9.00E-05	9.00E-05					
Dahl									
Location: Bee Co., TX Status: inactive No. Pits: 3 Area: 11.0 acres (480,000 ft ²)									
Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Groundwater n Range (mg/L) Avg
Chloride	6/87-8/87	4	3,000-8,000	4,713	6/87-8/87	4	3,000-8,000	4,713	6/87-8/87 4 3,000-8,000 4,713
Falcon Lake									
Location: Zapata Co., TX Status: inactive No. Pits: 2 Area: 5.0 acres (218,488 ft ²)									
Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Groundwater n Range (mg/L) Avg
O&G (%)	6/89	4	0.54-10	3.4	6/89	4	0.54-10	3.4	6/89 4 0.54-10 3.4
Fox									
Location: Matagorda Co., TX Status: abandoned No. Pits: 7 Area: 0.5 acres (22,233 ft ²)									
Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Groundwater n Range (mg/L) Avg
Aluminum	8/95	4	17,300-29,860	30955	8/95	4	17,300-29,860	30955	8/95 4 17,300-29,860 30955
Antimony	8/95	4	<160	<160	8/95	4	<60	<60	8/95 4 <160 <160
Arsenic	8/95	4	<60	<60	8/95	4	61,900-294,900	162,750	8/95 4 <60 <60
Barium	8/95	4	61,900-294,900	162,750	8/95	4	1.1-2.4	1.8	8/95 4 61,900-294,900 162,750
Beryllium	8/95	4	<2	<2	8/95	4	<2	<2	8/95 4 <2 <2
Cadmium	8/95	4	14,640-16,380	21,150	8/95	4	93-598	307	8/95 4 14,640-16,380 21,150
Calcium	8/95	4	93-598	307	8/95	4	Range (mg/kg)	Avg	8/95 4 93-598 307
Chloride	8/95	4	Range (mg/kg)	Avg	8/95	4	179-433	286	8/95 4 179-433 286
Chromium	8/95	4	14-36	25	8/95	4	106-426	305	8/95 4 14-36 25
Copper	8/95	4	18,090-27,960	24,365	8/95	4	<8-28	15	8/95 4 18,090-27,960 24,365
Iron	8/95	4	106-426	305	8/95	4	523-6,800	3,801	8/95 4 106-426 305
Lead	8/95	4	<8-28	15	8/95	4	274-502	360	8/95 4 <8-28 15
Lithium	8/95	4	523-6,800	3,801	8/95	4	<10	<10	8/95 4 523-6,800 3,801
Magnesium	8/95	4	274-502	360	8/95	4	<14-23	18.5	8/95 4 274-502 360
Manganese	8/95	4	<10	<10	8/95	4	342-396	399	8/95 4 <10 <10
Molybdenum	8/95	4	342-396	399	8/95	4	3,060-11,310	6,695	8/95 4 342-396 399
Nickel	8/95	4	3,060-11,310	6,695	8/95	4	<138	<138	8/95 4 3,060-11,310 6,695
Phosphorus	8/95	4	<138	<138	8/95	4	4,820-9,000	5,223	8/95 4 <138 <138
Potassium	8/95	4	4,820-9,000	5,223	8/95	4	869-3,750	1769	8/95 4 4,820-9,000 5,223
Selenium	8/95	4	869-3,750	1769	8/95	4	1,140-1,660	1,393	8/95 4 869-3,750 1769
Sodium	8/95	4	1,140-1,660	1,393	8/95	4	<18	<18	8/95 4 1,140-1,660 1,393
Strontium	8/95	4	<18	<18	8/95	4	816-2,540	1,727	8/95 4 <18 <18
Sulfate	8/95	4	816-2,540	1,727	8/95	4	24-72	47	8/95 4 816-2,540 1,727
Tin	8/95	4	24-72	47	8/95	4	177-498	347	8/95 4 24-72 47
Titanium	8/95	4	177-498	347	8/95	4	0.12-0.92	0.35	8/95 4 177-498 347
Vanadium	8/95	4	0.12-0.92	0.35	8/95	4	0.5-2.5	1.1	8/95 4 0.12-0.92 0.35
Zinc	8/95	4	0.5-2.5	1.1	8/95	4	<0.4-12.5	6.5	8/95 4 0.5-2.5 1.1
TPH (%)	8/95	4	<0.4-12.5	6.5	8/95	3			8/95 3 <0.4-12.5 6.5
O&G (%)									
BTEX									

Appendix B. Data summaries for CCDD sites in the database

Site: Fresh
 Location: Zapata Co., TX
 Status: Inactive
 No. Pits: 5
 Area: 0.6 acres (25,500 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride	9/96-1/98	226	100-6,000	5,360 (est)								
TPH	4/96	1	>16,600	>16,600								

Site: Gober
 Location: Matagorda Co. Co., TX
 Status: abandoned
 No. Pits: 3
 Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					1/90	3	7.42-7.98	7.66				
TDS					1/90	3	1,691-6,165	4,358				
Conductivity					1/90	3	2,800-8,300	6,400				
Barium					1/90	3	2-5.71	4				
Calcium					1/90	3	98-295	224				
Chloride					1/90	3	1,087-4,324	2,966				
Chromium					1/90	3	<0.05	<0.05				
Iron					1/90	3	0.1-0.7	0.3				
Magnesium					1/90	3	23-53	35				
Potassium					1/90	3	22031	26				
Sodium					1/90	3	390-1,385	1,015				
Sulfate					1/90	3	21-154	66				

Site: Lobo
 Location: Webb Co., TX
 Status: Abandoned
 No. Pits: 6
 Area: 19.4 acres (847,000 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride					8/2000	5	1,268-32,400	8,067				
O&G (%)					8/2000	5	0.01-9	2.6				

Site: Manvel Salt Water Disposal
 Location: Brazoria Co., TX
 Status: abandoned
 No. Pits: 4
 Area: 4.2 acres (181,448 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					11/95	6	7.55-8.66	8.18				
Conductivity	11/95	13	48-2,202	405	11/95	6	49.1-3,381	648.00	2/01	11	580-51,600	22689
TDS					11/95	6	326-20,816	3688.00	2/01	11	540-34,000	11136
Aluminum	11/95	4	24,000-34,420	21,105	11/95	6	<0.48	<0.48				
Antimony	11/95	4	<160	<160	11/95	6	<0.32	<0.32				
Arsenic	11/95	4	<60	<60	11/95	6	<1.2	<1.2	2/01	11	<0.05	<0.05
Barium	11/95	4	10,000-173,400	51,275	11/95	6	1.3-11.6	3.57	2/01	11	0.59-9.8	3.6
Beryllium	11/95	4	1.4-3.1	1.5	11/95	6	<0.02	<0.02				

Appendix B. Data summaries for CCDD sites in the database

Site: Manvel Salt Water Disposal (cont.)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Boron	11/95	4	<2-4	2.3	11/95	6	<2.2	1835	2/01	1	<0.03	<0.03
Bromide	11/95	4	4,290-27,820	12,675	11/95	6	9.3-2,200	398				
Cadmium	11/95	4	<110	<110	11/95	6	<0.01	<0.01				
Calcium	11/95	4			11/95	6						
Cesium	11/95	4			11/95	6						
Chloride	11/95	4			11/95	6						
Chromium	11/95	4	50-245	97	11/95	6	89.1-10,000	<0.05	2/01	11	23-5,000	3,148
Cobalt	11/95	4	12-52	22.5	11/95	6	<0.06	<0.06				
Copper	11/95	4	10-48	18.5	11/95	6	<0.06	<0.06				
Fluoride	11/95	4			11/95	6	0.8-4.7	1.5				
Iron	11/95	4	10,620-68,740	23,313	11/95	6	<0.04	<0.04				
Lanthanum	11/95	4	22-45.5	22.8	11/95	6	<0.2	<0.2				
Lead	11/95	4	22-262	89	11/95	6	<0.01	<0.01	2/01	1	<0.1	<0.1
Lithium	11/95	4	7-24	12.5	11/95	6	0.12-0.45	0.17				
Magnesium	11/95	4	2,000-3,530	2,553	11/95	6	3.7-18.5	10.6				
Manganese	11/95	4	85-412	169	11/95	6	<0.01-0.17	0.05				
Mercury	11/95	4			11/95	6	<0.0002	<0.0002				
Molybdenum	11/95	4	<10	<10	11/95	6	0.1-1.72	0.37				
Nickel	11/95	4	<14-31	14.3	11/95	6	<0.140,63	0.17				
Phosphorus	11/95	4	115-402	202	11/95	6	<2.4	<2.4				
Potassium	11/95	4	5,080-6,970	6,248	11/95	6	2.2-185	38.2				
Rubidium	11/95	4	<1,000	<1,000	11/95	6	<28	<28				
Selenium	11/95	4	<138	<138	11/95	6	<0.2-8	<2.8				
Silver	11/95	4			11/95	6	<0.01	<0.01	2/01	1	0.15	0.15
Sodium	11/95	4	4,980-6,420	5,168	11/95	6	76.6-5,010	933				
Strontium	11/95	4	174-1,250	525	11/95	6	0.44-25.2	5.36	2/01	11	<0.003-0.142	0.025
Sulfate	11/95	4			11/95	6	1.4-479	89				
Thorium	11/95	4	<76	<76	11/95	6	<1.52	<1.52				
Tin	11/95	4	<18	<18	11/95	6	<0.36	<0.36	2/01	11	<5.0	<5.0
Titanium	11/95	4	1,170-2,330	1,763	11/95	6	<1.0-0.5	0.38	2/01	11	<1.0	<1.0
Uranium	11/95	4	<500	<500	11/95	6	<24	<24	2/01	11	<5.0	<5.0
Vanadium	11/95	4	27-33	23	11/95	6	<0.08	<0.08				
Zinc	11/95	4	156-1380	489	11/95	6	<0.02-5.42	1.08				
Zirconium	11/95	4	40-84.4	44.3	11/95	6	<0.28	<0.28				
BTEX	11/95	8	0.25-55.5	25.1	11/95	6						
SVOL	11/95	8	0.2-20	5								
C ₆ -C ₁₀												
C ₁₀ -C ₄₀												
C ₆ -C ₄₀												

Site: Munson
Location: Burleson Co., TX
Status: abandoned
No. Pits: 5
Area: NA

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
Chloride					2/87	4	500-3,200	2,200				

Site: Post Oak Site
Location: Lee Co., TX
Status: abandoned
No. Pits: 1
Area: 2.3 acres (125,000 ft²)

Medium	Dates	n	Pit Sludge Range (mg/kg)	Avg	Dates	n	Pit Water Range (mg/L)	Avg	Dates	n	Groundwater Range (mg/L)	Avg
pH	8/99	4			8/99	1	7.26	7.26	8/99	2	6.38-6.42	6.4
Conductivity	8/99	4	5.22-7.35	5.99	8/99	1	0.717	0.717	8/99	2	0.7-1.3	2
Arsenic	8/99	4	3.6-4.4	4.00	8/99	1	<0.005	<0.005	8/99	2	<0.005	<0.005
Barium	8/99	4	280-1200	627.50	8/99	1	0.61	0.61	8/99	2	0.082-0.190	0.136
Cadmium	8/99	4	0.19-0.42	0.30	8/99	1	<0.005	<0.005	8/99	2	0.018-0.03	0.025
Chloride	8/99	4	960-2,200	1390.00	8/99	1	150	150	8/99	2	110-550	330
Chromium	8/99	4	10990	17.25	8/99	1	<0.005	<0.005	8/99	2	0.15-0.32	0.235
Lead	8/99	4	18-33	22.50	8/99	1	<0.005	<0.005	8/99	2	0.019-0.09	0.056
Mercury	8/99	4	<0.004-0.06	0.02	8/99	1	0.009	0.009	8/99	2	<0.0002	<0.0002
Selenium	8/99	4	<0.1-0.33	0.16	8/99	1	<0.005	<0.005	8/99	2	<0.1	<0.1
Silver	8/99	4			8/99	1	<0.005	<0.005	8/99	2	<0.005	<0.005
TPH	8/99	4	130-700	0.05								
TPH (%)	8/99	4	0.013-0.07	542.50	8/99	1	0.54	0.54	8/99	2	<0.005-0.042	0.024
Napthalene												

Appendix B. Data summaries for CCDD sites in the database

Site: Red River Oilfield Services
 Location: Wilbarger Co., TX
 Status: abandoned
 No. Pits: 2
 Area: 0.02 acres (755 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					11/93	2	4.9-7.7	6.3				
Arsenic					11/93	2	<0.01	<0.01				
Barium					11/93	2	1-3	2				
Cadmium					11/93	2	<0.01	<0.01				
Calcium					11/93	2	236-1,249	742.5				
Chloride					11/93	2	1,1772-8,169	4,970.5				
Chromium					11/93	2	<0.05	<0.05				
Lead					11/93	2	<0.01	<0.01				
Magnesium					11/93	2	50-211	130				
Mercury					11/93	2	<0.0002	<0.0002				
Potassium					11/93	2	20-61	40				
Selenium					11/93	2	<0.01	<0.01				
Silver					11/93	2	<0.01	<0.01				
Sodium					11/93	2	933-4,241	2,587				
Sulfate					11/93	2	<1-2	1.4				
TPH	11/93	2	360,000-450,000	405,000	11/93	2	<5	<5				
TPH (%)	11/93	2	36-45	40.5	11/93	2	<5-36	20				
O&G					11/93	2	10-11	10.5				

Site: Roeling Vacuum
 Location: Lee Co., TX
 Status: abandoned
 No. Pits: 8
 Area: 0.02 acres (760 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH									9/99	3	6.78-7.15	6.99
Conductivity									9/99	3	0.94-2.8	1.71
TDS									9/99	3	712-1558	1055
Arsenic	9/99	36	<0.5-3.6	0.67					9/99	3	<0.005-0.043	0.02
Barium	9/99	36	5.5-1,045	163.21					9/99	3	0.3-0.65	0.43
Bromide									9/99	3	<0.1-1	<1
Cadmium	9/99	36	<0.5	0.37					9/99	3	<0.005	<0.005
Calcium									9/99	3	80-250	160
Chloride	9/99	39	14-42,000	5653					9/99	3	140-710	403
Chromium	9/99	36	<0.5-237	63.26					9/99	3	<0.005-0.029	0.02
Lead	9/99	36	<0.1-150	11.63					9/99	3	<0.005	<0.005
Magnesium									9/99	3	6.6-20	11.83
Mercury	9/99	36	0.01-0.4	0.09					9/99	3	0.0006-0.0014	0.00
Potassium									9/99	3	1.2-6	3.87
Selenium	9/99	36	<0.1-0.43	0.35					9/99	3	<0.005	<0.005
Silver	9/99	8	<0.5	<0.5					9/99	3	<0.005	<0.005
Sodium									9/99	3	110-320	183
Strontium									9/99	3	0.15-0.61	0.37
Sulfate									9/99	3	<0.5-54	18
TPH	9/99	37	0-17,000	2,918								
TPH (%)	9/99	39	0.1-1.7	0.29								
O&G	9/99	30	0-2.6	0.27								

Site: Rule
 Location: Haskell Co., TX
 Status: abandoned
 No. Pits: 1
 Area: NA

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
TDS									NA	1	1,100	1,100
Chloride									NA	1	620	620
TPH	NA	2	65,700-128,000	96,850								
TPH (%)	NA	2	6.5-12.8	9.690								

Appendix B. Data summaries for CCDD sites in the database

Site: Sorenson Ranch
 Location: San Patricio Co., TX
 Status: inactive
 No. Pits: 1
 Area: 9.7 acres (420,750 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride					2/89-4/99	3	2,200-48,000	21,200 (est)				

Site: S. Texas Disposal
 Location: Duval Co. TX
 Status: inactive
 No. Pits: 3
 Area: 7.1 acres (308,750 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride					11/97	1	2,900	2,900				

Site: SR Service
 Location: Duval Co., TX
 Status: abandoned
 No. Pits: 2
 Area: 2.1 acres (91,500 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride					1/95	1	600	600				

Site: Steve's Oilfield Service
 Location: Kleberg Co., TX
 Status: abandoned
 No. Pits: 2
 Area: 0.001 acres (360 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH	9/00	2	7.3	7.3					9/00	3	6.71-7.9	7.18
Conductivity									9/00	3	2,230-19,100	0
TDS									9/00	3	130	130
Arsenic	9/00	2	7-9.5	8.25					9/00	2	<0.05	<0.05
Barium	9/00	2	2,100-4,700	3,400					9/00	2	<0.05-0.24	0.145
Cadmium	9/00	2	1.8-1.9	1.85					9/00	2	<0.03	<0.03
Chromium	9/00	2	43-45	44					9/00	2	<0.03	<0.03
Lead	9/00	2	11-160	85.5					9/00	2	<0.1	<0.1
Mercury	9/00	2	0.427-2.9	1.6635					9/00	2	<0.001	<0.001
Selenium	9/00	2	2.4-77	39.7					9/00	2	<0.050	<0.050
Silver	9/00	2	<0.75	<0.75								
C 6-10 (mg/kg)	9/00	3	243-595	475					9/00	3	<5	<5
C 10-28	9/00	3	2290-7640	5377					9/00	3	<1	<1
C 6-28	9/00	3	2530-8230	5847					9/00	3	<5	<5
Benzene	9/00	2	<1.0-1.3	1.1								
Ethylbenzene	9/00	2	3.65-4.54	4.095								
Isopropylbenzene	9/00	2	1.71-2.01	1.86								
p-Isopropyltoluene	9/00	2	<1.0	0.9								
naphthalene	9/00	2	13.2-16.9	15.05								
n-propylbenzene	9/00	2	2.3-2.44	2.37								
1,2,4-trimethylbnzn	9/00	2	9.07-10.5	9.785								
1,3,5-trimethylbnzn	9/00	2	2.33-5.74	4.035								
m,p-xylene	9/00	2	<2.0-4.36	3.13								
Bis(2-ethylhd)phthlste	9/00	2	15.9-26.4	20.45								
Fluorene	9/00	2	3.97-5.1	4.485								
2-mthyl-naphthln	9/00	2	25.3-37.9	31.6								
Naphthalene	9/00	2	7.41-14.1	10.755								
2-nitrophenol	9/00	2	<5.1-6.88	5.94								
Phenanthrene	9/00	2	11.1-11.7	11.4								
Ra 226	9/00	2	15-30	22.5								
Ra 228	9/00	2	5.3-11.5	8.4								

Appendix B. Data summaries for CCDD sites in the database

Site: Trant
Location: Chambers Co., TX
Status: Inactive
No. Pits: 1
Area: 9.2 acres (399,360 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
pH					6/90	1	8.16	8.16				
Conductivity					6/90	1	1,060	1,060				
TDS					6/90	1	585	585				
Barium					6/90	1	0.95	0.95				
Bicarbonate					6/90	1	172	172				
Calcium					6/90	1	34	34				
Chloride	6/90	1	350		6/90	1	189	189				
Chromium					6/90	1	0.05	0.05				
Iron					6/90	1	0.05	0.05				
Magnesium					6/90	1	2	2				
Potassium					6/90	1	10	10				
Sodium					6/90	1	187	187				
Sulfate					6/90	1	77	77				

Site: Wright
Location: Ector Co., TX
Status: inactive
No. Pits: 1
Area: 1.7 acres (71,700 ft²)

Medium	Pit Sludge				Pit Water				Groundwater			
	Dates	n	Range (mg/kg)	Avg	Dates	n	Range (mg/L)	Avg	Dates	n	Range (mg/L)	Avg
Chloride	9/87	9	362-5,141	1,545								
Sulfate	9/87	7	<5-71	44								