Five-Year Review Report

Second Five-Year Review Report for the Vertac Incorporated Superfund Site Jacksonville, Pulaski County, Arkansas

November 2003

PREPARED BY:

CH2M HILL
Contract Number 68-W6-0036
Work Assignment Number 119-FRFE-0604

PREPARED FOR:

Region 6
United States Environmental Protection Agency
Dallas, Texas

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SECOND FIVE-YEAR REVIEW
Vertac Incorporated Superfund Site
EPA ID# ARD000023440
Jacksonville, Pulaski County, Arkansas

This memorandum documents the United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the Vertac Incorporated Superfund Site (site) Second Five-Year Review under section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act (CERCLA), 42 U.S.C. §9621(c), as provided in the attached Second Five-Year Review Report prepared by CH2M HILL, Inc., on behalf of EPA.

Summary of Five-Year Review Findings

The second five-year review for this site indicates that the remedial actions set forth in decision documents for this site continue to be implemented as planned. Almost half of the overall site is now available for beneficial use, and the remainder is a secure, fenced facility primarily made up of the landfills and the operating ground water extraction and treatment system. The City of Jacksonville currently operates a drive-through recycling facility and houses its Sanitation Department in some of the former drum storage sheds EPA constructed on the northern portion of the property during the incineration process, released by EPA for reuse following completion of remedial actions. Within the fenced areas of the site, not available for reuse, contaminated soils and debris from the Offsite Areas Operable Unit and from onsite Operable Units (OUs) 1 and 2 are contained in the Resource Conservation and Recovery Act (RCRA) Subtitle C compliant landfill (the OU1 landfill). Wastes are also contained onsite within the burial areas and sedimentation vault (Mount Vertac) constructed as part of the court-ordered RCRA remedy. The onsite french drain system intercepts leachate from the burial areas and sedimentation vault and contaminated ground water at the site. The extracted ground water and leachate from the french drain and landfills are treated in the onsite wastewater treatment plant, and the treated water is discharged to Rocky Branch Creek. A fish consumption advisory and commercial fishing ban is in effect for Rocky Branch Creek and Bayou Meto to the Arkansas State Highway 13 bridge. Site Operation & Maintenance (O&M) is carried out, pursuant to several EPA-issued unilateral administrative orders (UAOs), by the Respondent Hercules Incorporated (Hercules), the site operator. Hercules implements site O&M through a remedial contractor Genesis Environmental Consulting, Inc. (GEC), which staffs the site with two operator personnel. The site is generally well-maintained by GEC. Based on the data review, site inspection, interviews and technology assessment, it appears the remedies are generally functioning as intended by the decision documents.

To ensure continued protectiveness, however, seven issues are identified in the second five-year review for this site. These issues do not currently affect the protectiveness of the remedy, but need to be addressed to ensure continued protectiveness. These issues include:

(1) The Arkansas Department of Health (ADH) has not completed the reevaluation of its fish consumption advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt TCDD action level for fish tissue, and it has not reinstituted the full geographical extent of the fish consumption advisory as an interim matter. Both of these actions were recommended by the first five-year review in light of current EPA guidance on fish advisories.

(2) The draft December 2002 Sitewide Operations and Maintenance Manual requires revision to address EPA and ADEQ comments, particularly in the area of communication of problems and followup actions.

(3) At the time of the five-year review site inspection, the GEC operators indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating more leachate than the south cell). A leak in the top liner was suspected, although the leachate collection system continued to adequately collect the leachate.

(4) Detections of chlorophenol, dichlorophenol, trichlorophenol, and pesticide compounds have been reported in the wastewater treatment plant discharge samples; while there are no discharge limits set for these compounds, results for these compounds are required to be documented in the monthly reports. The cause of these detections has not been documented. Monthly discharge limits for 2,3,7,8-TCDD were also exceeded on several occasions, as well as the discharge limits for chloride and TDS. The site operators determined the cause of the 2,3,7,8-TCDD detections to be the result of using contaminated backwash water to flush the carbon filters, and the presence of some leaking valves, which were subsequently repaired.

(5) Citing provisions of the 1997 Sitewide Ground Water Monitoring Plan and approval by the ADEQ, respectively, the site operator has reduced the frequency of sampling of monitor wells from semi-annual to biannual; and the site operator has removed the compounds 2,3,7,8-TCDD and tetrachlorobenzene from the ground water analyte list, except for monitoring wells around the OU1 landfill. EPA has not approved this change.

(6) The first five-year review recommended that the site operator provide Level III data packages (versus Level II) with at least one of the required annual progress reports per five-year review period to provide for more comprehensive review of data quality in the annual ground water monitoring progress report by the EPA and ADEQ. This recommendation has not yet been fully implemented.

(7) The ROD for OU3 (ground water) called for five-year reviews to evaluate the performance of the hydraulic containment system and to determine if any new technologies are available to remediate the contaminated ground water to confirm the continued applicability of the TI waiver. This has been done for this second five-year review, but remains an issue to be addressed in future five-year reviews.

Actions Needed

To address the issues identified during the second five-year review, the following recommendations and followup actions have been defined for the site:

(1) ADH should complete the reevaluation of its fishing advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt TCDD fish tissue action level and the geographical extent of the advisory, and pending completion of its evaluation and determination of an updated action

level, should reinstitute the geographical limits of the fish consumption advisory to the pre-existing boundary, as recommended by the first five-year review. This should be accomplished in light of that recommendation and current EPA guidance on fish advisories and the impacts of dioxin on such advisories. Hercules' recent recommendation on reducing the geographical extent of the current fish consumption advisory and dropping a sampling location is unacceptable and will not be adopted.

(2) The draft December 2002 Sitewide Operations and Maintenance Manual must be updated in accordance with Agency review comments, in particular to improve direct communication of problems and followup actions.

(3) Actions taken and recommendations for responding to the disparity in leachate volume between the north and south cells of the OU1 landfill should be documented in the next annual progress report for the site and reviewed by EPA and ADEQ.

(4) Detections of chlorophenols and pesticides in the wastewater treatment plant effluent samples should be evaluated, including review of the need for discharge limits and/or continued monitoring; and the exceedances of discharge limitation parameters, including those for 2,3,7,8-TCDD, should be evaluated by the EPA, which should also evaluate site waste water treatment technology in accordance with the best available technology for treating 2,3,7,8-TCDD under the Clean Water Act and other site ARARs.

(5) The site operator has been directed to reinstitute semi-annual ground water monitoring well analytical sampling and to restore 2,3,7,8- TCDD to the analyte list, while EPA reviews these requirements. No further modifications to the site remediation O&M program should be undertaken by the site operator without the express prior written approval of both the EPA and the ADEQ.

(6) The site operator has been directed to include a Level III data package with the report of analytical sampling and analysis from the October 2003 ground water monitoring analysis. The site operator should also be directed to amend the ground water monitoring plan to provide that at least one of the required annual progress reports to EPA and ADEQ per five-year review period contain Level III analytical data documentation and reporting and that this requirement be implemented on a continuing basis.

(7) The requirement defined in the ROD for OU3 (ground water) that called for five-year reviews to evaluate the performance of the hydraulic containment system and to determine if any new technologies are available to remediate the contaminated ground water to confirm the continued applicability of the TI waiver should be repeated in the next five-year review; and each subsequent one, in order to confirm the continued applicability of the TI waiver. As of this second five-year review, no new technologies have been identified that could effectively remove and/or treat the NAPL contained in the bedrock aquifer.

Determinations

I have determined that the remedy for the Vertac Incorporated Superfund Site is protective of human health and the environment in the short term, and will remain so provided the action items identified in the Five-Year Review Report are addressed as described above.

Myron O. Knudson, P.E.
Director, Superfund Division
U.S. Environmental Protection Agency, Region 6

Date

BW for Myron Knudson

11-20-03

CONCURRENCES

FIVE-YEAR REVIEW
Vertac Incorporated Superfund Site
EPA ID# ARD000023440

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List of Acronyms

ACM	Asbestos Containing Materials
ADEQ	Arkansas Department of Environmental Quality
ADH	Arkansas Department of Health
ADPC&E	Arkansas Department of Pollution Control and Ecology
AOC	Area of Concern
ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BAT	Best Available Technology
BCT	Best Conventional Technology
BMP	Best Management Practices
CDC	Centers for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DDT	1,1,1-trichloro-2,2-*bis*-(p-chlorophenyl)ethane
EPA	United States Environmental Protection Agency
ERM	Environmental Resources Management
ESD	Explanation of Significant Differences
FDA	United States Food and Drug Administration
LDRs	Land Disposal Restrictions
MCL	Maximum Contaminant Level
NAAQS	National Ambient Air Quality Standards
NAPL	Non-Aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NPL	National Priorities List
O&M	Operation and Maintenance
OUs	Operable Units
PCB	Polychlorinated Biphenyl
PCL	Plume Concentration Level
POTW	Publicly Owned Treatment Work
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PRP	Potentially Responsible Parties
RD/RA	Remedial Design/Remedial Action
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager (EPA)
SARA	Superfund Amendments and Reauthorization Act
SOW	Statement of Work

List of Acronyms, continued

TBCs	"To Be Considered" standards
TCB	Tetrachlorobenzene
TCDD	Tetrachlorodibenzo-p-dioxin
TDS	Total Dissolved Solids
TEQ	Toxicity Equivalents
TI	Technical Impracticability
TSD	Transportation, Storage, or Disposal facility
UAO	Unilateral Administrative Order
2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	2,4,5-trichlorophenoxypropionic acid

Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation & Liability Act ("CERCLA" or "Superfund"), 42 U.S.C. §9621(c), the second five-year review of the remedy in place at the Vertac Incorporated Superfund Site ("site" or "Vertac site") located in Jacksonville, Pulaski County, Arkansas, was completed in November 2003. The results of the five-year review indicate that the remedy completed to-date is currently protective of human health and the environment in the short term. Overall, the remedial actions performed appear to be functioning as designed, and the site has been maintained appropriately. No deficiencies were noted that currently impact the protectiveness of the remedy, although several issues were identified that require further action to ensure the continued protectiveness of the remedy.

Due to the complex nature of contamination associated with the Vertac site, remediation was handled through various actions, beginning with the court-ordered Resource Conservation and Recovery Act (RCRA) remedy in 1984, and four Operable Units (OUs) were delineated for the site. A removal action including the incineration of about 28,500 drums was conducted (about 25,500 drums were incinerated onsite and nearly 3,000 drums were incinerated offsite), and Records of Decision (ROD) were signed for each of the OUs, as amended by one ROD amendment, and two Explanations of Significant Differences (ESD). The four OUs include (a) the offsite areas; (b) OU1 (onsite above-ground media); (c) OU2 (onsite soil, curbs, foundations, and underground utilities); and (d) OU3 (ground water). Following the incineration removal action, the resultant ash, and non-recyclable structures, debris, and soil were disposed in a RCRA Subtitle C compliant landfill (the OU1 landfill) constructed onsite. Most of the incinerator was decontaminated and sold for future use offsite. Residual incineration salt residue was properly disposed offsite at a facility near Deer Trail, Colorado.

Through the various response actions defined by the RODs/ESDs, offsite contaminated soil in the Rocky Branch Creek flood plain and residential areas were excavated to an action level of 1 part per billion (ppb) for dioxins. In addition, contaminated portions of the City of Jacksonville's Old Sewage Treatment Plant and West Wastewater Treatment Plant were demolished and capped, and sludge and sediments from both plants were removed and disposed of in the onsite OU1 landfill. Two sewer interceptor lines

were decontaminated, and one was grouted and abandoned. Plant buildings, process vessels, and process equipment were demolished, treated, and either recycled or disposed in the onsite OU1 landfill. Process vessel contents were removed and treated or disposed of offsite. Onsite soil in the northern portion of the site was excavated to an action level of 1 ppb for dioxins, while soil in the southern portion of the site was excavated to an action level of between 5 and 50 ppb for dioxins; this area was backfilled with one foot of clean soil cover. All excavated soil was disposed in the onsite OU1 landfill. The ROD for OU3 determined that the ground water could not be effectively remediated due to the presence of non-aqueous phase liquids (NAPLs) and the nature of the site hydrogeology. A hydraulic containment system, which includes ground water extraction wells and a french drain constructed as part of the 1984 court-ordered remedy, was implemented as the OU3 Remedy in order to prevent the offsite migration of contaminated ground water above the Maximum Contaminant Levels (MCLs).

Under the statutory requirements of Section 121(c) of CERCLA and the subordinate provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300.430(f)(4)(ii), performance of five-year reviews are required for sites where hazardous substances remain onsite above levels that allow for unrestricted use and unrestricted exposure. Such are the factual circumstances at the Vertac site. Accordingly, following a citizen suit against the Administrator of the United States Environmental Protection Agency (EPA) in the year 2000, the first CERCLA five-year review was completed for the Vertac site in July 2001.

During the second five-year review period, Operations and Maintenance (O&M) activities at the site have continued. O&M activities include pumping of affected ground water from the ground water extraction system along the eastern portion of the site, collection of affected ground water from the french drain system that intercepts ground water flow along the western and southern boundaries of the burial areas at the site, treatment and discharge of the extracted ground water, maintenance of the capped burial areas and the OU1 landfill, ground water and surface water monitoring, and maintenance of the ground water extraction system, french drain, and the wastewater treatment plant. Site O&M is implemented by Hercules Incorporated (Hercules), the site operator, as the Respondent under EPA CERCLA Unilateral Administrative Orders (UAOs). Hercules has employed a remedial contractor Genesis Environmental Consulting, Inc. (GEC) to carry out site O&M activities. GEC staffs the site with

2 employee operators and the site is generally well-maintained. Approximately 12 million gallons of ground water are extracted and collected each year by the french drain and the ground water extraction system. This water is then treated and discharged into Rocky Branch Creek, while the filtrate media is drummed and then properly disposed at an off-site facility. The actual amount of water and leachate collected and treated is primarily dependent upon rainfall amounts for each year.

During the second five-year review, seven issues were identified that do not currently affect the protectiveness of the site. The following recommendations and followup actions have been defined for the site to address these issues:

1. Complete reevaluation of the fish consumption advisory for Bayou Meto. ADH should complete the reevaluation of its fishing advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt TCDD fish tissue action level and the geographical extent of the advisory, and pending completion of its evaluation and determination of an updated action level, should reinstitute the geographical limits of the fish consumption advisory to the pre-existing boundary, as recommended by the first five-year review. This should be done in light of the 0.7 ppt TCDD screening level recommended by EPA in its current fish advisory guidance. The reevaluation should be based on fish tissue sample results collected in Bayou Meto through 2002. Hercules' recent recommendation that the geographical extent of the current fish consumption advisory be reduced further back to the State Highway 15 bridge, and that the State Highway 15 bridge sampling location be dropped from the biannual fish tissue monitoring program, based on the demonstration of concentrations well below the 25 ppt action level currently in place, is unacceptable and will not be adopted.

2. Update the draft December 2002 Sitewide Operations and Maintenance Manual in accordance with Agency review comments. EPA's initial review of the draft Sitewide O&M Manual (December 2002) is described in a letter from EPA to Hercules dated September 2003 (**EPA, 2003a**). ADEQ's review of the draft Sitewide Operations and Maintenance Manual (December 2002) is described in a letter from ADEQ to EPA (with copy to Hercules) dated February 12, 2003 (**ADEQ, 2003**). The draft manual must be updated in accordance with all review comments and resubmitted to the regulatory

agencies for review and approval; and following approval, it must be implemented. In particular, it has been noted that the revised manual should specify more direct communication of problems and followup actions by the site operator to the regulatory agencies.

3. Document status of disparity in leachate volume between the north and south cells of the OU1 landfill. At the time of the five-year review site inspection, the GEC site operator staff indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating more leachate than the south cell). This caused the operators to suspect a leak in the top liner, although the landfill leachate collection system was able to adequately handle the increased volume. Actions taken and recommendations for addressing this disparity in leachate volume must be documented in the next annual progress report for the site and reviewed by EPA and ADEQ.

4. Address detections and exceedances in the wastewater treatment plant effluent. The detection of low concentrations of chlorophenols and pesticides in the discharge effluent samples from the wastewater treatment plant should be addressed. Hercules is required to report concentrations of these contaminants in their monthly report to the ADEQ, but no discharge limits have been set. While the concentrations are usually low (less than 10 ppb), the continued detection of these contaminants should be evaluated, including review of the need for discharge limits.

The reported chloride and TDS exceedances should also be reviewed and evaluated by the EPA Remedial Project Manager (RPM) and/or the EPA oversight contractor, along with the 2001-2003 2,3,7,8-TCDD monthly discharge limitation exceedances, including a review of the supporting data, documentation, analysis, and determinations of the site operator with respect to the cause of these discharge exceedances. Although a site waste water treatment facility was originally used as part of the Vertac Remedy, a new plant was constructed just prior to the OU3 remedial action to treat the leachate produced by the OU1 landfill, as well as contaminated liquids produced by the new remedial components added in the OU3 remedial action and the elements of the existing Vertac Remedy that were adopted and incorporated by the OU3 CERCLA remedy. As part of the actions directed by this review, EPA will

investigate and determine if the streamlined treatment methods currently being employed by the wastewater treatment plant prior to discharge into Rocky Branch Creek meet the OU3 ARAR Best Available Technology (BAT) standards for certain toxic pollutants under the Clean Water Act.

5. Sitewide Ground Water Monitoring Plan and Operations Review. The site operator has been directed by the EPA RPM to reinstitute semi-annual ground water monitoring in the first quarter of calendar year 2004 and to restore 2,3,7,8-TCDD to the ground water monitoring analyte list, as required by the OU3 ROD. The site operator is also directed to make corrections to the Sitewide Ground Water Monitoring Plan to reflect these requirements, which should continue until otherwise directed. EPA will further evaluate this issue. No further modifications to the site remediation O&M program should be undertaken by the site operator without the express prior written approval of both the EPA and the ADEQ.

6. Submission of Level III data packages. The first five-year review recommended that the site operator provide Level III data packages (versus Level II) with at least one of the required annual progress reports per five-year review period to provide for more comprehensive review of data quality in the annual ground water monitoring progress report by the EPA and ADEQ. This recommendation has not yet been fully implemented, although the site operator has been directed by the EPA RPM to include a Level III data package with the report of analytical sampling and analysis from the October 2003 ground water monitoring analysis. The site operator should also be directed to amend the ground water monitoring plan to provide for this requirement and continue to implement it.

7. Reevaluate the availability of new technologies to treat and/or remove NAPL from the contaminated bedrock aquifer. The OU3 ROD requirement for evaluation of the performance of the hydraulic containment system and determination of whether new technologies are available to remediate the contaminated ground water, should be accomplished at the next five year review and each subsequent one, in order to confirm the continued applicability of the TI waiver. This has been done for the second five-year review (the hydraulic containment system was found to be operating as intended, and no new

technologies for remediation of the contaminated ground water were identified); this should also be done as required at the next five-year review.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Vertac Incorporated Superfund Site

EPA ID (from WasteLAN): ARD000023440

Region: EPA Region 6	**State:** Arkansas	**City/County:** Jacksonville/Pulaski County

SITE STATUS

NPL Status: ■ Final □ Deleted □ Other (specify):

Remediation status (choose all that apply): □ Under Construction ■ Operating □ Complete

Multiple OUs? ■ Yes □ No **Construction completion date:** June 1998

Has site been put into reuse? ■ Yes (partially) □ No

REVIEW STATUS

Reviewing agency: ■ EPA □ State □ Tribe □ Other Federal Agency:

Author: EPA Region 6, with support from RAC6 contractor CH2M HILL, Inc.

Review period: July 2001 through November 2003

Date(s) of site inspection: April 16, 2003, with follow-up inspection conducted August 5, 2003

Type of review:
- ■ Statutory
- □ Policy
  - □ Post-SARA □ Pre-SARA □ NPL-Removal only
  - □ Non-NPL Remedial Action Site □ NPL State/Tribe-lead
  - □ Regional Discretion

Review number: □ 1 (first) ■ 2 (second) □ 3 (third) □ Other (specify):

Triggering action:
- ■ Actual RA Onsite Construction
- □ Actual RA Start
- □ Construction Completion
- □ Recommendation of Previous Five-Year Review Report
- □ Other (specify): Request from State

Triggering action date (from WasteLAN): November 1993

Due date (five years after triggering action date): November 2008

Five-Year Review Summary Form

Issues: Operations and maintenance are ongoing at the site, and based on the data review, site inspection, interviews and technology assessment, it appears the remedy is functioning as intended by the decision documents. To ensure continued protectiveness, seven issues are identified in the second five-year review for this site, as described in the following paragraph. These issues do not currently affect the protectiveness of the remedy, although they need to be addressed to ensure continued protectiveness.

1. **Status of the Fish Consumption Advisory for Bayou Meto.** The ADH has not completed the reevaluation of its fish consumption advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt TCDD action level for fish tissue and the geographic extent of the advisory, and it has not reinstituted the full geographical extent of the fish consumption advisory as an interim matter. Both of these actions were recommended by the first five-year review in light of current EPA guidance on fish advisories.

2. **Review and Approval of the draft Sitewide Operations and Maintenance Manual.** The draft December 2002 Sitewide Operations and Maintenance Manual requires revision to address EPA and ADEQ comments, particularly in the area of communication of problems and followup actions.

3. **Disparity in leachate volume between the north and south cells of the OU1 landfill.** At the time of the five-year review site inspection, the GEC operators indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating about 300 gallons a month, depending on rainfall amounts, which is significantly more leachate than is generated in the south cell). This caused the operators to suspect a leak in the top liner, although the landfill leachate collection system was able to adequately handle the increased volume.

4. **Detections and Exceedances in the Wastewater Treatment Plant Effluent.** Detections of chlorophenol, dichlorophenol, trichlorophenol, and pesticide compounds have been reported in the wastewater treatment plant discharge samples; while there are no discharge limits set for these compounds, results for these compounds are required to be documented in the monthly reports. The cause of these detections has not been documented. Monthly discharge limits for 2,3,7,8-TCDD were also exceeded on several occasions, as well as the discharge limits for chloride and TDS. The site operators determined the cause of the 2,3,7,8-TCDD detections to be the result of using contaminated backwash water to flush the carbon filters, and the presence of some leaking valves, which were subsequently repaired.

5. **Sitewide Ground Water Monitoring Plan and Operations Review.** Citing provisions of the 1997 Sitewide Ground Water Monitoring Plan and approval by the ADEQ, respectively, the site operator has reduced the frequency of sampling of monitor wells from semi-annual to biannual; and it has removed the compounds 2,3,7,8-TCDD and tetrachlorobenzene from the ground water analyte list, except for monitoring wells around the OU1 landfill. EPA has not approved this change.

6. **Level III data packages.** The first five-year review recommended that the site operator provide Level III data packages (versus Level II) with at least one of the required annual progress reports per five-year review period to provide for more comprehensive review of data quality in the annual ground water monitoring progress report by the EPA and ADEQ. This recommendation has not yet been fully implemented.

7. **Reevaluation of the availability of new technologies to treat and/or remove NAPL from the contaminated bedrock aquifer.** The ROD for OU3 (ground water) called for five-year reviews to evaluate the performance of the hydraulic containment system and to determine if any new technologies are available to remediate the contaminated ground water to confirm the continued applicability of the TI waiver. This has been done for this second five-year review, but remains an issue to be addressed in future five-year reviews.

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Recommendations and Follow-up Actions: The following recommendations and followup actions have been defined for the site:

1. Complete reevaluation of the fish consumption advisory for Bayou Meto. ADH should complete the reevaluation of its fishing advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt TCDD fish tissue action level and the geographical extent of the advisory, and pending completion of its evaluation and determination of an updated action level, should reinstitute the geographical limits of the fish consumption advisory to the pre-existing boundary, as recommended by the first five-year review. This should be accomplished in light of that recommendation and current EPA guidance on fish advisories and the impacts of dioxin on such advisories. Hercules' recent recommendation on reducing the geographical extent of the current fish consumption advisory and dropping a sampling location is unacceptable and will not be adopted.

2. Update the draft Sitewide Operations and Maintenance Manual in accordance with Agency review comments. The draft December 2002 Sitewide Operations and Maintenance Manual must be updated in accordance with Agency review comments, in particular to improve direct communication of problems and followup actions.

3. Document status of disparity in leachate volume between the north and south cells of the OU1 landfill. Actions taken and recommendations for responding to the disparity in leachate volume between the north and south cells of the OU1 landfill should be documented in the next annual progress report for the site and reviewed by EPA and ADEQ.

4. Address detections in the wastewater treatment plant effluent. Detections of chlorophenols and pesticides in the wastewater treatment plant effluent samples should be evaluated, including review of the need for discharge limits and/or continued monitoring; and the exceedances of discharge limitation parameters, including those for 2,3,7,8-TCDD, should be evaluated by the EPA, which should also evaluate site waste water treatment technology in accordance with the best available technology for treating 2,3,7,8-TCDD under the Clean Water Act and other site ARARs.

5. Sitewide Ground Water Monitoring Plan and Operations Review. The site operator has been directed to reinstitute semi-annual ground water monitoring well analytical sampling and to restore 2,3,7,8- TCDD to the analyte list while EPA reviews these requirements. No further modifications to the site remediation O&M program should be undertaken by the site operator without the express prior written approval of both the EPA and the ADEQ.

6. Submission of Level III data packages. The site operator has been directed to include a Level III data package with the report of analytical sampling and analysis from the October 2003 ground water monitoring analysis. The site operator should also be directed to amend the ground water monitoring plan to provide that at least one of the required annual progress reports to EPA and ADEQ per five-year review period contain Level III analytical data documentation and reporting and that this requirement be implemented on a continuing basis.

Five-Year Review Summary Form

7. Reevaluate the availability of new technologies to treat and/or remove NAPL from the contaminated bedrock aquifer. The requirement defined in the ROD for OU3 (ground water) that called for five-year reviews to evaluate the performance of the hydraulic containment system and to determine if any new technologies are available to remediate the contaminated ground water to confirm the continued applicability of the TI waiver should be repeated in the next five-year review; and each subsequent one, in order to confirm the continued applicability of the TI waiver. As of this second five-year review, no new technologies have been identified that could effectively remove and/or treat the NAPL contained in the bedrock aquifer.

Protectiveness Statement(s): The remedies for the Vertac site are considered protective of human health and the environment because the wastes have been removed or contained. Wastes buried in the burial areas and the OU1 landfill are protected from erosion by caps. Contaminated ground water is contained and removed by the french drain and ground water extraction systems and treated at the wastewater treatment plant prior to discharge. Ongoing implementation of the O&M program monitoring will ensure that the remedies continue to be protective.

Because the completed remedial actions and O&M program for the Vertac site are considered protective for the short term, the overall remedy for the site is protective of human health and the environment for the short term, and will continue to be protective if the action items identified in this five-year review are addressed.

Other Comments: The site is generally well-maintained and operated. The site operators have been somewhat proactive at identifying and correcting problems when encountered at the site, however, communications need improvement. No modifications to the site remediation O&M program should be undertaken by the site operator without the express prior written approval of both the EPA and the ADEQ.

Second Five-Year Review Report
Vertac Incorporated Superfund Site

The United States Environmental Protection Agency (EPA) Region 6 has conducted a second five-year review of the remedial actions implemented at the Vertac Incorporated Superfund Site ("site" or "Vertac site"), for the period since the first five-year review was completed in July 2001 through September 2003. The site is located in the City of Jacksonville, in Pulaski, County, Arkansas. The purpose of a five-year review is to determine whether the remedy at a site remains protective of human health and the environment, and to document the methods, findings, and conclusions of the five-year review in a Five-Year Review Report. Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them. This second five-year review report documents the results of the review for the Vertac Incorporated Superfund site, conducted in accordance with EPA guidance on five-year reviews. EPA RAC6 contractor CH2M HILL provided support for conducting this review and the preparation of this report.

EPA guidance on conducting five-year reviews is provided by OSWER Directive 9355.7-03B-P, *Comprehensive Five-Year Review Guidance* (**EPA, 2001b**) (replaces and supercedes all previous guidance on conducting five-year reviews). EPA and contractor personnel followed the guidance provided in this OSWER directive in conducting the five-year review performed for the Vertac site.

1.0 Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9601 *et seq.* and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300 *et seq.*, call for five-year reviews of certain CERCLA remedial actions. The EPA policy also calls for a five-year review of remedial actions in some other cases. The statutory requirement to conduct a five-year review was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA), P.L. 99-499. The EPA classifies each five-year review as either "statutory" or "policy" depending on whether it is being required by statute or is being conducted as a matter of policy. The second five-year review for the Vertac site is a statutory review.

As specified by CERCLA and the NCP, statutory reviews are required for sites where, after remedial actions are complete, hazardous substances, pollutants, or contaminants will remain onsite at levels that will not allow for unrestricted use or unrestricted exposure. Statutory reviews are required for such sites if the ROD was signed on or after the effective date of SARA. CERCLA §121(c), as amended , 42 U.S.C. § 9621(c), states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The implementing provisions of the NCP, as set forth in the Code of Federal Regulations (CFR), state at 40 CFR 300.430(f)(4)(ii):

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The five-year review for the Vertac site is required by statute because the first Record of Decision (ROD) for the site, the Offsite Areas Operable Unit (OU), was signed in 1990, after the effective date of SARA, and because materials remain onsite above levels that allow for unlimited use and unrestricted exposure. This is the second five-year review for the Vertac site; the first five-year review was completed in July 2001. The triggering action for five-year reviews at the Vertac site is the date of the start of Remedial Action (RA) for the Offsite Areas OU (November 30, 1993).

2.0 Site Chronology

A chronology of significant site events and dates is included in **Table 1**, provided at the end of the report text. Sources of this information are listed in **Attachment 1a, Documents Reviewed.**

3.0 Background

This section describes the physical setting of the site, including a description of the land use, resource use, and environmental setting. This section also describes the history of contamination associated with the site, the initial response actions taken at the site, and the basis for each of the initial response actions. Remedial actions performed subsequent to the initial response actions for each of the OUs defined for the site are described in Section 4.

3.1 Physical Characteristics

The Vertac Incorporated Superfund Site is located on Marshall Road near the western edge of Jacksonville, Pulaski County, Arkansas, about 15 miles northeast of Little Rock (see **Figure 1** for a site map). The overall Vertac site is about 193 acres in size (**EPA, 1996e**). The Vertac Chemical Corporation (Vertac), the successor company to Vertac Incorporated, is currently in receivership as ordered by the U.S. District Court. This includes control of Vertac assets, such as the site. The contamination at the site resulted from poor waste management practices, plant operations, and discharges of process wastewater to Rocky Branch Creek and the City of Jacksonville's wastewater treatment systems (**EPA, 1996g, and EPA, 1996e**). The site is associated with the nearby Jacksonville Landfill and Rogers Road Municipal Landfill Superfund Sites (some wastes generated at the Vertac site were disposed in the landfills).

The overall site consists of two main parcels of land, consisting of smaller tracts acquired at different times during historical plant operations. Parcel 1, in the southern portion of the site, is about 93 acres in size. This is the original industrial parcel developed during the 1930's, and it includes the central process area where facility operations occurred. This is also the area, along with any contaminated contiguous off-site areas, that is considered the Vertac site (the site) for purposes of this five year review. Parcel 2 includes about 100 acres in the northern part of the greater site; and, as noted below, the City of Jacksonville has taken possession of much of this area and put it to productive re-use. This parcel was purchased by Vertac in 1978, but it was never used for facility operations by Vertac and its predecessors companies, or other site owners and operators. (**EPA, 1990**).

The Vertac site is located in the transition zone between the Gulf Coastal Plain and the Interior Highlands Physiographic Provinces. The land at the site has moderate topographic relief, sloping from approximately 310 feet above mean sea level in the north to approximately 260 feet above mean sea level in the southwest portion of the site. Soils in the area of the site are classified as the Leadvale-Urban land complex with 1 to 3 percent slope. Because of extensive development and earth-moving activities at the site, natural soil characteristics have been obscured. Surface water at the site drains into Rocky Branch Creek, which flows through the western portion of the site (**EPA, 1996d**).

Contaminated ground water at the site occurs within unconsolidated surface soils and weathered and unweathered portions of the Atoka Formation. The Atoka Formation consists of alternating beds of highly consolidated and fractured sandstone, siltstone, and shale. Ground water flow primarily occurs within the intergranular pore spaces in the unconsolidated surface soils and within fractures and partings within the sandstone layers of the bedrock. The Atoka Formation has a low yield due to its low porosity and permeability. At the site, ground water flows outward from the central process area towards the east, south, and west (**EPA, 1996d**).

3.2 Land and Resource Use

Land use in the vicinity of the site is varied. Residential areas border the site to the south and east. The western side of the site is bounded by an industrial area, and the northern side of the site is bounded by the Little Rock Air Force Base. The site itself is currently zoned for industrial use. Approximately 1,000 people live within 1 mile of the site, and approximately 29,000 people live in the city of Jacksonville. Rocky Branch Creek flows through the western side of the site, and it discharges into Bayou Meto approximately 1 mile south of the site. Ground water under the site is found within both unconsolidated surface deposits and the fractured bedrock of the Atoka Formation. Ground water at the site is not currently used, and no ground water supply wells are located within ½ mile of the site (**EPA, 1996g**). Land and resource use have not changed significantly since completion of the first five-year review, except in the northern portion of the site where the City of Jacksonville now operates a drive-through recycling facility and houses its Sanitation Department in some of the former drum storage sheds EPA constructed on the northern portion of the property during the incineration process described in Section 4. This property was released by EPA for reuse following completion of remedial actions.

3.3 History of Contamination

The first industrial facilities at the site were built in the central process area by the federal government during the 1930's and 1940's as part of a munitions complex that extended beyond the present site boundaries. In 1948, the site was purchased by the Reasor-Hill Company and converted for manufacture of insecticides such as 1,1,1-trichloro-2,2-*bis*-(p-chlorophenyl)ethane (DDT), aldrin, dieldrin, and toxaphene. During the 1950's, Reasor-Hill manufactured herbicides such as 2,4-dichlorophenoxyacetic acid (2,4-D), 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), and 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP, or "Silvex"). A major impurity formed during the production of 2,4,5-T is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). TCDD is often referred to generally as dioxin. Dioxins are a group of similar chemicals of which TCDD is the most toxic, and they represent the major contaminants of concern at the site. Reasor-Hill also stored drums of organic waste in an open field southwest of the central process area. Untreated process water was discharged from the western end of the plant directly into Rocky Branch Creek (**EPA, 1990**).

In 1961, the City of Jacksonville's sewage treatment plant (also known as the Old STP) was upgraded by adding a sludge digester, sludge-drying beds, and two 22-acre oxidation ponds. At this time, the city agreed to accept and treat wastewater from the Reasor-Hill facility, and Reasor-Hill began discharging some of its process wastewater to the city sewage treatment plant (**EPA, 1990**).

Hercules Powder Company, now known as Hercules Incorporated (Hercules), purchased the facility (consisting of Parcel 1 at that time) in 1961 and continued the manufacture and formulation of herbicides. In 1967 and 1968, Hercules also produced the herbicide Agent Orange, which was a formulation of equal parts of 2,4-D and 2,4,5-T, for the Department of Defense. The drums that were left by Reasor-Hill in the open field southwest of the central process area were buried by Hercules in what is now known as the Reasor-Hill Landfill. In 1964, Hercules built a pretreatment facility for its process wastewater that consisted of equalization basins and neutralization systems. Shortly after it took over the facility, Hercules changed the manufacturing process, which resulted in the generation of liquid and solid wastes contaminated with dioxins. These wastes were stored in drums and disposed of in the North Landfill (also known as the Hercules-Transvaal Landfill). In 1969, Hercules and the City of Jacksonville constructed a 3-acre aerated lagoon upstream from the oxidation ponds, and Hercules began discharging

all of its process wastewater to city wastewater treatment facilities (the West Wastewater Treatment Facility) at that time (**EPA, 1990**).

From 1971 to 1976, Hercules leased the facility to Transvaal, Inc., a predecessor company of Vertac. Transvaal produced 2,4-D and intermittently produced 2,4,5-T. Transvaal continued the practice of burying drums of organic wastes in the North Landfill until 1974, when Transvaal began storing the drums of waste above ground. Transvaal purchased the facility from Hercules in 1976. In 1976, Transvaal reorganized as Vertac, Inc., and was eventually renamed the Vertac Chemical Corporation. Vertac produced 2,4-D on the same equipment used to manufacture 2, 4, 5-T, which was made by Vertac until 1979. Vertac purchased Parcel 2 (the northern portion of the site) during 1978. Vertac operated the site until January 1987, when Vertac became insolvent and abandoned the site (**EPA, 1990**).

3.4 Initial Response

Six different phases of remediation were conducted at the Vertac site to address the contamination resulting from past facility operations and disposal practices. The first two remediation phases performed at the site are discussed in this section as part of the initial response. The site was later separated into four OUs to address the hazards posed by the site, and the four phases of remediation conducted for each of these four OUs are described under Section 4. A summary of each of the remedial actions performed at the site is provided in Table 2.

The Arkansas Department of Pollution Control and Ecology (ADPC&E, now the Arkansas Department of Environmental Quality [ADEQ]) issued an order in 1979 that required Vertac to improve its hazardous waste practices, and in 1980 EPA and ADPC&E jointly filed suit against Vertac and Hercules in the United States District Court for the Eastern District of Arkansas under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 *et seq*. The parties signed a Consent Decree in January 1982 which required an independent consultant to assess the site conditions and propose a remedial plan for the onsite wastes. The remedial plan proposed by the consultant under the 1982 Consent Decree included leaving hazardous wastes buried onsite in unlined pits, which was deemed unsatisfactory by EPA. The site was placed on the initial National Priorities List (NPL) on September 8, 1983; and EPA returned to court in 1984, opposing the Vertac remedial plan and seeking an order approving an EPA

alternative remedial plan, which would have required excavation of buried wastes and proper disposal in a lined landfill compliant with RCRA Subtitle C. The Court generally decided in favor of the remedy proposed by Vertac in July 1984. The Court-ordered remedy, also known as the Vertac Remedy, was implemented from mid-1984 to July 1986 (**EPA, 1990**).

The 1984 court-ordered Vertac Remedy, implemented over EPA opposition under the 1982 Consent Decree, is now considered the first phase of remediation (an initial response action). The response action included the closing and capping of the plant cooling water pond and equalization basin. Sediments from these units were removed and land filled within an area where earlier site operators had buried drums of waste. This landfill is commonly referred to as "Mount Vertac." (Seen in the background in **Photograph 31 of Attachment 4**). The land filled area was capped, and a french drain, slurry walls, and leachate collection system were installed around the burial area. Improvements were also made to the surface water collection system at that time. The remedy also included the installation of ground water monitoring wells and the initiation of a ground water monitoring program. Contaminated leachate, ground water, and surface water was pumped from a series of sumps to an onsite wastewater treatment plant, and subsequently discharged directly into Rocky Branch Creek (after meeting discharge limits established by ADPC&E) (**EPA, 1990**). For reasons related to the timing and manner of its selection and implementation, as well as to the non-CERCLA statutory and regulatory authority underlying its selection, remedial actions undertaken as part of the Vertac Remedy are not specifically subject to this five-year review as such. However, since the units, components, and elements of the Vertac Remedy were incorporated into the CERCLA site remedy selected for OU3, they are considered as a part of OU3 and thus the overall CERCLA site five-year review.

On or about January 31, 1987, Vertac shut down operations , abandoned the site, and declared bankruptcy. The plant was "mothballed," which consisted of flushing the process lines and draining several process vessels. Approximately 28,500 drums of 2,4-D (D-wastes) and 2,4,5-T (T-wastes) herbicide still bottom wastes were left onsite. Many of the drums were corroded and leaking. After the site was abandoned, EPA initiated an emergency removal action to stabilize and secure the site (**EPA, 1990**).

The second phase of environmental response was the incineration of drums left onsite when Vertac abandoned the site. As part of this response action, ADPC&E signed a contract in 1989 to have the approximately 28,500 drums of D-waste and T-wastes incinerated onsite. To accomplish the incineration, the State of Arkansas utilized a trust fund that was established when Vertac went bankrupt. Incineration of the D-wastes began in January 1992. In June 1993, funding for the project was becoming depleted, and EPA assumed responsibility for incinerating the remaining drums as a time critical removal action under CERCLA, Section 104, 42 U.S.C. §9604. In late September 1994, the incineration of the dioxin contaminated D-waste was completed at the site. In July 1994, EPA had announced that it would pursue offsite incineration of the dioxin-contaminated T waste located at the site. On or about November 9, 1994, a contract was signed between Aptus commercial incineration facility in Coffeyville, Kansas, and EPA's prime contractor, URS Consultants, for Aptus to accept the T-wastes remaining in drums at the Vertac site. The first shipment went to Aptus in November 1994, and the last shipment was sent offsite on March 29, 1996 (**EPA, 1996e**).

Approximately 28,500 drums containing D-wastes and T-wastes had been left at the site by the former owners and operators in various conditions. All drummed wastes were treated as F-listed (dioxin containing) wastes pursuant to RCRA, 42 U.S.C. §6901 et seq. (**EPA, 1996e**). Wastes from the production of 2,4,5-T at Vertac have been found to contain up to 50 parts per million (ppm) of dioxin, while wastes from the production of 2,4-D generally contain dioxin in the low part per billion (ppb) range. The second phase of remediation included the overpacking of deteriorating and leaking drums, the onsite incineration of D-wastes, the offsite incineration of T-wastes, and the dismantling, decontamination, and disposal/recycling of the incinerator, associated structures, and debris. Overall, the action resulted in the incineration of approximately 25,179 drums of D-waste and 3,200 drums of T-waste (**EPA, 1998c**).

On December 31, 1996, EPA issued a Unilateral Administrative Order (UAO) to Hercules requiring the demolition, decontamination, and disposal of the onsite incinerator, associated structures, and debris. Parts of the incinerator, structures, debris, and contaminated soil were disposed in the onsite landfill that is compliant with the requirements of RCRA, Subtitle C (hazardous waste), constructed as part of the remedy for OU1 (hereinafter referred to as the "OU1 Landfill"). The majority of the incinerator was

decontaminated, and sold to a third party for future use elsewhere. All response activities associated with the demolition of the onsite incinerator were completed in early 1998 (**ERM, 1998c**). This removal action resulted in clean closure of the northern portion of the site. O&M activities are not required for this portion of the site, and this land is available for reuse (**EPA, 1998c**).

3.5 Basis for Taking Action

The purpose of the response actions conducted at the Vertac site was to protect public health and welfare and the environment from releases or threatened releases of hazardous substances from the site. Exposure to drummed wastes, contaminated building structures and utilities, affected soil, ground water, surface water, and sediment was determined to be associated with human health risks higher than the acceptable range. The primary threats that the Vertac site posed to public health and safety were: potential releases of contamination from drummed wastes; direct contact with contaminated soils in nearby residential yards; transport and direct contact with contaminated flood plain soils and sediments; consumption of dioxin-contaminated fish in Rocky Branch Creek and Bayou Meto; transport of onsite contaminated soils and sediments to nearby populated areas, Rocky Branch Creek, and Bayou Meto by surface runoff; transport of onsite contaminated soils and sediments along sewer lines to the City of Jacksonville's wastewater treatment plant; direct contact with contaminated site buildings, other structures, and soils; and the migration of contaminated ground water offsite.

4.0 Remedial Actions

This section provides a description of the remedy objectives, selection, and implementation for each of the four OUs delineated by EPA for the site. It also describes the ongoing O&M activities performed at the site in the period since the first five-year review. The four OUs are: (a) the offsite areas; (b) OU1 (onsite above-ground media); (c) OU2 (onsite soil, curbs, foundations, and underground utilities); and (d) OU3 (ground water).

4.1 Remedy Objectives

The specific remedial objectives of the Off-Site Areas OU remedial action were:

- Remediate residential and agricultural areas to 1.0 ppb TCDD.

- Prevent direct public contact with soil containing TCDD concentrations above 1.0 ppb through soil capping.
- Prevent migration of TCDD-contaminated soil into waterways and surrounding flood plains.
- Prevent the migration of TCDD-contaminated sediments through sewage collection lines to the new Jacksonville sewage treatment facility.
- The carcinogenic risk after remedy implementation would range between 10^{-5} and 10^{-6}. It was determined that remediation for TCDD contamination would also eliminate risks associated with any other contaminants (**EPA, 1990**).

The specific remedial objectives of the OU1 (above ground media) remedial action were:

- Treat principle threat wastes (such as process vessel contents, spent carbon, shredded trash and pallets, polychlorinated biphenyl (PCB) transformer oils, and miscellaneous drummed wastes).
- Decontaminate and recycle/reuse process equipment where practicable.
- Contain low level threat wastes (demolition debris) in the onsite RCRA Subtitle C landfill.
- The carcinogenic risk after remedy implementation would be reduced to less than 10^{-6} (**EPA, 1993a**).

The specific remedial objectives of the OU2 (soils, foundations, curbs, and underground utilities) remedial action were:

- Remediate dioxins and furans to 5 ppb, expressed as toxicity equivalents (TEQs) of TCDD (toxicity equivalents use a toxicity equivalency factor for particular dioxin-like compounds to compare each compound's relative toxicity to that of TCDD).
- Remediate tetrachlorobenzene (TCB) contaminated soils to 500 ppm and treat through off-site incineration.
- Prevent water migration along underground utilities through the installation of cut-off barriers.
- Return as much land as possible to beneficial use (**EPA, 1996e**).

The specific remedial objectives of the OU3 (ground water) remedial action were:

- Prevent potential contamination of offsite ground water by controlling ground water migration through the use of ground water extraction wells and the existing french drain system.

- Prevent off-site human and environmental receptors from potential exposure to contaminated ground water discharges that would result in an adverse toxic response or a carcinogenic risk greater than 1 x 10^{-4} to 1 x 10^{-6} through treatment of extracted ground water at the onsite wastewater treatment plant.
- Use institutional controls to prevent the installation of wells onsite and prevent exposure of site workers to use of the contaminated ground water (**EPA, 1996d**).

4.2 Remedy Selection

Four RODs were issued by EPA for the Vertac site, for each of the four OUs. The Off-Site Areas OU ROD addressed the clean-up of releases to areas off the Vertac plant site. The ROD for OU1 addressed the site buildings and other above-ground contaminated media. The ROD for OU2 dealt with the remedy for subsurface contamination at the site, and the ROD for OU3 addressed the clean-up of ground water contamination at the site. The site was also addressed through other response actions (the 1984 court imposed "Vertac Remedy" and the drum incineration time critical removal action) as described in Section 3.4.

The ROD for the Offsite Areas OU was signed on September 27, 1990, to address the cleanup of contiguous offsite areas that were contaminated as a result of untreated and partially-treated surface and underground discharges of plant wastewater and other releases. Elements of this OU included an active sewer interceptor and an abandoned sewer interceptor, portions of the Old STP, the active West Wastewater Treatment Plant, and the Rocky Branch Creek flood plain (**EPA, 1990**).

The remedy described in the 1990 ROD for the Off-Site Areas OU consisted of the following elements:

- Sediments were to be removed from the active sewage collection lines and stored and incinerated onsite. Pipe liners were to be installed in the active line, and the abandoned line was to be filled with grout.
- At the Old STP, sludge was to be removed from the sludge digester and stored and incinerated onsite. The sludge drying beds were to be capped with one foot of clean soil. Accumulated water in the treatment units was to be treated and discharged, and the treatment units were to be demolished and capped with one foot of clean soil. EPA was to negotiate with the City of Jacksonville to place a restriction on the deed to keep the site zoned as commercial/industrial and to restrict access.

- The aeration basin at the West Wastewater Treatment Plant was to be drained, the dikes demolished, and the basin capped with one foot of clean soil. A notice was to be placed in the deed that recommended the site zoning remain as commercial/industrial and access restricted.
- Residentially zoned areas of the Rocky Branch Creek and Bayou Meto flood plains with TCDD concentrations above 1.0 ppb were to be excavated and the soil incinerated onsite.
- The fish in Rocky Branch Creek and Bayou Meto were to be monitored for dioxin, and the ban on commercial fishing and advisory discouraging sport fishing should continue as long as fish tissue dioxin levels remain above the Food and Drug Administration (FDA) alert level of 25 parts per trillion (ppt) (**EPA, 1990**).

Amendments to the Offsite Areas OU ROD and the ROD for OU2 were signed on September 17, 1996, which allowed the excavated media from the Vertac Offsite Areas OU to be disposed in the onsite RCRA Subtitle C landfill. The reasons for this change were: (1) the onsite incinerator had been permanently shut down, (2) the citizens of Jacksonville had expressed opposition to further onsite incineration, and (3) similar site media should be disposed in a consistent manner (**EPA, 1996f**).

The ROD for OU1, the onsite above-ground media, was signed on June 30, 1993. The above-ground media included buildings, process equipment, leftover chemicals in the process vessels, spent activated carbon, shredded trash and pallets, and miscellaneous drummed wastes at the site (**EPA, 1990**).

The remedy described in the ROD for OU1 (onsite above ground media) included the following elements:

- Onsite construction of the OU1 landfill meeting RCRA Subtitle C substantive requirements.
- Onsite incineration of F-listed wastes.
- Offsite treatment/disposal and/or onsite incineration of demonstrated non-F-listed wastes.
- Demonstrated uncontaminated raw materials were to be shipped offsite for recycle/reuse or offsite treatment/disposal, and/or onsite incineration.
- Spent carbon could be regenerated/reused in the onsite leachate collection/treatment system and/or incinerated onsite.

- Onsite incineration of drummed french drain oily leachate, spent Butyl-T, recovery waste, 2,4-D drum wash waste, and used filters.
- Onsite disposal of drummed Remedial Investigation (RI) wastes in the onsite OU1 Landfill.
- Deferment of a remedy for containerized mud and sediments collected from manholes, drains, leaf filters, drilling, and bagged soil until the ROD for OU2.
- Offsite incineration of PCB transformer oils.
- Onsite incineration of shredded trash and pallets.
- Demolition of onsite buildings and disposal of the debris in the onsite OU1 landfill.
- Process equipment was to be decontaminated to the treatment standards for hazardous debris and shipped offsite for recycle/reuse. Any equipment not meeting decontamination standards would be demolished, and the debris was to be disposed of in the onsite OU1 landfill.
- Friable asbestos containing materials (ACM) were to be removed following the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) regulations, and the resultant media was to be disposed of in the onsite OU1 landfill.
- Spent solvents generated during decontamination activities were to be incinerated onsite. Waste water generated during decontamination activities was to be treated in the onsite wastewater treatment facility and discharged to Rocky Branch Creek.
- Deferral of a decision for disposal of ash and salt generated by onsite incineration of OU1 media to be consistent with the ash and salt generated from the incineration of the drummed D-waste and T-waste (**EPA, 1993a**).

A UAO was issued to Hercules in March 1994 requiring it to perform remedial design and remedial action (RD/RA) under the ROD for OU1. Hercules' remedial design work plan expressed interest in pursuing offsite incineration as a means to perform some actions under the ROD. EPA agreed, and subsequently, an Explanation of Significant Differences (ESD) was issued in May 1995 by EPA to allow offsite incineration of F-listed process vessel contents, shredded trash and pallets, miscellaneous drummed wastes (except for RI wastes), spent carbon, and decontamination residues (**EPA, 1995b**). Hercules later signed a contract with Aptus for the offsite incineration of contaminated media required by the ROD for OU1. Hercules completed all aspects of the OU1 remedy in May 1998 (**ERM, 1998c**).

A ROD for OU2, the soil, foundations and curbs, and underground utilities, was signed on September 17, 1996. This ROD also focused on pads, and it addressed both surface and subsurface soil. (**EPA, 1996e**). As part of the remedy for OU2, a treatability variance from the Land Disposal Restrictions (LDRs) was granted by the Regional Administrator on July 18, 1996. The variance granted a change in the LDR treatability standard for dioxin-contaminated wastes from 1 ppb to 5 ppb. As noted above, the OU2 ROD allowed certain offsite OU waste to be consolidated onsite in the OU1 landfill. This standard would apply should placement of wastes be determined to have occurred in the onsite OU1 landfill (**EPA, 1996g**).

The remedy for OU2 as described in the 1996 ROD included the following elements:

- Soil in the northern and southern parcels containing dioxin concentrations above 5 ppb were to be excavated and disposed in the onsite OU1 landfill. All excavated areas were to be backfilled with clean soil and re-vegetated, and drainage modifications were to be made to control run on and runoff.
- Excavation and offsite incineration of soil containing TCB concentrations above the 500 ppm health-based action level. All excavated areas were to be backfilled with clean soil, graded, and re-vegetated.
- Consolidation in the OU1 landfill of approximately 2,770 cubic yards of dioxin contaminated soil excavated from residential yards by Hercules in 1989.
- Consolidation in the OU1 landfill of contaminated soil to be excavated from the Rocky Branch Creek and Bayou Meto floodplains.
- Consolidation in the OU1 landfill of approximately 890 cubic yards of digester sludge from the Old STP and about 2 cubic yards of sediment removed from the interceptor lines as part of the offsite areas OU.
- Cleaning and removal of solids from underground chemical sewer lines. The lines would then be filled with grout, and cut-off barriers would be installed around various underground utility lines to prevent shallow water migration.
- Foundations and curbs were to be cleaned through scarification, and surface sealing was to be employed for areas where staining is persistent. The foundations and curbs were to be covered with enough soil to support vegetative growth and graded to prevent erosion and the ponding of water.

- During the RA, air monitoring and dust suppression were to be conducted to prevent airborne migration of contaminants offsite.
- EPA would work with the City of Jacksonville and the Vertac receiver to impose deed restrictions and/or land use restrictions to limit the use of the property.
- Long-term O&M measures were to be implemented to ensure that the integrity of the OU1 landfill is maintained.
- A phased-fencing approach was to be used for the southern parcel, to allow the maximum amount of property possible to be available for potential commercial redevelopment (**EPA, 1996e**).

In 1997, studies by the Agency for Toxic Substances and Disease Registry (ATSDR) and the Arkansas Department of Health (ADH) determined that a resident near the Vertac site had elevated levels of dioxin in blood. ATSDR and ADH recommended that the soil in the area be further investigated (**ATSDR, 1997b**). EPA and Hercules both collected additional soil samples, and the results showed that four residential properties east of the Vertac site contained soil contaminated with TCDD above the 1 ppb residential action level. These yards were designated the Jacksonville Residential Areas Superfund Site. To address the yards, EPA signed an ESD for the OU2 ROD on January 12, 1998. This ESD determined that the Jacksonville Residential Areas Superfund Site was part of an "area of contamination" under OU2 of the Vertac Superfund Site, and it stipulated that soils excavated from the residential yards were to be disposed in the onsite OU1 landfill (**EPA, 1998b**). Response activities eventually affected nine residences and a portion of the Vertac site east of Marshall Road. All activities associated with the RA for the Jacksonville Residential Areas Superfund Site were completed in May 1998 (**EPA, 1998a**).

The ROD for OU3, ground water, was signed on September 17, 1996. This ROD called for the use of a new ground water extraction system and the existing french drain system (Vertac Remedy) to impede the offsite migration of contaminated ground water, and invoked a Technical Impracticability (TI) Waiver for Non Aqueous Phase Liquids (NAPLs) identified in the tilted, fractured bedrock system. The presence of NAPL in the bedrock system precluded the cleanup of contaminated ground water using existing technology, and thus the maximum contaminant levels (MCLs) specified at 40 CFR §141.11-26 were waived as unachievable (**Roy F. Weston, 1996, and EPA, 1996g**). The ROD also called for five-year reviews to evaluate the performance of the hydraulic containment system and to determine if any new

technologies are available to remediate the contaminated ground water to confirm the continued applicability of the TI waiver (**EPA, 1996g**).

The remedy described in the 1996 ROD for OU3 included the following elements:

- Installation of extraction wells in the central process area to hydraulically control the offsite migration of ground water to the east.
- Continued operation of the french drain to impede contaminant migration to the south and west.
- Proposed use of the Reasor-Hill well and MW-92 as additional extraction wells to help remove contaminants from the center of mass.
- Treatment of extracted ground water in the onsite wastewater treatment facility.
- Granted a TI waiver. This waiver established a TI zone within the central process area where the MCLs are unachievable due to the presence of NAPL in the fractured, tilted bedrock system.
- Established Plume Concentration Levels (PCLs) for contaminants that were to be monitored at the edge of the TI zone. The PCLs act as a trigger level. If a PCL is exceeded, additional actions would be required to ensure the protectiveness of the remedy.
- Established a semi-annual ground water monitoring program to assess the effectiveness of the remedy at containing the contaminant plume, including monitoring wells that were already installed in connection with the Vertac Remedy.
- Restrictions should be imposed on the use of the ground water at the site (**EPA, 1996g**).

EPA determined that containment, rather than treatment, of the contaminated ground water was an appropriate approach for OU3. This decision was based on the presence of NAPLs in the ground water system that could not be remediated effectively using existing technologies. Also, the Atoka Formation underlying the site has limited potential as a water resource, and there was no anticipated future use of the ground water at the site (**EPA, 1996g**).

The remedial action goals were to prevent the offsite migration of contaminated ground water and to prevent offsite receptors from potential exposure to contaminated ground water discharges. The PCLs were established for selected compounds in order to monitor the boundaries of the plume. These levels were established based on both carcinogenic and non-carcinogenic risks ranging from $1x10^{-4}$ to $1x10^{-6}$.

The PCLs are listed in Table 3. The ROD states that if the PCLs are initially exceeded, then monitoring would increase from semi-annually to quarterly. Additional actions that may be required to contain the plume could include changing the pumping rates on the existing extraction system and/or installing new wells or reworking existing wells to provide better containment, capture, and control (**EPA, 1996g**).

4.3 Remedy Implementation

The selected remedies for the Vertac Incorporated Superfund Site have been implemented through various UAOs issued by EPA from 1993 to 1996 to the remaining Potentially Responsible Parties (PRPs) for the site: Hercules, Inc., Uniroyal Chemical Ltd., and Vertac Chemical Corporation. The UAOs instructed the PRPs to implement the RD/RA for the selected remedies, however, only Hercules Incorporated complied with the UAOs. A Statement of Work (SOW) defining the remedial actions was attached to each UAO.

A UAO was signed by EPA on June 22, 1993, instructing the PRPs, including Hercules, to implement the remedies selected in the ROD for the Offsite Areas OU (**EPA, 1993b**). Remedial actions conducted for the Offsite Areas OU ROD included the cleaning of the two interceptor lines, removal of sludge from the sludge digester and capping of the sludge drying beds at the Old STP, the demolition and capping of the aeration basin at the West Wastewater Treatment Plant, and the excavation of contaminated sediments from residential areas in the Rocky Branch Creek and Bayou Meto flood plains (**ERM, 1998b**).

The 1993 UAO SOW required the following for the excavation of flood plain soil:

- Soil containing TCDD concentrations greater than 1.0 ppb be excavated to 12 inches.
- Soil containing TCDD concentrations greater than 10.0 ppb be excavated to 4 feet or to bedrock.
- Excavated areas where TCDD concentrations were between 1.0 and 10.0 ppb should be backfilled with 12 inches of clean soil.
- Excavated areas where TCDD concentrations exceeded 10.0 ppb should be backfilled with 4 feet of clean fill or returned to original grade, whichever is less.
- All excavated areas were to be re-graded and re-vegetated.

Hercules was instructed in the SOW to plan the excavation to coincide with the issuance of the ROD for OU2 to avoid long-term storage of the soil at the site (**EPA, 1993b**). On June 27, 1997, Hercules awarded the RA contract to ENSR, and mobilization to the site began during the week of July 7, 1997. RA activities began with the clearing of vegetation to allow access to grids established for the purposes of sampling and excavation. Samples were collected prior to excavation, except for those grids immediately next to Rocky Branch Creek, which were known to be contaminated. Excavation occurred in 6 to 12 inch intervals. After each interval, confirmation samples were collected to determine if further excavation was required. Eight grids on the west side and ten grids on the east side of Rocky Branch Creek were excavated. Excavation of the flood plain soil was completed in October of 1997, and the backfilling, grading, and seeding were completed by early April 1998 (**ERM, 1998b**).

A UAO was issued on March 24, 1994, requiring the implementation of the RD/RA for OU1 (**EPA, 1994**). Another UAO for the implementation of the RD/RA for OU2 was issued on December 10, 1996 (**EPA, 1996c**). With EPA concurrence, Hercules amended the OU1 RD documents to incorporate the work required for OU2. This allowed for the administration of a comprehensive remedial action for both OUs (**ERM, 1998a**).

While completing the RD, several site stabilization activities were completed in advance to better facilitate work during the RA. These activities included the removal of process vessel contents, storage tank contents, and drummed wastes, asbestos abatement and storage of ACM, the removal of TCB and TCB contaminated soil, and the construction of the OU1 landfill. Liquid and solid wastes from process vessels were separated into F-listed wastes and non-F-listed wastes. All F-listed wastes were sent to the Aptus incinerator in Coffeyville, Kansas, and all non-F-listed wastes were sent to the Chemical Waste Management Facility incinerator in Port Arthur, Texas. The removal of the process vessel contents was conducted between August 1995 and July 1996. Approximately 1,353,720 pounds of spent carbon were also removed from the site and sent to the Aptus incinerator between August 1996 and February 1997. In January and February 1996, Environmental Resources Management (ERM) performed an asbestos assessment to prepare for ACM abatement activities at the site. Asbestos was found in both friable and non-friable forms in insulation for buildings, vessels, piping, and fittings, as well as in roofing and siding shingles, tar paper, and floor tiles. Abatement activities occurred during April and May 1996, and all

materials were wrapped in plastic and stored for disposal in the onsite OU1 landfill. The excavation of TCB and TCB-contaminated soil began in May 1997. These contaminated media were sent to Aptus for incineration. Progress was dependent upon the availability of incinerator capacity, and the work was completed in October 1997. Approximately 2.2 million pounds of TCB-contaminated material was sent to Aptus. Mobley Contractors was awarded the contract to construct the onsite OU1 landfill. Construction work began in August of 1996. The OU1 landfill was completed in June 1997 (**ERM, 1998a**).

Mobilization for the comprehensive RA for OU1 and OU2 began on July 9, 1997. ENSR was awarded the RA contract by Hercules, and ERM performed quality assurance for Hercules during the RA. The US Army Corps of Engineers performed oversight for EPA during this RA. Activities completed for the OU1 and OU2 RA included the demolition of plant buildings, removal and offsite incineration of PCB transformers, transportation and offsite incineration of shredded trash and pallets, excavation of onsite TCDD-contaminated soil, cleaning and grouting of underground chemical sewers, installation of trench cutoff barriers along underground utility lines, cleaning of exposed surfaces of building foundations and curbs, decontamination of process equipment and associated materials suitable for recycle/reuse, backfilling of site to final grade, consolidation of materials into the onsite OU1 landfill, and capping and closure of the onsite OU1 landfill. All activities were completed in June 1998 (**ERM, 1998a**).

As a result of RA activities, 952 tons of equipment, scrap tin, and scrap steel were shipped offsite for recycle/reuse. Efforts to recycle/reuse site materials resulted in a redesign of the final grade for the cap of the OU1 landfill. The final elevation was lower than originally designed. Approximately 2 million pounds of shredded trash and pallets and 4 PCB transformers were shipped to Aptus for incineration. Materials disposed of in the onsite OU1 landfill included demolished site buildings, structures, process equipment, debris, ACM, RI derived wastes, bagged residential soil, drainage ditch soil, Rocky Branch Creek flood plain soil, site soil, drummed sludge and sewer solids, onsite TCDD contaminated soil, and wastes, and debris and soil from remediation of the northern parcel of land (**ERM, 1998a**).

For the removal of onsite TCDD-contaminated soil, an approach similar to that for the Rocky Branch Creek flood plain soil was employed. Additional soil sampling had determined that TCDD represented

70% of the dioxin TEQ results. Therefore, the clean-up goal of 3.5 ppb TCDD was used for the RA. Grids containing between 3.5 and 35 ppb of TCDD after the initial excavation required no additional excavation provided that the grid was covered with one foot of clean backfill (**ERM, 1998a**).

On December 31, 1996, EPA signed a UAO requiring Hercules to perform a Non-Time Critical Removal action for the dismantling, decontamination, and demolition of the onsite incinerator, associated structures, and debris (**EPA, 1996a**). Activities associated with this action included the demolition and decontamination of the onsite incinerator facility and associated structures, shipment of some materials offsite for recycle/reuse, excavation of soil contaminated above 1 ppb TCDD, stabilization of excavated soil and incinerator ash, and onsite disposal in the OU1 landfill of soil, incinerator ash, shredded pallets, and all equipment that could not be recycled or reused. As part of this removal action, several buildings on the northern parcel were decontaminated and left in place for potential reuse if the site is redeveloped. Removal activities began in early July 1997 and were completed in March 1998 (**ERM, 1998c**).

On December 10, 1996, EPA signed a UAO requiring Hercules to perform the RA for OU3 (**EPA, 1996b**). The objective of RA for OU3 is to hydraulically contain the flow of the shallow contaminated ground water at the site through the use of extraction wells and the french drain. Prior to construction of the remedy for OU3, a new wastewater treatment facility was constructed by Hercules at the site. This construction occurred between January and June of 1997. Activities conducted as part of the RA for OU3 included the construction of the Ground Water Recovery Building, installation of additional monitoring wells, installation of the extraction wells, and the development of a site wide ground water monitoring plan. Construction of the remedy for OU3 began in December 1997. The extraction wells were connected to a collection/transfer tank in the Ground Water Recovery Building through underground piping, and the collection/transfer tank was connected to the new wastewater treatment facility through underground piping. The ground water extraction system was put into operation on May 19, 1998, and all RA activities for OU3 were completed in June 1998. The ROD had proposed the use of the Reasor-Hill well as an additional extraction well to remove NAPL in the central process area. During excavation activities associated with the RA for OU2, the well was buried. Attempts to locate the well were unsuccessful, and the well has not been plugged and abandoned (**Maud, 1998**).

4.4 Operations and Maintenance

As the Respondent under several EPA CERCLA Unilateral Administrative Orders (UAOs), Hercules is the site operator and is responsible for O&M activities at the site. Due to the complexity of the Vertac site, the remediation occurred in several phases; and several O&M plans were initially prepared and implemented at the site. In the time since completion of the first five-year review, a single comprehensive draft O&M Manual has been written for the site by Hercules' site operations contractor Genesis Environmental Consulting, Inc. (GEC), which currently staffs the site with two operator personnel (**Hercules, 2002**). GEC reported at the second five-year review site inspection that current O&M activities are conducted in accordance with this manual. EPA's review of the draft Sitewide O&M Manual is described in a letter from EPA to Hercules dated September 2003 (**EPA, 2003a**). ADEQ's review of the draft December 2002 Sitewide Operations and Maintenance Manual is described in a letter from ADEQ to EPA (with copy to Hercules) dated February 12, 2003 (**ADEQ, 2003**). The manual needs to be updated in accordance with all review comments, and resubmitted to the regulatory agencies for final review and approval. In particular, it has been noted that the revised manual should specify more direct communication of problems and followup actions to the regulatory agencies.

O&M activities at the site include the continued operation and upkeep of the french drain and ground water extraction system, operation and upkeep of the wastewater treatment plant, inspections and upkeep of the OU1 landfill, inspections and maintenance of the fences at the site, maintenance of the ground water monitoring wells, semi-annual ground water monitoring, biannual (every other year) fish monitoring in Bayou Meto, Rocky Branch Creek, and Lake Dupree, sampling of the effluent from the wastewater treatment plant, sampling of storm water at two locations along Rocky Branch Creek, and mowing of the capped burial areas at the site. O&M activities are conducted by onsite personnel, and routine maintenance and monitoring of the various components of the remedy are conducted on a weekly and monthly basis as described by the draft December 2002 Sitewide O&M Manual (**Hercules, 2002**) and summarized in the following paragraphs.

The OU1 landfill is inspected once a month to verify the integrity of the landfill cap and associated components. The leachate collection system and leachate detection system are monitored every two weeks, and leachate is extracted on an as needed basis. The site operator indicated during the second

five-year review site inspection that leachate is generally removed from the leachate collection system of the north cell about every two weeks, depending upon rainfall (about 300 gallons per month). The site operator also indicated that leachate rarely needs to be removed from the leachate collection system of the south cell. The cause of leachate generation in the north cell was suspected at the time to be due to a leak identified in the top liner of the north cell. Actions taken and recommendations for addressing this disparity in leachate volume should be documented in the next annual progress report for the site and reviewed by EPA and ADEQ.

The french drain and ground water extraction system are monitored remotely from the wastewater treatment facility, and repairs are made as necessary to both systems. The french drain sumps and ground water extraction and monitor wells are inspected monthly. Water levels are collected on a monthly basis to verify that the ground water flow gradients indicate the contaminant plume is still contained. Ground water sampling has been conducted semi-annually since the construction of the ground water extraction system was completed (results of ground water sampling events since 1998 are presented in **Table 4**).

Biannual (every other year) monitoring of fish tissue in Rocky Branch Creek and Bayou Meto has occurred since 1994 (sample locations are illustrated in **Figure 2**). Samples have also been collected in certain events at Lake Dupree (which is outside the scope of the site CERCLA remedy). The last sampling event occurred in the summer of 2002 (results of fish sampling events conducted since 1994 are presented in **Table 5**)

The fences at the site are inspected monthly. The site operator inspects the signs on the fence and condition of the fence. In addition, each gate is inspected to verify that it is still locked, and observations are made to determine if obvious signs of trespassing are present along the site fence.

The wastewater treatment plant is inspected monthly to verify that all equipment is operational and no leaks are present. In addition, the system has been automated. Operators can access the system remotely via computer to determine the operational status of the wastewater treatment plant, amounts of water stored in tanks, and the daily pumping and status of the french drain and ground water extraction well

pumps. The wastewater treatment plant effluent is sampled in accordance with discharge requirements, and the results are submitted to the ADEQ monthly. In addition, water samples are collected and analyzed prior to entry into the first carbon treatment unit, after exiting the first carbon treatment unit, and after exiting the second carbon treatment unit. This data is used to determine when the carbon needs to be replaced in the treatment units.

4.5 Progress Since Initiation of Remedial Action

During the remedial action, approximately 10,000 cubic yards of highly contaminated wastes were incinerated. Approximately 25,000 cubic yards of contaminated debris (from the demolition of buildings and equipment) and 20,000 cubic yards of contaminated soil were disposed in the onsite RCRA Subtitle C landfill. All remedial actions were completed for the site in 1998; EPA and the State of Arkansas conducted the final inspection on June 24, 1998 (**EPA, 1998c**). Much of the northern portion of the site (the area of approximately 100 acres adjacent to the former 93 acre plant site) has been released for reuse, and long-term O&M is ongoing for the southern portions of the site, which includes the landfills and ground water extraction and treatment system (**EPA, 2000**). In the period since completion of the first five-year review, the City of Jacksonville municipal government has assumed possession of the northern part of the site, and now operates a drive-through recycling facility and houses its Sanitation Department in some of the former drum storage sheds EPA constructed during the incineration process (refer to **Photographs 53** and **54** of **Attachment 4** of this five-year review).

In the southern portion of the site, there have been eight rounds of ground water sampling since 1998, (results presented in **Table 4**), and water levels have been collected on a monthly basis. Fish sampling has been conducted biannually in Bayou Meto and Rocky Branch Creek (results presented in **Table 5**). The site is inspected regularly to ensure that all components of the remedy are functioning properly, and the security fence is well maintained to restrict access to the site. The wastewater treatment plant treats approximately 12 million gallons of water annually, dependent upon rainfall totals and subject to ADEQ discharge limitations. The treatment plant wastewater discharge is sampled monthly to ensure compliance with the ADEQ discharge limits.

5.0 Progress Since the First Five-Year Review

The first five-year review of the Vertac Site was completed in July 2001, for the period from November 1993, when RA activities began on the site, through December 2000. The findings of the first five-year review, the status of recommendations and follow-up actions, the results of implemented actions, and the status of any other issues are described in the following sections.

5.1 Protectiveness Statements from First Five-Year Review

The first five-year review report concluded that the remedial actions implemented at the Vertac site were protective of human health and the environment, subject to implementation of the first five-year review report's recommendations and follow-up actions. The report also noted that the determination of protectiveness was made under the existing health effects assessment and guidance on dioxin, and that EPA was conducting an ongoing reassessment of dioxin exposure and human health effects. The report noted that the results of this reassessment could potentially impact future determinations regarding protectiveness at the site.

5.2 First Five-Year Review Recommendations and Follow-up Actions

The first five-year review of the Vertac site, completed in July 2001, recommended the following followup actions (**EPA, 2001a**):

- The ROD for the Offsite Areas OU required that fish in Bayou Meto and Rocky Branch Creek be monitored, and that a ban on commercial fishing and an advisory to discourage sport fishing be continued as long as dioxin levels remain above the FDA alert level for fish consumption. The FDA alert level for dioxin in fish tissue is 25 ppt. EPA currently recommends the use of 0.7 ppt as a screening value for dioxin in fish tissue, however, while a reassessment of dioxin exposure and human health effects is ongoing. Because the current fish advisory was based on the 25 ppt level, the first five-year review recommended that the ADH review the status of the fish consumption advisory for Bayou Meto and Rocky Branch Creek, including the action level for dioxin in fish used to establish the fishing advisories for Bayou Meto and Rocky Branch Creek, to determine if a lower level is necessary to maintain the remedy's protectiveness in light of EPA's 0.7 ppt screening level established in its fish advisory guidance based upon human health risk analysis. In addition, the first

five-year review recommended ADH reinstate the pre-existing boundaries for the fish consumption advisory pending the outcome of the review of action levels.

- To consolidate the various O&M Plans in place for the site, the first five-year review recommended finalization of a Sitewide O&M Manual, and submission of this manual to the regulatory agencies for review.
- To address the requirements of the discharge limits set by the ADEQ for the site, a Storm Water Pollution Prevention Plan is required for the site; the first five-year review recommended this plan be completed and submitted to the ADEQ for review and approval.
- To allow more comprehensive reviews of the annual ground water monitoring progress report by the regulatory agencies, the first five-year review recommended that the site operator provide Level III data packages with one progress report per five-year review period.
- Because some areas of the RCRA Subtitle C landfill cap demonstrated sparse vegetation during the first five-year review site inspection, the first five-year review report recommended the vegetation be reestablished and maintained to prevent future erosion of the cap.
- In accordance with the requirements of the OU3 ROD for each five-year review, the first five-year review recommended that the second five-year review also include an assessment of the availability of technologies to remove NAPL from the fractured bedrock at the site (this reassessment is required by the OU3 ROD to be included in each five-year review for the site).

5.3 Status of Recommended Actions

This section describes the current status of implementation of the recommendations included in the first five-year review report.

As a part of interviews conducted during the second five-year review, Ms. Shirley Louie/ADH indicated that the ADH has not yet completed the evaluation of the limits of the fishing advisory recommended by the first five-year review. Some additional data has been collected to support this evaluation however: fish tissue samples were collected by the Arkansas Game and Fish Commission for ADH at the downstream limit of the current fish advisory in 2001 (downstream of the State Highway 13 bridge), and analyzed by EPA (**CH2M HILL, 2002**). These results are presented on **Table 5** and discussed in **Section 6** along with the results of biannual fish tissue monitoring conducted by Hercules. Ms. Louie

acknowledged that recent literature on dioxins indicates a need to reassess the ban, especially in consideration of the results from the 2000 and 2001 fish sampling events. At the time of the interview, Ms. Louie indicated that the data from the 2002 fish sampling had not been made available to her yet by the PRP, and that she was awaiting those results before taking any action on the first five-year review recommendation that the fishing ban in Bayou Meto be reassessed.

Regarding the recommendation for completion of a draft Sitewide O&M Manual, Hercules has prepared and submitted a comprehensive draft Sitewide O&M Manual to EPA and ADEQ for review (**Hercules, 2002**). This manual also includes a Storm Water Pollution Prevention Plan for the site. GEC operator employees are using this December 2002 version of the draft manual to implement O&M activities at the site. EPA's initial review of the draft December 2002 Sitewide O&M Manual is described in a letter from EPA to Hercules dated September 2003 (**EPA, 2003a**). ADEQ's review of the draft December 2002 Sitewide Operations and Maintenance Manual is described in a letter from ADEQ to EPA (with copy to Hercules) dated February 12, 2003 (**ADEQ, 2003**). The manual needs to be updated in accordance with all review comments, and resubmitted to the regulatory agencies. In particular, it has been noted that the revised manual should specify more direct communication of problems and followup actions to the regulatory agencies.

The first five-year review recommended that the site operator provide Level III data packages (vice Level II) with at least one of the required annual progress reports per five-year review period to provide for more comprehensive review of data quality in the annual ground water monitoring progress report by the EPA and ADEQ. Although this requirement has not yet been fully implemented, the site operator has been directed to include a Level III data package with the report of analytical sampling and analysis from the October 2003 ground water monitoring analysis. The site operator should also be directed to amend the ground water monitoring plan to provide for this requirement and implement it, commencing with a Level III data package in the 2003 annual progress report.

Regarding the first five-year review recommendation that the vegetative cover on the OU1 landfill cap be reestablished and maintained to prevent erosion of the cap, it was noted during the second five-year review site inspection that the vegetation was still sparse in some areas of the cap, though perhaps not as

widespread as during the first five-year review site inspection. GEC operator employees indicated during the second five-year review site inspection that the vegetation on the cap varies throughout the year with the amount of rainfall received, and also noted that conditions had been dryer than normal at the time of the site inspection. No significant erosion features were observed during the second five-year review site inspection. A follow-up inspection was conducted by the EPA Remedial Project Manager (RPM) on August 5, 2003, and it was observed at that time that the trees had been removed in accordance with discussions between the EPA RPM and the site operator during the April 2003 five-year review site inspection. The EPA RPM had reiterated to the site operator the importance of maintaining vegetation on the cap, as well as noting the problem with the growth of small trees into the caps of the OU1 landfill and the North and Reasor-Hill drum burial areas, as discussed in sections 6.6, 7.1, 7.4, 8.0, and 9.0 of this report below.

Regarding the first five-year review recommendation that the next five-year review include another assessment of the availability of technologies to remove NAPL from the fractured bedrock at the site to confirm the status of the TI waiver for the ground water, this assessment has been performed as part of this second five-year review. The results of this assessment are included in Section 7.4 of this report.

6.0 Five-Year Review Process

This second five-year review for the site has been conducted in accordance with the EPA's Comprehensive Five-Year Review guidance dated June 2001 (**EPA, 2001b**). Interviews were conducted with relevant parties; a site inspection was conducted; and applicable data and documentation covering the period of the review were evaluated. The activities conducted as part of this review and specific findings are described in the following paragraphs.

6.1 Administrative Components

The five-year review for this site was initiated by the EPA when EPA contractor CH2M HILL, Inc., was tasked to perform the technical components of the review. A public notice announcing initiation of the five-year review was published in the *Arkansas Democrat-Gazette*, the *North Pulaski Leader*, and the *Jacksonville Patriot*. The review team was led by the EPA RPM for this site, Mr. Philip Allen/ EPA Region 6. Two ADEQ agency representatives, Mr. Masoud Arjmandi/ ADEQ and Mr. Jerry Neill/

ADEQ, assisted the review team, providing information related to the Vertac site and assistance during the second five-year review site inspection. The components of the review included community involvement, document review, data review, a site inspection, interviews, and development of this five-year review report, as described in the following paragraphs.

6.2 Community Involvement

A public notice announcing initiation of the five-year review was published in the *Arkansas Democrat-Gazette*, the *North Pulaski Leader*, and the *Jacksonville Patriot* during May 2003. Upon signature, the second five-year review report will be placed in the information repositories for the site, including the City of Jacksonville City Hall, the ADEQ office in Little Rock, Arkansas, and the EPA Region 6 office in Dallas, Texas. A notice will then be published in the *Arkansas Democrat-Gazette*, the *North Pulaski Leader*, and the *Jacksonville Patriot* to summarize the findings of the review and announce the availability of the report at the information repositories. Copies of the two public notices are provided as **Attachment 5** to this report.

6.3 Document Review

This second five-year review for the site included a review of relevant site documents, including decision documents, construction and implementation reports, quarterly and annual operations reports, and related monitoring data. Documents reviewed are listed in **Attachment 1a**. Copies of relevant correspondence are provided in **Attachment 1b**.

6.4 Data Review

Performance and compliance monitoring data collected as part of O&M activities at the site were reviewed as part of this second five-year review. These data consist of ground water quality data, ground water level measurements, wastewater treatment plant discharge data, and fish tissue monitoring data.

The treatment plant discharge data are collected monthly and compiled in monthly reports submitted to the ADEQ (**Hercules, 2003**). Through October 2001, ground water quality data was collected semi-annually and submitted in an annual progress report (**Maud, 2001** and **Maud, 2003**). As described in the annual progress reports, after October 2001 the ground water sampling frequency was reduced to biannual (every other year). Currently, under this plan revision, the next ground water sampling event is

scheduled for October 2003. However, EPA will be conducting a review of this requirement as noted in Section 9.0 below; and in the interim, the site operator is directed to resume semi-annual sampling in the first quarter of calendar year 2004, and to continue on a semi-annual basis until otherwise directed by the EPA. The site operator will also be directed to modify the Sitewide Ground Water Monitoring Plan to reflect this change. Ground water level measurements are collected on a monthly basis, and this data is also submitted in the annual progress report (**Maud, 2001** and **Maud, 2003**). The fish tissue monitoring data is collected biannually and submitted in a biannual report (**GMB & Associates, 2003**). Ground water quality data available for the site since 1998 is summarized in **Table 4** (through October 2001). Fish tissue monitoring data available for the site through 2002 is summarized in **Table 5**.

The ground water monitoring data collected through October 2001 indicates that the MCLs and PCLs are not being exceeded outside of the TI zone (**Maud, 2003**). In general, reported contaminant concentrations have either decreased or been steady since the ground water monitoring program began in 1998, although one well (MW-77) continues to exhibit elevated chloride detections (up to 520 mg/L in October 2001) that exceed the secondary MCL (250 mg/L).

The annual progress report for May 2000 through May 2001 proposed to reduce the analyte list for the sampling program by eliminating 2,3,7,8-TCDD and tetrachlorobenzene (**Maud, 2001**). The reduction in the analyte list was approved by the ADEQ in a letter dated September 5, 2000, with the exception that these two compounds would continue to be monitored in the wells at the OU1 landfill (**Maud, 2003**). In accordance with the ADEQ approval, in the last two sampling events covered by the May 2001 to May 2002 annual report (April and October 2001), the compounds 2,3,7,8-TCDD and tetrachlorobenzene were analyzed in samples from the monitor wells at the RCRA landfill, though not in other wells (**Maud, 2003**). Neither of these compounds have been detected in any monitored ground water wells since the post-remediation monitoring program began in 1998. Also, the frequency of ground water sampling was reduced as of October 2001 to biannual (every other year). The annual progress reports indicate that this was done in accordance with the October 1997 Sitewide Ground Water Monitoring Plan (**Maud, 2003**). EPA will undertake a review of these requirements; and in the interim, the site operator is directed to continue with semi-annual sampling of all site ground water monitoring wells and to make the appropriate change in the ground water monitoring plan to reflect the change. The site operator is

directed to restore 2,3,7,8-TCDD to the analyte list for all site monitor wells. This issue is discussed further in Section 9.0 below.

The water level data available in the 2001 and 2002 annual progress reports indicate that the ground water extraction system is containing the flow of ground water to the east in the fresh bedrock aquifer. These results also indicate that the ground water extraction system is containing the contamination along the eastern edge of the TI zone (**Maud, 2003**). The french drain system is installed to the bedrock surface and intercepts the flow of all contaminated ground water to the west and south at the site (**EPA, 1996d**).

The wastewater treatment plant discharge data is collected on a monthly basis, and the data is submitted to the ADEQ in monthly reports. The data from July 2001 through March 2003 were reviewed as part of this second five-year review. The data show that the treatment plant exceeded the discharge limit for 2,3,7,8-TCDD in December 2001, February, March, and April 2002, and January 2003 (**Hercules, 2003**). Except those exceedances noted below, all other discharge requirements were met, during the requisite period. After their analysis, the site operator determined that the cause of the reported 2,3,7,8-TCDD exceedances was the result of using contaminated backwash water to flush the carbon filters, and the presence of some leaking valves. EPA intends to further evaluate this issue, and it is further addressed in Section 9.0 below.

The wastewater treatment discharge data also shows that the monthly average limit for total dissolved solids (TDS) and chlorides was exceeded in July and November 2001, and for the months June through October 2002. In addition, the maximum daily average for TDS and chlorides were exceeded at least once for the months July through October 2002 (**Hercules, 2003**). The cause of these exceedances has not been documented, but EPA intends to examine this issue further as noted in Section 9.0.

Finally, various chlorophenol, dichlorophenol, trichlorophenol, and pesticide compounds are regularly detected in the wastewater treatment plant discharge samples (**Hercules, 2003**). There are no discharge limits set for these compounds, but the ADEQ discharge permit does require that results for these

compounds be reported in the monthly reports (**ADPC&E, 1996**). The cause for these detections has not been documented, but EPA intends to further analyze this matter as noted in **Section 9.0**.

Fish flesh monitoring has historically been performed at seven locations: one in Rocky Branch Creek; one in Lake Dupree; and five along Bayou Meto. The locations sampled in Bayou Meto are (from upstream near the site to downstream): US Highway 67, State Highway 161, Interstate 40, State Highway 15 and State Highway 13. Refer to **Figures 2** and **3** for the layout of Rocky Branch Creek and Bayou Meto relative to the site, and the locations of the highway intersections with Bayou Meto where fish tissue samples are collected. Hercules currently performs biannual fish tissue monitoring at the Rocky Branch Creek location and four Bayou Meto locations (US Highway 67, State Highway 161, Interstate 40, State Highway 15). The last biannual sampling event occurred in July and August 2002 (**GMB, 2003**). In May 2001, the Arkansas Game and Fish Commission conducted sampling of fish tissue for the ADH in Bayou Meto below the Arkansas State Highway 13 bridge (the furthest downstream location) (**CH2M Hill, 2002**), in part to provide data for the evaluation of the current extent of the fish consumption advisory in place downstream from the Vertac Site, as recommended by the first five-year review. The current extent of the fish consumption advisory (to the State Highway 13 bridge) is shown on **Figure 3**. The analytical results for all sampling events are presented in **Table 5**.

Geographically, the fish tissue sample results show a general decreasing trend in the 2,3,7,8-TCDD results downstream of the site towards the furthest-downstream sampling location at the State Highway 13 bridge. During the period 2000 to 2002, the highest concentrations of 2,3,7,8-TCDD were detected in fish tissue collected during the 2000 and 2002 events at the State Highway 161 and Rocky Branch Creek locations, and the lowest concentrations of 2,3,7,8-TCDD were detected in the 2001 samples collected near the Arkansas Highway 13 bridge.

At each sample location over time, the data also generally shows a decreasing trend of 2,3,7,8-TCDD concentrations. The one exception is for fish tissue collected at the Lake Dupree and US Highway 67 sampling locations, where the 2,3,7,8-TCDD concentration increased in largemouth bass from 2000 to 2002 (more significantly in the Lake Dupree sample). Although Lake Dupree has been the subject of a

separate cleanup response effort involving the ADEQ, it has not been the subject of CERCLA remedial action and is not formally a part of the Vertac Site five year review.

All sample results have been below the FDA alert level of 25 ppt dioxin in fish tissue samples that is utilized by the ADH. However, fish tissue at all sampled locations demonstrated the presence of 2,3,7,8-TCDD concentrations above the current EPA recommended screening level of 0.7 ppt (**EPA, 1995a**), including four out of seven fish tissue samples collected by the Arkansas Game and Fish Commission downstream of the State Highway 13 bridge (where there is no fish consumption advisory in effect).

The most recent biannual fish sampling report submitted by Hercules Incorporated recommended that the fish consumption advisory be lifted on Bayou Meto between the State Highway 15 bridge and the State Highway 13 bridge (**GMB & Associates, 2003**). This Hercules recommendation was based on its results indicating concentrations below the FDA alert level of 25 ppt TCDD in fish tissue samples. The Hercules report also recommended the cessation of biannual fish tissue monitoring at the State Highway 15 bridge location to coincide with the recommended lifting of the fish consumption advisory downstream of this location (**GMB & Associates, 2003**). However, the Hercules recommendations fail to take into account the EPA guidance recommended screening level (**EPA, 1995a**) and the fact that this matter is under review by the ADH at the request of EPA in the first five year review.

6.5 Interviews

During the course of this five-year review, interviews were conducted with several parties involved with the site: (1) Mr. Masoud Arjmandi and Mr. Jerry Neill of the ADEQ; (2) Ms. Shirley Louie of the Arkansas Department of Health; (3) Mayor Tommy Swaim, City of Jacksonville; (4) Mr. Phillip Carlyle, Vice President Concerned Citizens Coalition; and (5) Mr. David Jaros and Earl Pilgrim, operator employees of the site operator's remedial operations contractor GEC. Interview Record Forms which document the issues discussed during these interviews are provided in **Attachment 2.**

In general, the interviews reflected the perception that site operations are generally going well, and in particular there has been a positive response about the City's installation of a recycling center on the northern portion of the property. ADEQ personnel indicated they would like better communication from

the site operator in terms of more direct communication of problems as they arise, and followup actions as they are being completed. ADH indicated they would like to see more communication about the site, and in particular would like to be copied on monthly discharge reports and annual progress reports in addition to receipt of the fish tissue monitoring results that they already receive.

6.6 Site Inspection

An inspection was conducted at the site on April 16, 2003. The completed site inspection checklist is provided in **Attachment 3**. Photographs taken during the Vertac site inspection are provided in **Attachment 4**. The Vertac site appears to be well maintained and there was no visible evidence of trespassing or vandalism. Security fencing and gates were secured and in good condition (**Photograph Nos. 16, 39, 41, and 52**). Identification signs were also posted at proper intervals on the perimeter fences.

Many of the existing onsite ground water monitoring wells and extraction wells (**Photograph Nos. 40 and 42**) were located during the Vertac site inspection. All observed surface completions were secure and in good condition. Due to the size of the site and the various components of the remedy, every well was not visually inspected during the second five-year review site inspection, but the condition of all inspected wells was very good. One of the extraction wells was opened during the site inspection (**Photograph Nos. 40 and 42**). The equipment inside the well vault was in good condition. The extraction well pump could be heard operating during the inspection.

The entire french drain was also reviewed during the site inspection. All manholes were in good condition (**Photograph Nos. 12, 15, and 44**). Several manholes were opened for inspection (**Photograph Nos. 37 and 38**). The pumps in each inspected manhole were in good condition and functioning properly. The controllers and flow meters for each pump are mounted on power poles near the manholes (**Photograph Nos. 38 and 44**). Each controller and flow meter appeared in good condition and was functioning properly. There were no visible signs of surface seepage along the french drain.

During the site inspection, small trees were observed growing on the capped North Burial Area (**Photograph Nos. 6, 7, and 8**) and the capped Reasor Hill Burial Area (**Photograph Nos. 17 and 18**).

Otherwise, these two areas appeared to be properly mowed and maintained. The vegetative cover was well established, and no obvious signs of erosion were noted. The sediment containment vault (Mt. Vertac) was also inspected while the team was onsite for the second five-year review site inspection. The vegetative cover was in good condition. Rocks were placed along the west side to prevent erosion of the clay cap (**Photograph No. 31**). No obvious signs of erosion were noted. The EPA RPM reiterated to the site operator the importance of maintaining vegetation on the caps, including removing the small trees into the caps of the OU1 landfill and the North and Reasor-Hill drum burial areas. During a followup site inspection conducted by the EPA RPM on August 5, 2003, the EPA RPM noted that the trees had been properly removed by the site operator.

The second five-year review site inspection also included an inspection of the OU1 landfill. The vegetative cover was observed to be thin in places on the cap (**Photograph Nos. 22, 23, 28, 29, and 30**). A few small pine trees were observed growing on the cap (**Photograph Nos. 21, 25, 26, 27, and 30**), and again these tress were properly removed by GEC following the request of the EPA RPM. Some minor erosion was noted at the base of the cap along the northern edge. No signs of slumping, bulging, cracking, or settlement were noted on the cap. The leachate collection and leachate detection sumps were secured and in good condition (**Photograph Nos. 23 and 24**). A few small animal burrows were present on the cap. The letdown channels are covered with large rocks. These channels drain runoff from the top of the cap. The letdown channels were in good condition, and only minor erosion was noted (**Photograph Nos. 20, 21, 22, and 25**). Sedimentation ponds to address runoff from the landfill cap are present along the north, east, and south sides of the landfill. The containment structures surrounding these ponds appeared to be in good condition. The overflow structures were also in good condition, and no signs of excessive siltation were noted in the sedimentation ponds (**Photograph 20**).

The site contains two buildings. One building contains the wastewater treatment plant, and the other contains equipment associated with the ground water extraction system (the Ground Water Recovery Building). The ground water recovery building contains a tank, pumps, piping, and ports for collecting samples from the extraction wells and some of the monitor wells. This building also contains some spare equipment. The site workers noted that there was a leak along the building foundation that allowed rain water to flow into the building when heavy rainfall occurred (**Photograph 43**). Dirt was present over

much of the floor within the building. Several monitor wells and the extraction wells are connected to the tank in the ground water recovery building via underground piping (**Photograph 43**). The tank is used to store the recovered ground water for transfer via underground pipes to the wastewater treatment plant. The tank was in good condition. The pumps, piping, and sampling ports also appeared in good condition.

The wastewater treatment plant was also inspected (**Photographs 1, 2, and 3**). Two large equalization tanks are located outside the building (**Photograph 46**). These tanks store the water extracted from the french drain and the ground water extraction system. In addition, leachate recovered from the leachate collection sumps at the OU1 landfill is also pumped into these tanks. The tanks appeared to be in good condition. No leaking was noted around the tanks, and proper secondary containment is present around the tanks. Inside the wastewater treatment plant building, the components of the system include two pumps (**Photograph 47**), two sand filters (**Photograph 48**), a backwash hold tank for the sand filters (**Photograph 48**), three carbon treatment units (**Photograph 49**), a pH neutralization tank (**Photograph 50**), and the treated water tank (**Photograph 50**). Sampling ports are located inside the building before each carbon treatment unit, after the final carbon treatment unit, and after the treated water tank (**Photograph 51**). All components inside the building appeared in good condition. The wastewater treatment plant only operates when enough water has been recovered to treat. The plant was not operating at the time of the site inspection. The facility can be operated manually, but the system is primarily operated by computer. The outfall for the wastewater treatment facility was also inspected (**Photograph 35**). No discharges were observed, and the discharge pipe appeared to be in good condition.

7.0 Technical Assessment

The five-year review must determine whether the remedy at a site is protective of human health and the environment. The EPA guidance describes three questions used to provide a framework for organizing and evaluating data and information and to ensure all relevant issues are considered when determining the protectiveness of a remedy. These questions are assessed for the site in the following paragraphs. At the end of the section is a summary of the technical assessment.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The documents that detail the remedial decisions for the site are the September 1990 ROD for the Offsite Areas and it amendment of September 1996, the June 1993 ROD for OU1 and its May 1995 ESD, the September 1996 ROD for OU2 and its January 1998 ESD, and the September 1996 ROD for OU3. EPA and ADEQ have concurred that the remedial actions for the site are complete. The O&M is ongoing, and based on the data review, the site inspection, and interviews, it appears that the Vertac site remedy is functioning as intended by the decision documents. Opportunities for optimization, early indicators of potential remedy problems, and institutional controls are described below.

Opportunities for Optimization. The site operator has monitored and studied the wastewater treatment plant to identify potential opportunities for optimization. Several opportunities for optimization and design changes have been identified since the first five-year review. Several steps in the treatment process have been removed with EPA and ADEQ approval. These include the oil/water separator, the filter socks, the polymer feed step, and the acidification step. Also, the carbon change-out procedure has been changed so that less manual labor is required to change the carbon beds. This process has reduced both human exposure to the spent carbon and costs. The spent carbon is sent off-site for disposal/regeneration. In addition, the wastewater treatment plant is now fully automated, and the plant operators are able to monitor the ground water extraction system, french drain, and wastewater treatment plant remotely. Finally, the collection of a sample after the third carbon bed was found to be redundant and removed from the effluent sampling program. Hercules also proposed a reduction in the ground water sampling program analyte list (**Maud, 2001**). The reduction in the analyte list was approved by the ADH in September 2000 (**Maud, 2003**), and this reduction has been implemented (2,3,7,8-TCDD and tetrachlorobenzene have been dropped from the analyte list). As noted in section 9.0, EPA will review this issue; and in the interim, the site operator will be directed to restore the indicated analytes to the list effective in the first quarter of calendar year 2004. The site operator has reported that it has implemented provisions of the October 1997 Ground Water Monitoring Plan that specify a change from semi-annual to biannual (every two years) ground water monitoring as of October 2001. (**Maud, 2001** and **Maud, 2003**). The next ground water sampling event is scheduled under this revised schedule to occur in October 2003 (**Maud, 2003**). However, EPA is undertaking a review of the ground water monitoring requirements, including the sampling frequency. In the interim, EPA will direct the site operator to resume semi-annual

sampling of all site ground water monitoring wells until further notice and to change the ground water monitoring plan accordingly. No further modifications to the site remediation O&M program should be undertaken by the site operator without the express prior written approval of both the EPA and the ADEQ.

Early Indicators of Potential Remedy Problems. At the time of the five-year review site inspection, the GEC operators indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating about 300 gallons a month, depending on rainfall amounts, which is significantly more leachate than is generated in the south cell). A leak in the top liner was suspected, although the leachate collection system continued to adequately collect the leachate. Actions taken and recommendations for addressing this disparity in leachate volume should be documented in the next annual progress report for the site and reviewed by EPA and ADEQ.

During the second five-year review site inspection, small trees were observed growing in the clay caps of the North and Reasor Hill Burial Areas and on top of the cap for the OU1 landfill. If tree roots penetrate the clay caps or the landfill cap, rainfall could seep through the caps and generate leachate. Leachate from the North and Reasor Hill Burial Areas would percolate into the ground water and be intercepted by the french drain system, while leachate from the OU1 landfill would be collected by the leachate collection system. Upon the direction of the EPA RPM, the small trees were properly removed and the clay caps repaired by the site operator, as documented by the RPM in a follow-up inspection conducted on August 5, 2003.

The wastewater treatment plant discharge data is collected on a monthly basis, and the data is submitted to the ADEQ in monthly reports. The data from July 2001 through March 2003 were reviewed as part of this second five-year review. The data show that the treatment plant is currently meeting the discharge requirements set by the ADEQ, although the discharge limit for 2,3,7,8-TCDD was exceeded in December 2001, February, March, and April 2002, and January 2003 (**Hercules, 2003**). The site operator determined the cause of the 2,3,7,8-TCDD detections to be the result of using contaminated backwash water to flush the carbon filters, and the presence of some leaking valves. As noted above, EPA still has questions about this issue, and it is further addressed in section 9.0 below.

The wastewater treatment discharge data also shows that the monthly average limit for total dissolved solids (TDS) and chlorides was exceeded in July and November 2001, and for the months June through October 2002. In addition, the maximum daily average for TDS and chlorides were exceeded at least once for the months July through October 2002 (**Hercules, 2003**). The cause of these exceedances has not been documented. As noted above, the cause of these exceedances has not been documented, and EPA intends to examine this issue further as noted in **Section 9.0**.

Also, various chlorophenol, dichlorophenol, trichlorophenol, and pesticide compounds are regularly detected in the wastewater treatment plant discharge samples (**Hercules, 2003**). There are no discharge limits set for these compounds, but the ADEQ discharge permit does require that results for these compounds be reported in the monthly reports (**ADPC&E, 1996**). As noted above, the cause for these detections has not been documented, but EPA intends to require further analysis of this matter as noted in **Section 9.0**.

The May 2001 to May 2002 annual progress report indicates the pumps on extraction wells EX-1, EX-3, and EX-4 failed during the spring of 2001. Repairs were made to the extraction wells, and the ground water gradient reversal was reestablished by the fall of 2001 (**Maud, 2003**).

Institutional Controls. Institutional controls used at the Vertac Site include deed restrictions prohibiting the installation of water wells at the site other than those associated with the ground water extraction and monitoring system, controls on redevelopment of the southern portion of the site, and access controls to limit access to the site. Access at the site is controlled by a fence and locked gates. Access through the main gate can only be obtained from inside the wastewater treatment plant or through the use of an access code. No wells other than those associated with the ground water extraction and monitoring system have been installed at the site. No development has occurred on the southern portion of the site, nor is any development of this part of the Vertac site contemplated due to the remedial action components in place in the area, as well as the presence of contamination below the caps and in ground water and disposal units.

Status of the TI Waiver for NAPLs identified in the tilted, fractured bedrock system. The OU3 ROD included a requirement that five-year reviews at the site determine if any new technologies are available to remediate the contaminated ground water, in light of the NAPLs contained in the fractured bedrock (**EPA, 1996g**). As part of this five-year review, the potential development of new technologies that might be capable of remediating NAPL in fractured bedrock aquifers was researched. This search was conducted by reviewing available technologies at EPA's Remediation And Characterization Innovative Technologies (REACHIT) website data-base at http://epareachit.org (**EPA, 2003**). No new technologies that might benefit the ground water remediation at the Vertac site were identified.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of the Remedy Selection Still Valid?

The purpose of this question is to evaluate the effects of any significant changes in standards or assumptions used at the time of remedy selection. Changes in promulgated standards or "to be considereds" (TBCs) and assumptions used in the original definition of the remedial action may indicate an adjustment in the remedy is necessary to ensure the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics. There have been no changes in exposure pathways for the Vertac site. As described below, no final regulatory standards in this category have been implemented, since the first site five-year review was completed. However, as identified in the first five-year review for the site, in the time since the Vertac Off-Site ROD was approved in 1990 there has been a change in the recommended EPA screening level for dioxin in fish tissues. The EPA currently recommends that 0.7 ppt be used to indicate that more intensive site-specific monitoring and/or further evaluation of human health risks should be conducted (**EPA, 1995a**). This change in guidance was reflected in the first site five-year review recommendation that the State of Arkansas reevaluate the fish consumption advisory for Bayou Meto. Also, as identified in the first five-year review, the EPA, along with other government agencies and the scientific community, is currently undergoing a comprehensive and ongoing reevaluation of dioxin exposures and human health effects. The outcome of this assessment could change the methods used to determine safe dioxin levels in fish tissue, as well as other aspects of site remediation.

Changes in ARARs. Applicable or Relevant and Appropriate Requirements (ARARs) for this site were identified in all four RODs. The five-year review for this site included identification of and evaluation of changes in the ROD-specified ARARs and TBCs to determine whether such changes may affect the protectiveness of the selected remedy. The ARARs and TBCs identified by the RODs for the Vertac site include contaminant, action and location specific requirements. These ARARs and TBCs are described below.

Off-Site Areas Operable Unit ROD (signed on September 27, 1990; Amended Sept. 17, 1996)

Contaminant Specific Requirements:

1. LDRs pertaining to the placement of wastes outside the unit boundary or Area of Contamination (AOC), 40 CFR Part 268.

Action-Specific Requirements:

1. Executive Order on Flood Plain Management, Executive Order No. 11988.
2. Consultation requirements of the Fish and Wildlife Coordination Act, 40 CFR 6.302.
3. RCRA capping requirements, 40 CFR 264.117(c) and 264.228(a-b)
4. RCRA regulations for container and tank storage, 40 CFR 264 Subparts I and J.
5. Requirements for direct discharges of treatment system effluents, 40 CFR 122.221, 122.41, and 122.44 (surface discharges), 40 CFR 125.100 and 125.104 (discharges to surface waters), 40 CFR 131 (approved state regulations), and 40 CFR 136.1-.4 (sampling of surface water discharges).
6. Requirements for discharges to a Publicly Owned Treatment Works (POTW), 40 CFR 403.5.
7. RCRA regulations for hazardous waste incinerators, 40 CFR 264 Subpart O.
8. RCRA post-closure care requirement to ensure a site is maintained and monitored, 40 CFR 264.1.

Location-Specific Requirements

1. Design, construction, and operation requirements for RCRA units within the 100-year flood plain, 40 CFR 264.18(b).

TBCs

1. April 24, 1986 memo from the ATSDR to EPA Region 6 recommending cleanup levels specific to the Vertac offsite areas.
2. January 26, 1989 memo from EPA to ATSDR stating that the highest concentration of TCDD found in sediments in Rocky Branch Creek and Bayou Meto does not pose an unacceptable health threat.
3. Centers for Disease Control (CDC) recommendation of 1 ppb action level for TCDD in residential soil employed by EPA at other TCDD contaminated sites.

OU1 ROD (signed on June 30, 1993; ESD signed May 25, 1995)

Contaminant-Specific Requirements:

1. Requirements for treatment, storage, and disposal of PCBs, 40 CFR 761.70.
2. Identification and classification of hazardous wastes under RCRA, 40 CFR Part 261.
3. NESHAPs regulations, 40 CFR 61 Subpart M.
4. National Ambient Air Quality Standards (NAAQS), 40 CFR 50.
5. LDRs, 40 CFR 268.
6. Treatment standards, pretreatment standards, and effluent limitations for discharges to a POTW, 40 CFR 403.
7. Arkansas Water and Air Pollution Control Act.
8. Arkansas Non-Criteria Air Pollutants Control Strategy
9. Arkansas Hazardous Waste Management Code.

Action-Specific Requirements:

1. RCRA regulations for hazardous waste incinerators, 40 CFR 264 Subpart O.
2. RCRA regulations for hazardous waste landfills, 40 CFR 264 Subpart N.
3. RCRA regulations for container storage of hazardous wastes, 40 CFR 264, Subpart I.
4. RCRA regulations for Corrective Action Management Units (CAMUs), as they apply under the CERCLA AOC policy, 40 CFR 264, Subpart S.

Location-Specific Requirements:

1. RCRA requirements for the location of hazardous waste treatment, storage, and disposal facilities (TSDs), 40 CFR 264.18.
2. Siting standards for hazardous waste management facilities, Arkansas Waste Management Code.
3. Landfill design and planning requirements, Arkansas Solid Waste Management Code.

TBCs

1. Effluent limitations for discharges to the City's POTW, City of Jacksonville Ordinances 604, 620, 684, and 877.

OU2 ROD (signed on September 17, 1996)

Contaminant –Specific Requirements:

1. RCRA requirements for classification of hazardous wastes, 40 CFR 261.
2. Standards for respirable dust during remediation under the NAAQS, 40 CFR 50.06, administered through the State of Arkansas' State Implementation Plan.
3. Ambient air quality standards, Arkansas Non-Criteria Pollution Control Strategy.
4. State water quality criteria for discharge of effluent, as established by the site-specific, State-developed effluent discharge limitations.
5. LDRs, 40 CFR 268.

Action-Specific Requirements:

1. RCRA regulations for hazardous waste landfills, 40 CFR 264 Subpart N.
2. Hazardous waste manifesting, packaging, labeling, analysis, and notification to TSD requirements for offsite shipments of hazardous wastes, 40 CFR 262.20-.23, 40 CFR 262.30-.32, and 40 CFR 268.7.
3. Requirements for transportation of TCB contaminated soils offsite, 40 CFR Parts 107, 171-177, and 263, and state hazardous waste transportation regulations.

OU3 ROD (signed on September 17, 1996)

Contaminant-Specific Requirements:

1. Identification and classification of hazardous wastes under RCRA, 40 CFR Part 261.
2. National Primary Drinking Water Standards, 40 CFR Part 141.
3. Secondary Drinking Water Standards, 40 CFR Part 143.
4. Applicable discharge requirements, 40 CFR Parts 122, 125, and 129, Arkansas Regulation 2, and Arkansas Regulation 6.

Action-Specific Requirements:

1. Substantiative operating requirements, 40 CFR Parts 122, 125, and 129, Arkansas Regulation 2, Arkansas Regulation 3, Arkansas Regulation 6, and Arkansas Regulation 23.
2. General TSD facility requirements, 40 CFR Part 264, Subparts B, C, D, and E.
3. Closure requirements for extraction wells, 40 CFR Parts 144 and 146, Arkansas Regulation 17.
4. Substantiative requirements for development and operation of extraction wells.
5. Ground water monitoring requirements, 40 CFR Part 264.
6. Discharge requirements, 40 CFR Parts 122, 125, and 129 as applicable to point source discharges to waters of the United States (including use of BAT for toxic and nonconventional pollutants, Best Conventional Control Technology (BCT) for conventional pollutants, compliance with applicable Federally-approved state water quality standards, setting of discharge limits at more stringent standards than technology-based standards for toxic pollutants, use of Best Management Practices (BMPs) to prevent releases of toxic pollutants, and requirements to monitor discharges).

ARARS Involving Activities that are No Longer Occurring. The requirements listed below, which were previously identified as ARARs, apply to activities that are no longer taking pace at the site or conditions that no longer exist. Therefore, as a practical matter, they are no longer applicable to site remediation.

The following standards are only applicable to incineration processes, and incineration is no longer occurring on site.

1. National Ambient Air Quality Standards (NAAQS), 40 CFR Part 50.
2. Hazardous Waste Incinerators, 40 CFR Part 264, Subpart O.
3. Arkansas Non-Criteria Air Pollutants Control Strategy

The following standards are only applicable to discharges of effluents to a publically owned treatment works (POTW). The onsite wastewater treatment plant discharges effluent, but directly to Rocky Branch Creek and not into a POTW.

1. Treatment standards, pretreatment standards, and effluent limitations for discharges to a POTW, 40 CFR 403.
2. Effluent limitations for discharges to the City's POTW, City of Jacksonville Ordinances 604, 620, 684, and 877.

The disposal of PCBs, asbestos abatement, and active surface remediation activities, such as excavation of contaminated soil, have been completed at the site. The following standards involve those contaminants and activities.

1. Requirements for treatment, storage, and disposal of PCBs, 40 CFR 761.70.
2. NESHAPs regulations, 40 CFR 61 Subpart M.
3. Standards for respirable dust (PM_{10}) during remediation under the NAAQS, 40 CFR 50.6, administered through the State of Arkansas' State Implementation Plan (SIP).
4. Ambient air quality standards, Arkansas Non-Criteria Pollution Control Strategy.

The TCB contamination has been remediated at the site. Therefore, the following standards are no longer applicable:

1. Requirements for transportation of TCB contaminated soils offsite, 40 CFR Parts 107, 171-177, and 263, and state hazardous waste transportation regulations.

Interpretation, Changes, and Revisions to Guidance and Regulations. The ADEQ and the Federal regulations have not been revised to the extent that the effectiveness of the remedy at the site would be called into question. No new regulations have been issued by the State of Arkansas or the Federal government that would call into question the effectiveness of the remedy.

For Superfund sites, EPA applies the CERCLA AOC concept in a similar vein to the RCRA corrective action management unit. Thus, consolidation of otherwise LDR RCRA hazardous waste bearing soil and debris within an AOC will not trigger the application of the LDR regulations at 40 CFR Part 268. *See* 55 Fed. Reg. 8666, 8758-60 (March 8, 1990). *See also* 61 Fed. Reg. 18804-18805 (April 29, 1996) EPA policy states that as long as contaminated materials remain within the AOC, placement is generally not considered to have occurred, and the LDRs do not apply within the AOC (**EPA, 1989**). EPA determined that the entire Vertac site was a former industrial facility that had been throughly contaminated above and below ground and thus could not be reasonably subdivided into discrete waste management units. Accordingly, the entire site was considered to be one AOC. The contaminated offsite areas are properly viewed in the regulatory sense as a contiguous and continuous extension of the AOC, and therefore the LDRs do not apply to consolidation of excavated soils from these areas within the AOC.

Although the LDRs do not apply to wastes consolidated within the AOC (as noted above), if a material is treated within the definition of RCRA, and then redeposited within the AOC, then placement has occurred, and the LDRs will apply. However, a treatability variance can be granted under 40 CFR 268.44. On July 18, 1996, EPA Region 6 granted a treatability variance for dioxin-contaminated wastes that changed the treatment standard from 1 ppb to 5 ppb. This new LDR treatment standard was set to allow for the proper land disposal of residues from the onsite incineration of dioxin-contaminated wastes (salt and ash).

The ATSDR has revised its guidance for the evaluation of safe concentrations of TEQs of TCDD in residential soil. ATSDR's new guidelines establish a screening level for TEQs of TCDD, evaluation levels between which site specific factors are evaluated to determine the risks associated with exposure to dioxin contamination, and an action level for TEQs of TCDD above which actions should be

considered to protect public health. The ATSDR recommends a screening level of 50 ppt TEQs, evaluation levels between 50 ppt and 1 ppb TEQs, and an action level of 1 ppb TEQs. These action levels are based only on human exposure through the direct ingestion of dioxin contaminated soil (**ATSDR, 1997a**). The Vertac Site has undergone extensive risk assessments to determine cleanup values. These risk assessments were site-specific, and safe cleanup levels were determined based on the results. All contaminated soil in residential areas have been remediated based on the 1 ppb action level and covered with at least one foot of clean soil to prevent future exposures. Thus, the change in the ATSDR guidelines does not affect the protectiveness of the remedy at the Vertac site..

The closure requirements for injection wells, as regulated under 40 CFR 144 and 146, and Arkansas Regulation 17, have not been changed. During the remedial action, the Reasor Hill Well was buried. Several unsuccessful attempts were made to locate the well, and the well has not been closed. These ARARs still apply to the remedy in the event that the Reasor Hill Well is eventually located.

Compliance with the MCLs was waived through a TI Waiver in the ROD for OU3. This waiver from achieving the MCLs applies to a portion of the site identified as the TI Zone in the ROD. The ROD also established Plume Concentration Levels (PCLs), which are contaminant concentration levels of designated contaminants that must be achieved at the boundary of the TI Zone to insure that ground water is not contaminated above the MCLs at the site boundary. No changes have been made to the MCLs or the PCLs since the ROD was issued, however, one of the chemicals for which PCLs are designated in the ROD has been approved for removal from the ground water monitoring analyte list by ADEQ. See discussion in **Section 9.0** below.

Each of these issues were also identified in the first five-year review report for the site.

7.3 Question C: Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy

Examples of other information that might call into question the protectiveness of the remedy include potential future land use changes in the vicinity of the site or other expected changes in site conditions or exposure pathways; no such information has come to light as part of this second five-year review for the site.

7.4 Summary of the Technical Assessment

The technical assessment, based on the data review, site inspection, technical evaluation, and interviews, indicates the remedial actions selected for this site generally appear to have been implemented as intended by the decision documents. The site operator has made improvements to the wastewater treatment system that allow remote operation and that reportedly eliminate redundant sampling points and unnecessary steps in the treatment process. However, as noted in Section 9.0, in view of exceedances of limitations in specific parameters for water discharges, including several violations of TCDD limits, EPA will evaluate the waste water treatment plan against relevant and appropriate BAT requirements of the Clean Water Act. A reduction in the ground water sampling analyte list (to remove 2,3,7,8-TCDD and tetrachlorobenzene) was proposed by the site operator and approved by the ADEQ. Also, the provisions of the October 1997 Ground Water Monitoring Plan that specify a change from semi-annual to biannual (every two years) ground water monitoring was implemented as of October 2001. These changes were not approved by EPA, and the site operators are being required to reinstate the previous requirements pending review and approval by EPA. The next ground water sampling event is scheduled to occur in October 2003 (**Maud, 2003**). It should be noted that any additional reductions in the analyte list or change in frequency must be proposed and approved by both ADEQ and EPA prior to implementation.

No new technologies for the remediation of NAPL in fractured bedrock were identified as part of this five-year review. Also, no changes in ARARs or changes in exposure pathways, toxicity data, or other contaminant characteristics were noted for the second five-year review period.

As noted in the first five-year review, however, there has been a change in the EPA screening level for dioxin in fish tissues since the 1990 Off-Site ROD was signed. The current action level set by the FDA

(and ADH) is still 25 ppt. EPA is involved with other agencies in an ongoing comprehensive reassessment of dioxin exposures and human health effects. The outcome of that reassessment could change the methods used to determine safe dioxin levels in fish tissue. However, the EPA currently recommends in its fish advisory guidance that 0.7 ppt be used as a screening level to indicate that more intensive site-specific monitoring and/or further evaluation of human health risks should be conducted (**EPA, 1995a**). The development of this screening level led to the first five-year review recommendation that the ADH reevaluate the 25 ppt action levels for the fish consumption advisory for Bayou Meto, in light of the dioxin screening level established in current EPA fish advisory guidance. ADH has not yet completed the reevaluation recommended by the first five-year review, although additional fish tissue samples were collected and analyzed in 2001 downstream of the current extent of the advisory on Bayou Meto (State Highway 13 bridge) to support the evaluation. The status of the fish advisory action levels and the geographical extent of the fish advisory remains an issue for the second five-year review.

At the time of the five-year review site inspection, the GEC operators indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating about 300 gallons a month, depending on rainfall amounts, which is significantly more leachate than is generated in the south cell). A leak in the top liner was suspected, although the leachate collection system continued to adequately collect the leachate. Actions taken and recommendations for addressing this disparity in leachate volume should be documented in the next annual progress report for the site and reviewed by EPA and ADEQ. Also during the five-year review site inspection, it was noted that small trees are growing on the caps of the North and Reasor Hill Burial Areas and the OU1 landfill. As noted above, the trees have been properly removed from the caps by the site operator at the direction of the EPA RPM, as documented by the RPM in a follow-up inspection conducted on August 5, 2003.

During the second five-year review data evaluation, it was noted that exceedances of the discharge criteria for 2,3,7,8-TCDD and monthly average and daily maximum criteria for TDS and chlorides have been exceeded in the past, though not since January 2003. The 2,3,7,8-TCDD exceedances were reported as addressed by the site operator by changing the backwash procedures for the carbon beds and repairing leaky valves on the carbon treatment units. Nevertheless, as noted below, EPA will further evaluate this

issue. Also, the data review revealed that chlorophenols and pesticides are regularly detected in the discharge from the wastewater treatment facility (although these compounds do not have discharge limits, they are required to be reported).

8.0 Issues

Operations and maintenance are ongoing at the site, and based on the data review, site inspection, interviews and technology assessment, it appears the remedy is functioning as intended by the decision documents. To ensure continued protectiveness, five issues are identified in the second five-year review for this site, as described in the following paragraphs. These issues do not currently affect the protectiveness of the remedy, although they need to be addressed to ensure continued protectiveness.

1. Status of the Fish Consumption Advisory for Bayou Meto. The current action level set by the FDA is 25 ppt. The EPA is involved with other agencies in an ongoing comprehensive reassessment of dioxin exposures and human health effects. The outcome of that reassessment could change the methods used to determine safe dioxin levels in fish tissue. Nevertheless, the EPA currently recommends in its fish advisory guidance that 0.7 ppt be used as a screening level to indicate that more intensive site-specific monitoring and/or further evaluation of human health risks should be conducted (**EPA, 1995a**). The development of this screening level led to the first five-year review recommendation that the ADH reevaluate the status of its fish advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt action levels for the fish consumption advisory and the downstream limit of the current fish advisory at State Highway 13, and consider reinstating the former boundaries of the fish consumption advisory while the reevaluation is conducted. ADH has not yet completed the reevaluation recommended by the first five-year review, although additional fish tissue samples were collected in 2001 downstream of the current extent of the advisory on Bayou Meto (State Highway 13 bridge) by the Arkansas Game and Fish Commission for ADH and analyzed by EPA to support the evaluation. Most of the fish tissue samples collected in Bayou Meto, including several samples from the downstream location near the State Highway 13 bridge, exceed the 0.7 ppt screening level, although none exceed the 25 ppt FDA action level. EPA has notified ADH of the need to complete this reevaluation (**EPA, 2003b**), and ADH has responded that the ADH is requesting financial assistance from the Agency for Toxic Substance and Disease Registry to complete the evaluation (**ADH, 2003**). The status of the fish advisory action levels

and the geographical extent of the fish advisory therefore remains an issue for the second five-year review, particularly in light of Hercules' recent recommendation that the geographical extent of the current fish consumption advisory be reduced further back to the State Highway 15 bridge, and that the State Highway 15 bridge sampling location be dropped from the biannual fish tissue monitoring program, based on the demonstration of concentrations well below the 25 ppt action level currently in place. Hercules' recommendation is considered unacceptable by EPA.

2. Review and Approval of the draft Sitewide Operations and Maintenance Manual. EPA has reviewed and provided comments on the draft Sitewide O&M Manual (December 2002) as described in a letter from EPA to Hercules dated September 2003 (**EPA, 2003a**). ADEQ has also reviewed and commented on the draft manual and its comments are described in a letter from ADEQ to EPA (with copy to Hercules) dated February 12, 2003 (**ADEQ, 2003**). In particular, it was noted that the revised Manual should specify more direct communication of problems and followup actions to the regulatory agencies.

3. Disparity in leachate volume between the north and south cells of the OU1 landfill. At the time of the five-year review site inspection, the GEC operators indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating more leachate than the south cell). This caused the operators to suspect a leak in the top liner, although the landfill leachate collection system was able to adequately handle the increased volume.

4. Detections and Exceedances in the Wastewater Treatment Plant Effluent. The wastewater treatment plant discharge data is collected on a monthly basis, and the data is submitted to the ADEQ in monthly reports. The data from July 2001 through March 2003 were reviewed as part of this second five-year review. The data show that the treatment plant is currently meeting the discharge requirements set by the ADEQ, although the discharge limit for 2,3,7,8-TCDD was exceeded in December 2001, February, March, and April 2002, and January 2003 (**Hercules, 2003**). The site operator determined the cause of the 2,3,7,8-TCDD detections to be the result of using contaminated backwash water to flush the carbon filters, and the presence of some leaking valves.

The wastewater treatment discharge data also shows that the monthly average limit for total dissolved solids (TDS) and chlorides was exceeded in July and November 2001, and for the months June through October 2002. In addition, the maximum daily average for TDS and chlorides were exceeded at least once for the months July through October 2002 (**Hercules, 2003**). The cause of these exceedances has not been documented.

Also, various chlorophenol, dichlorophenol, trichlorophenol, and pesticide compounds are regularly detected in the wastewater treatment plant discharge samples (**Hercules, 2003**). There are no discharge limits set for these compounds, but the ADEQ discharge permit does require that results for these compounds be reported in the monthly reports (**ADPC&E, 1996**). The cause for these detections has not been documented.

5. Site Ground Water Monitoring Plan and Operations Review. Citing provisions of the 1997 Sitewide Ground Water Monitoring Plan and approval by the ADEQ, respectively, the site operator has reduced the frequency of sampling of monitor wells from semi-annual to biannual; and it has removed the compounds 2,3,7,8-TCDD and tetrachlorobenzene from the ground water analyte list, except for monitoring wells around the OU1 landfill. EPA has not approved this change.

6. Level III data packages. The first five-year review recommended that the site operator provide Level III data packages (versus Level II) with at least one of the required annual progress reports per five-year review period to provide for more comprehensive review of data quality in the annual ground water monitoring progress report by the EPA and ADEQ. This recommendation has not yet been fully implemented.

7. Reevaluation of the availability of new technologies to treat and/or remove NAPL from the contaminated bedrock aquifer. The ROD for OU3 (ground water) called for five-year reviews to evaluate the performance of the hydraulic containment system and to determine if any new technologies are available to remediate the contaminated ground water to confirm the continued applicability of the TI waiver. This has been done for this second five-year review, but remains an issue to be addressed in future five-year reviews.

9.0 Recommendations and Follow-up Actions

As described in the previous section, seven issues were identified during the second five-year review for this site. To address these issues, the following recommendations and followup actions have been defined.

1. Complete reevaluation of the fish consumption advisory for Bayou Meto. ADH should complete the reevaluation of its fishing advisory for Rocky Branch Creek and Bayou Meto, including the 25 ppt action level for TCDD in fish tissue and the geographical extent of the advisory, and pending completion of its evaluation and determination of an updated action level, should reinstitute the geographical limits of the fish consumption advisory to the pre-existing boundary, as recommended by the first five-year review. This should be done in light of the 0.7 ppt TCDD screening level recommended by EPA in its current fish advisory guidance. The reevaluation should be based on fish tissue sample results collected in Bayou Meto through 2002. Hercules' recent recommendation that the geographical extent of the current fish consumption advisory be reduced further back to the State Highway 15 bridge, and that the State Highway 15 bridge sampling location be dropped from the biannual fish tissue monitoring program, based on the demonstration of concentrations well below the 25 ppt action level currently in place, is unacceptable and will not be adopted.

2. Update the draft December 2002 Sitewide Operations and Maintenance Manual in accordance with Agency review comments. EPA's initial review of the draft Sitewide O&M Manual (December 2002) is described in a letter from EPA to Hercules dated September 2003 (**EPA, 2003a**). ADEQ's review of the draft Sitewide Operations and Maintenance Manual (December 2002) is described in a letter from ADEQ to EPA (with copy to Hercules) dated February 12, 2003 (**ADEQ, 2003**). The draft manual must be updated in accordance with all review comments and resubmitted to the regulatory agencies for review and approval; and following approval, it must be implemented. In particular, it has been noted that the revised manual should specify more direct communication of problems and followup actions by the site operator to the regulatory agencies.

3. Document status of disparity in leachate volume between the north and south cells of the OU1 landfill. At the time of the five-year review site inspection, the GEC operators indicated that a disparity

in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating more leachate than the south cell). A leak in the top liner was suspected, although the leachate collection system continued to adequately collect the leachate. Actions taken and recommendations for addressing this disparity in leachate volume should be documented in the next annual progress report for the site and reviewed by EPA and ADEQ.

4. Address detections and exceedances in the wastewater treatment plant effluent. The detection of low concentrations of chlorophenols and pesticides in the discharge effluent samples from the wastewater treatment plant should be addressed. Hercules is required to report concentrations of these contaminants in their monthly report to the ADEQ, but no discharge limits have been set. While the concentrations are usually low (less than 10 ppb), the continued detection of these contaminants should be evaluated, including review of the need for discharge limits.

The reported chloride and TDS exceedances should also be reviewed and evaluated by the EPA RPM and/or the EPA oversight contractor, along with the 2001-2003 2,3,7,8-TCDD monthly discharge limitation exceedances, including a review of the supporting data, documentation, analysis, and determinations of the site operator with respect to the cause of these discharge exceedances. Although a site waste water treatment facility was originally used as part of the Vertac Remedy, a new plant was constructed just prior to the OU3 remedial action to treat the leachate produced by the OU1 landfill, as well as contaminated liquids produced by the new remedial components added in the OU3 remedial action and the elements of the existing Vertac Remedy that were adopted and incorporated by the OU3 CERCLA remedy. As part of the actions directed by this review, EPA will investigate and determine if the streamlined treatment methods currently being employed by the wastewater treatment plant prior to discharge into Rocky Branch Creek meet the OU3 ARAR Best Available Technology (BAT) standards for certain toxic pollutants under the Clean Water Act.

5. Site Ground Water Monitoring Plan and Operations Review. The site operator has been directed by the EPA RPM to reinstitute semi-annual ground water monitoring in the first quarter of calendar year 2004 and to restore 2,3,7,8-TCDD to the ground water monitoring analyte list, as required by the OU3 ROD. The site operator should also be directed to make corrections to the site ground water monitoring

plan to reflect these requirements, which should continue until otherwise directed. EPA will further evaluate this issue. No further modifications to the site remediation O&M program should be undertaken by the site operator without the express prior written approval of both the EPA and the ADEQ.

6. **Submission of Level III data packages.** The first five-year review recommended that the site operator provide Level III data packages (versus Level II) with at least one of the required annual progress reports per five-year review period to provide for more comprehensive review of data quality in the annual ground water monitoring progress report by the EPA and ADEQ. This recommendation has not yet been fully implemented, although the site operator has been directed by the EPA RPM to include a Level III data package with the report of analytical sampling and analysis from the October 2003 ground water monitoring analysis. The site operator should also be directed to amend the ground water monitoring plan to provide for this requirement and continue to implement it.

7. **Reevaluate the availability of new technologies to treat and/or remove NAPL from the contaminated bedrock aquifer.** The OU3 ROD requirement for evaluation of the performance of the hydraulic containment system and determination of whether new technologies are available to remediate the contaminated ground water, should be accomplished at the next five year review and each subsequent one, in order to confirm the continued applicability of the TI waiver. This has been done for the second five-year review (the hydraulic containment system was found to be operating as intended, and no new technologies for remediation of the contaminated ground water were identified); this should also be done as required at the next five-year review.

10.0 Protectiveness Statement

The remedies for the Vertac site are considered protective of human health and the environment because the wastes have been removed or contained. Wastes buried in the burial areas and the OU1 landfill are protected from erosion by caps. Contaminated ground water is contained and removed by the french drain and ground water extraction systems and treated at the wastewater treatment plant prior to discharge. Ongoing implementation of the O&M program monitoring will ensure that the remedies continue to be protective.

Because the completed remedial actions and O&M program for the Vertac site are considered protective for the short term, the overall remedy for the site is protective of human health and the environment for the short term, and will continue to be protective if the action items identified in this five-year review are addressed.

11.0 Next Review

The next five-year review, the third for the site, should be completed during or before November 2008.

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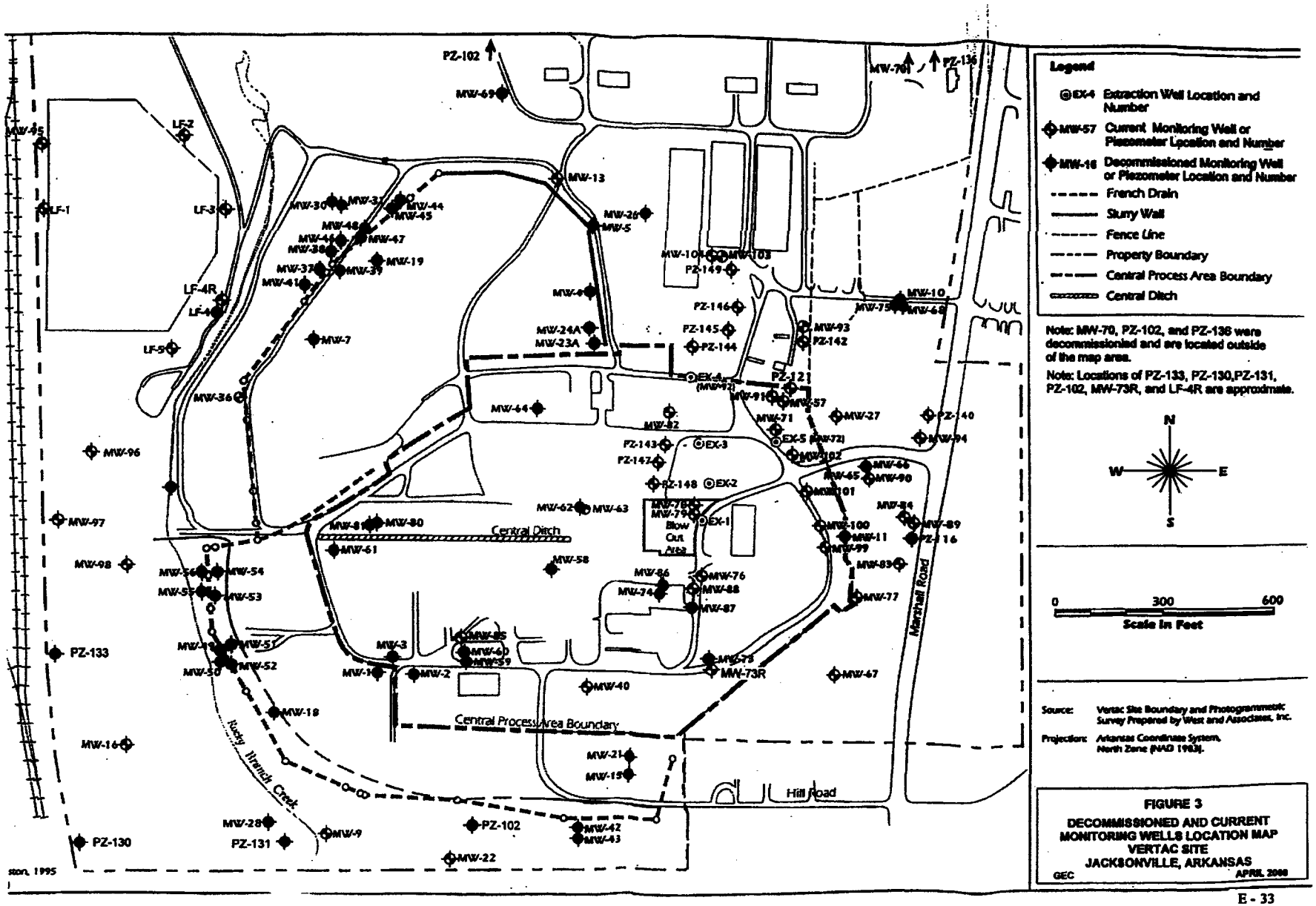

Figure 1
Site Map, with Monitoring Wells
Vertac Incorporated Superfund Site
Second Five-Year Review Report
(figure reproduced from Maud, 2003)

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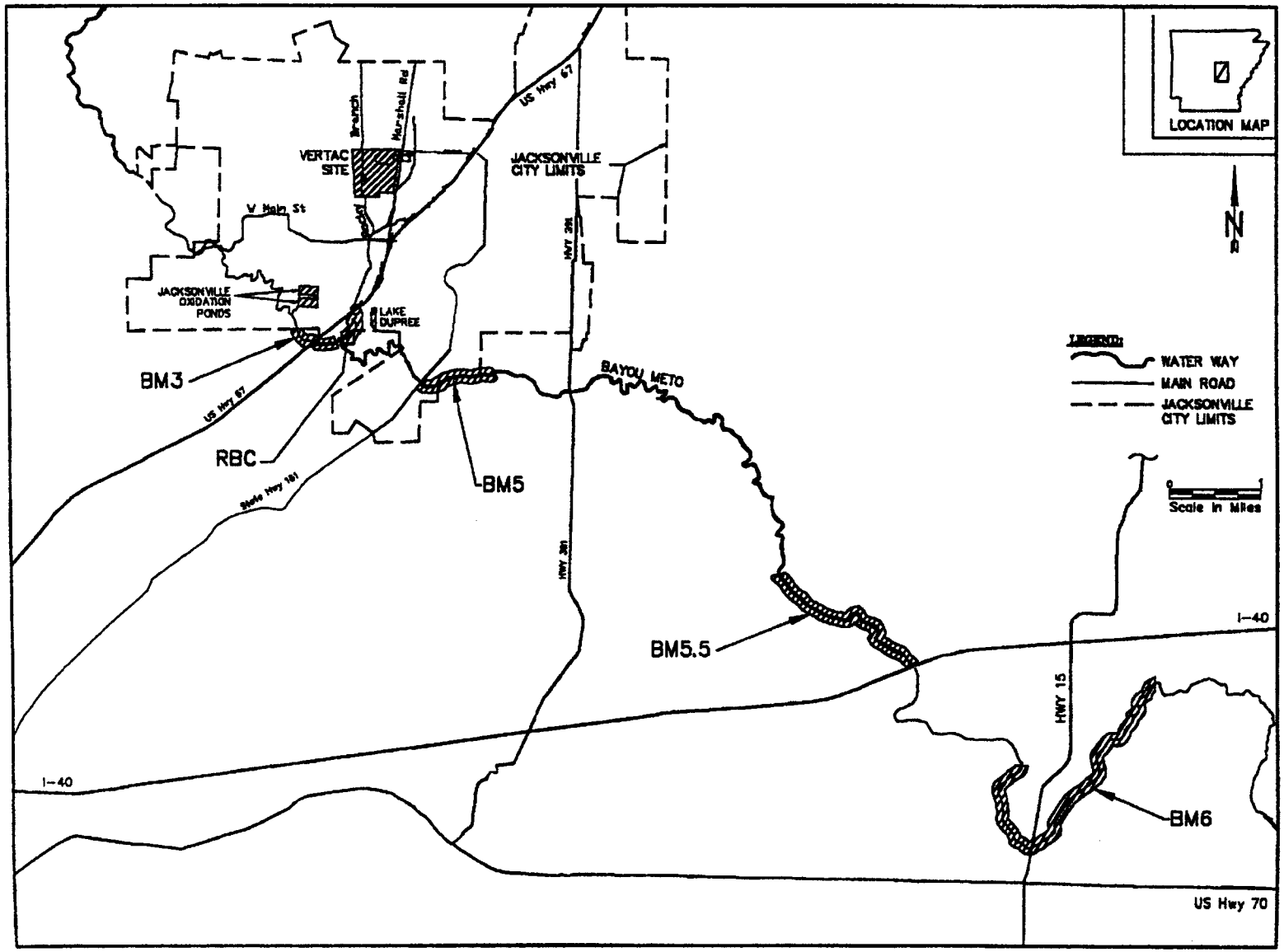

Figure 1.2. Stations sampled in 1998 as required by the Bayou Metro Flesh Monitoring Program.

Figure 2, Fish Sample Locations, Vertac Incorporated Superfund Site, Second Five-Year Review Report [figure reproduced from GMB & Associates, 1999]

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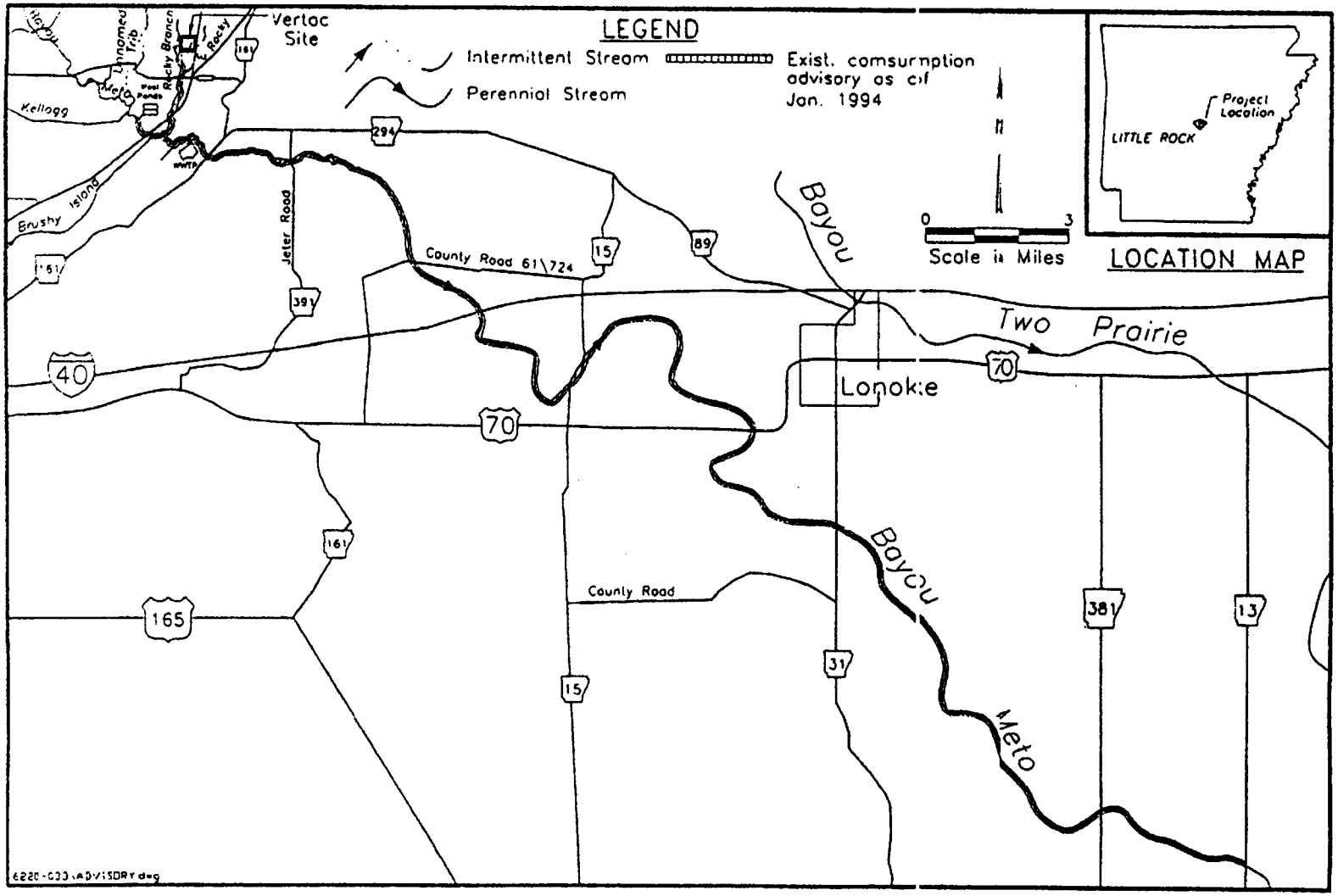

Figure 1.1. Area of existing fish consumption advisory as delineated by the ADH (FTN, 1996).

Figure 3, Bayou Meto Fish Consumption Advisory Area
Vertac Incorporated Superfund Site, Second Five-Year Review Report
[Figure reproduced from GMB & Associates, 1999]

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Table 1
Chronology of Site Events
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Date	Event
1930's	Use of site began as Arkansas Ordinance Plant.
1948	Reasor Hill purchased the site and began production of insecticides.
1950's	Reasor Hill began the production of herbicides.
1961	Reasor Hill began discharging process wastewater to the City of Jacksonville's Old Sewage Treatment Plant. Hercules Powder Company purchased the plant.
1964-1968	Hercules produced the herbicide "Agent Orange."
1969	The city's West Wastewater Treatment Facility is upgraded, and Hercules began discharging all of its process wastewater to the city's wastewater treatment facility.
1971	Hercules leased the plant to Transvaal Corporation.
1976	Transvaal purchased the property from Hercules and reorganized as Vertac, Inc.
1979	ADPC&E issued order to Vertac Chemical Corp. to improve its hazardous waste practices.
1980	EPA and ADPC&E file joint lawsuit against Vertac and Hercules under RCRA.
January 1982	Consent Decree entered by all parties to allow an independent consultant to assess the site and propose a remedy.
September 8, 1983	Site is finalized on the NPL.
Fall 1983 - Spring 1985	RI/FS for the offsite areas is conducted.
July 1984	Court orders the implementation of the "Vertac Remedy," which was opposed by the EPA.
Mid 1984 - July 1986	"Vertac Remedy" is implemented.
July 15, 1986	Trust fund is established by Vertac to remediate portions of the site.

Table 1
Chronology of Site Events
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Date	Event
August 1986	EPA issues a UAO to PRPs requiring the posting of warning signs and fencing at the West Wastewater Treatment Facility and along portions of Rocky Branch Creek.
January 1987	Vertac declares insolvency and abandons the site. EPA commences a CERCLA removal action to secure and stabilize the site, including thousands of dioxin-contaminated waste drums.
1987 - 1989	Additional sampling is conducted to determine the extent of offsite contamination in Rocky Branch Creek, Bayou Meto, and Lake Dupree.
September 1988	AOC issued to Hercules requiring the excavation of soils in residential yards south of the site and improvements to onsite drainage control.
1989	ADPC&E signs a contract to incinerate approximately 28,500 drums of 2,4-D and 2,4,5-T wastes left at the site by Vertac.
June 1989	Hercules completes the removal of soils from residential yards.
July 1989	AOC issued to Hercules requiring Hercules to perform the onsite RI/FS.
June 1990	FS for offsite areas revised based on additional data and to meet the requirements of SARA.
September 27, 1990	ROD for the offsite areas is signed.
March 1991	RI/FS for OU1 completed.
January 1992	Trial burn approved by ADPC&E and incineration of drummed wastes begins.
May 1993	Trust fund money being used for the incineration is expended.
June 1993	EPA takes over incineration of drummed wastes under removal action.
June 30, 1993	ROD for OU1 is signed.

Table 1
Chronology of Site Events
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Date	Event
July 1993	UAO issued to Hercules to conduct the RD/RA for the offsite areas.
November 1993	Hercules commences cleanup of interceptor sewer under EPA Offsite UAO.
March 1994	UAO issued to Hercules to conduct the RD/RA for OU1.
September 1994	Incineration of D-wastes completed.
November 1994	EPA contracts with Aptus in Coffeyville, KN to incinerate 3,100 drums of T-waste.
1995	All RA activities for the offsite areas completed except for the excavation of Rocky Branch Creek floodplain soils.
January 31, 1995	Onsite incinerator permanently shut down.
April 1995	RI/FS for OU2 completed.
May 1995	ESD signed by EPA to allow for offsite incineration under ROD for OU1.
September 1995	RI/FS for OU3 completed.
March 29, 1996	Final shipment of T-waste leaves site for Aptus.
July 16, 1996	EPA Region 6 executes a Non-Time Critical Action Memorandum which grants a treatability variance from the LDRs treatment standard for dioxin-contaminated waste to 5 ppb.
September 17, 1996	RODs for OU2 and OU3 signed. ESD signed for Off-Site Operable Unit.
December 10, 1996	UAOs issued to Hercules to conduct the RD/RA for OU2 and OU3.
December 20, 1996	Non-Time Critical Removal Action authorized to dismantle, decontaminate, and dispose of the onsite incinerator and associated structures and debris.
December 31, 1996	UAO issued to Hercules to dismantle, decontaminate, and dispose of the onsite incinerator and associated structures and debris.

Table 1
Chronology of Site Events
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Date	Event
Summer 1997	Floodplain soils excavated and disposed of in the onsite landfill. All RA activities for the offsite areas completed.
June 1997	Construction of the new onsite wastewater treatment plant completed, and facility begins operating.
July 1997 - May 1998	RA for OU1 and OU2 conducted and completed.
August 11, 1997	Exposure Investigation completed by ATSDR and ADOH. Additional soil sampling requested for Jacksonville Residential Areas Superfund Site to determine extent of dioxin contamination in residential soils near Vertac site.
November 1997 - May 1998	RA for OU3 conducted and completed.
January 12, 1998	ESD for OU2 signed by EPA Region 6 to allow for disposal of residential soils from Jacksonville Residential Areas Superfund Site in the onsite landfill.
Early 1998	RA activities associated with demolition of the onsite incinerator are completed.
June 24, 1998	Final inspection conducted.
August 31, 1998	EPA issues preliminary close out report.
September 1, 1998	EPA declares all CERCLA remediation complete at ceremony at Jacksonville, Arkansas, City Hall.
October 23, 1998	U.S. District Court for the Eastern District of Arkansas finds Hercules Incorporated and Uniroyal Chemical Ltd. liable for EPA past and future CERCLA response costs in summary judgement opinion. *United States v. Vertac Chemical Corp., et al.*, Civ. No. LR-C-80-109 (E.D.Ark.), *United States v. Vertac Chemical Corp.*, 33 F.Supp.2d 769 (E.D.Ark., 1998).

Table 1
Chronology of Site Events
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Date	Event
August 9, 1999	U.S. District Court enters final judgment against Hercules Incorporated. and Uniroyal Chemical Ltd. for EPA CERCLA response costs. *United States v. Vertac Chemical Corp., et al.*, Civ. No. LR-C-80-109 (E.D.Ark.)
January 21, 2000	Jeffrey and Brenda Shelton sue EPA to require performance of CERCLA Five-Year Review. *Shelton v.Browner*, Civ. No. 4:00CV00030 HDY (E.D.Ark)
October 12, 2000	EPA reaches settlement, agreeing to conduct Five-Year Review in *Shelton v. Browner* (E.D. Ark.).
April 10, 2001	U.S. Eighth Circuit Court of Appeals issues opinion and order remanding the issue of divisibility of harm in the finding of joint and several liability against Hercules Incorporated to the U.S. District Court for further proceedings. *United States v. Hercules, Inc.*, 247 F.3d 706 (8th Cir., 2001).
July 30, 2001	First CERCLA Five-Year Review for the Vertac, Inc. Superfund Site is completed.
December 12, 2001	U.S. District Court concludes the evidentiary hearing on issue of divisibility of harm in connection with Hercules Incorporated that was conducted from October 9 to 19, 2001 and from December 11 to 12, 2001. *United States v. Vertac Chemical Corp., et al.*, Civ. No. 4:80cv109 GH (E.D.Ark.).
March 5, 2003	All post hearing briefing is concluded by the parties in the divisibility of harm remand in U.S. District Court. *United States v. Vertac Chemical Corp., et al.*, Civ. No. 4:80cv109 GH (E.D.Ark.).
November 2003	Second Five-Year Review for the Vertac, Inc. Superfund Site is completed.

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Table 2
Summary of Response Actions
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Phase/ Operable Unit	Dates Implemented	Overview of Remedy
1. Vertac Remedy (RCRA)	1984-1986 O&M Ongoing	Removal of sediment from cooling water pond and equalization basin and landfilling of sediment under a cap w/french drain and leachate collection system. Contaminated leachate treated onsite and discharged. Includes long-term groundwater monitoring. Ordered by Court over EPA opposition.
2. Site Stabilization. Offsite residential removal response. Drummed Waste Incineration and Support.	1987-1998	Site removal actions including stabilization and removal of drummed waste, tanks, vessels, process equipment, and contents. Excavation and removal of contaminated soils and sediments in residential areas and consolidation on the plant site. Onsite and offsite incineration support for, and incineration of, drummed 2,4-D, 2,4,5-T, and Silvex wastes (28,500 drums).
3. Vertac Offsite Areas	1990-1997 O&M Ongoing	Excavation of offsite contaminated sediment/soil, removal of contaminated sludge/sediment in sewer interceptors and treatment plants and contaminated Rocky Branch Creek flood plain sediments, and staging onsite, with ultimate disposal in onsite OU No. 2 RCRA Subtitle C compliant vault under the Offsite Areas ROD Amendment. Includes long-term monitoring of fish for dioxin in tissue.
4. Onsite Above-Ground Media (Operable Unit No. 1)	1994-1998 O&M Ongoing	Onsite incineration, offsite incineration, onsite consolidation/containment of above-ground media including buildings, process equipment, leftover chemicals in the process vessels, spent activated carbon, shredded trash and pallets, and miscellaneous drummed wastes and treatment residues, and recycle/reuse of equipment. Deferral of treatment of excavated offsite soil from residential area to be addressed under OU No. 2 (disposal in onsite RCRA Subtitle C compliant landfill).
5. Soils and Underground Utilities (Operable Unit No. 2)	1996-1997	Excavation and disposal in the on-site RCRA Subtitle Compliant consolidation/containment unit of all soils with dioxin concentrations at or above the action level of 5 ppb, excavation and offsite incineration of TCB and TCB-associated spill soils >500 ppm , cleaning of chemical sewer lines to remove solids and backfilling with grout, scarification of foundations and curbs to remove visible staining, and the application of epoxy sealant where staining persisted, and cover with adequate soil (typically between 18 and 24 inches) to support a vegetative cover, contoured to prevent erosion and ponding of storm water. Also addressed Vertac Offsite Areas soil and OU No. 1 residential soil.
6. Groundwater (Operable Unit No. 3)	1996-1998 O&M Ongoing	Installation of extraction wells in the central process area to hydraulically control offsite migration of contaminated groundwater to the east, continued operation of the existing French drain system (Vertac Remedy) to impede groundwater contaminant migration to the south and west, and the proposed use of the Reasor-Hill well and MW-92 as additional extraction wells, and "Technical Impracticability Waiver" for NAPLs identified in the subsurface.

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Table 3
Plume Contaminant Levels (PCLs)
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Contaminant	PCL
Chlorophenol-2	6 mg/l (N)
Dichlorophenol-2,4	2 mg/l (N)
2,4-D	210 mg/l (N)
2,4,5-TP	84 mg/l (N)
Toluene	9 mg/l (N)
Trichlorophenol-2,4,5	52 mg/l (N)
Trichlorophenol-2,4,6	0.1 mg/l (C)
2,4,5-T	210 mg/l (N)
2,3,7,8-TCDD	7 ng/l (C)
(N) - Noncancer risk-based concentration (C) - Cancer risk-based concentration	

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Table 4
Ground Water Monitoring Analytical Data
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Well	Date	Toluene ug/l	Phenol ug/l	2-Chlorophenol ug/l	4-Chlorophenol ug/l	2,4-Dichlorophenol ug/l	2,6-Dichlorophenol ug/l	2,3,6-Trichlorophenol ug/l	2,4,5-Trichlorophenol ug/l	2,4,6-Trichlorophenol ug/l	2,4-D ug/l	2,6-D ug/l	2,4,5-T ug/l	2,4,6-T ug/l	2,4,5-TP ug/l	TCDD ng/l	Tetrachlorobenzene ug/l	Chloride mg/l
PCLs		9000		6000		2000			52000	100	210000		210000		84000	7		
MCLs		1000									70				50	0.03		250*
MW-9	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.79
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.36
	04/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.89
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.61
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.34
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.36
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	7.95
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	7.82
MW-13	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.62
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.19
	10/28/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.76
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.02
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.93
	04/24/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	8.55
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	10.6
MW-22	04/26/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.66
	04/19/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.66
	04/23/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND
MW-31	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	83.7
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	86.1
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	84.7
	10/28/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	81.9
MW-36	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18.8
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	17.1
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18.3
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	17.8
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
	10/31/00	ND	ND	ND	22.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20
	01/19/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	39.6
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	21.4
MW-66	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23.3
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	24.2
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22.4
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18.9
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.6
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23.3
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	21
	10/04/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	21.8
MW-76	04/22/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	43.9
	10/27/98	12	ND	38.7	5.22	11	12.5	ND	12.6	ND	ND	ND	ND	ND	4.55	ND	ND	41.1
	04/21/99	ND	ND	29.5	ND	22	6.96	ND	14.4	ND	ND	ND	ND	4.51	3.12	ND	ND	43.2
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	41.5
	04/17/00	ND	ND	17.2	44.7	16.2	ND	ND	12.3	ND	ND	ND	ND	ND	ND	ND	ND	45.7
	10/31/00	ND	ND	43.4	44.6	45.4	18.1	ND	6.72	ND	ND	ND	ND	5.63	3.54	ND	ND	56.9
	04/23/01	34.3	ND	33.4	ND	36	12.8	ND	13.3	ND	ND	ND	ND	ND	2.88	NA	NA	48.8
	10/02/01	ND	ND	12.3	ND	13.1	13.5	ND	12.3	ND	ND	ND	ND	ND	6.46	NA	NA	52.5
MW-77	04/23/98	786	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	500
	07/15/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	509
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	528
	04/20/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	466
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	462
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	486
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	485
	04/24/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	433
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	559

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Well	Date	Toluene ug/l	Phenol ug/l	2-Chlorophenol ug/l	4-Chlorophenol ug/l	2,4-Dichlorophenol ug/l	2,6-Dichlorophenol ug/l	2,3,6-Trichlorophenol ug/l	2,4,5-Trichlorophenol ug/l	2,4,6-Trichlorophenol ug/l	2,4-D ug/l	2,6-D ug/l	2,4,5-T ug/l	2,4,6-T ug/l	2,4,5-TP ug/l	TCDD ng/l	Tetrachlorobenzene ug/l	Chloride mg/l
PCLs		9000		6000		2000			52000	100	210000		210000		84000	7		
MCLs		1000									70				50	0.03		250*
MW-94	08/25/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	38.1
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35.1
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	29.4
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	28.7
	04/19/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.6
	10/31/00	ND	ND	ND	5.2	ND	ND	ND	ND	ND	ND	ND	ND	2.36	ND	ND	ND	28.8
	01/16/01	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	18.8
	10/04/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	36.8
MW-95	04/25/98	ND	ND	ND	ND	7.36	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.5
	10/27/98	12.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.46
	04/21/99	6.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.7
	04/17/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15.3
	10/30/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.6
	04/23/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	8.92
	10/02/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	16.6
MW-98	04/22/98	12.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.5
	10/27/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2
	04/20/99	7.45 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.85
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.5
	04/17/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.9
	10/30/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.51
	04/23/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	5.9
	10/02/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	6.57
MW-91	04/22/98	10100	7240	6520	24400	3260	2980	65.9	668	678	24200	55400	4195	87200	622	ND	ND	341
	10/28/98	1120	662	6.18	266	ND	ND	ND	ND	ND	53.4	285	14.8	167	33.7	ND	ND	228
	04/20/99	373	42.1	ND	20.3	ND	ND	ND	ND	ND	ND	8.65	ND	4.26	ND	ND	ND	86.9
	10/27/99	13.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	90.3
	04/17/00	16.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	82.2
	10/30/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	107
	04/24/01	30.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	94.2
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	110
MW-93	04/22/98	ND	736	ND	23.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	203
	10/27/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	174
	04/20/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	114
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	169
	04/17/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	165
	10/30/00	11.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	186
	04/23/01	22.5	ND	ND	27.8	6.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	77.4
	10/02/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	169
MW-99	04/22/98	ND	10.2	ND	ND	ND	ND	ND	ND	ND	ND	32.9	6	17.2	3.18	ND	ND	216
	10/28/98	38.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	189
	04/20/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	189
	10/27/99	2260	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	297
	02/02/00	13.2																
	04/17/00	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	189
	10/30/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	253
	04/23/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	225
	10/02/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	257
MW-100	04/22/98	6670	3110	3920	12600	5000	1610	29.8	311	283	7330	20300	944	16900	1670	ND	ND	312
	10/27/98	1570	208	49	210	6.72	ND	43.2	ND	ND	66.2	370	18.1	147	99.9	ND	ND	199
	04/20/99	1990	455	66.4	770	20.3	6.08	ND	ND	ND	17	59.4	3.16	27.6	22.1	ND	ND	137
	10/27/99	388	150	15.6	285	11	ND	ND	ND	ND	13.8	34	2.36	27.6	3.88	ND	ND	97.3
	01/21/00	524																
	04/17/00	350	72	12.3	212	5.8	ND	ND	ND	ND	7.87	36	ND	28.8	2.17	ND	ND	186
	10/30/00	382	59.5	28.4	282	75.2	20.7	ND	ND	6.76	74.1	291	15.2	53.8	8.18	ND	ND	126
	04/23/01	37.2	ND	ND	ND	ND	ND	ND	ND	ND	7.77	18.6	2.34	6.45	ND	NA	NA	169
	10/02/01	14.9	ND	ND	8.74	ND	ND	ND	ND	ND	ND	15.2	ND	7.29	2.29	NA	NA	94.6

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Well	Date	Toluene ug/l	Phenol ug/l	2-Chlorophenol ug/l	4-Chlorophenol ug/l	2,4-Dichlorophenol ug/l	2,6-Dichlorophenol ug/l	2,3,6-Trichlorophenol ug/l	2,4,5-Trichlorophenol ug/l	2,4,6-Trichlorophenol ug/l	2,4-D ug/l	2,6-D ug/l	2,4,5-T ug/l	2,4,6-T ug/l	2,4,5-TP ug/l	TCDD ng/l	Tetrachlorobenzene ug/l	Chloride mg/l
PCLs		9000		6000		2000			52000	100	210000		210000		84000	7		
MCLs		1000									70				50	0.03		250*
MW-101	04/22/98	136	480	21.5	630	6.64	5.14	ND	ND	ND	ND	88.3	ND	14.5	42.2	ND	ND	140
	10/27/98	46.7	337	ND	442	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	74.4
	04/20/99	6.46 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	87.8
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	72.5
	04/17/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	55.5
	10/30/00	15.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	81.8
	04/23/01	42.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	84
	10/02/01	55.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	73.4
MW-102	04/22/98	4100	4240	1460	8730	356	122	ND	102	36.3	1450	5640	364	11000	120	ND	ND	382
	10/28/98	1180	157	51.1	436	71.7	15.5	107	14	9.52	283	564	57.7	516	9.47	ND	ND	167
	04/20/99	166	18	ND	24.2	ND	ND	ND	6.68	ND	ND	ND	ND	ND	ND	ND	ND	235
	10/27/99	14.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	256
	04/18/00	679	71.8	11	172	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	230
	10/30/00	21.8	9.67	ND	25.9	ND	ND	7.43	ND	ND	ND	ND	ND	ND	ND	ND	ND	270
	04/23/01	77.4	53.6	ND	18.6	ND	ND	ND	ND	ND	7.69	56.9	ND	6.24	ND	NA	NA	288
	10/02/01	53.4	6.32	ND	23.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	230
MW-103	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.89
	10/27/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.28
	04/20/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.67
	10/27/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3
	04/17/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.25
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.94
	04/23/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	1.16
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	2.16
PZ-142	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.07
	10/27/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.08
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.67
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.6
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.51
	10/31/00	ND	ND	ND	17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.57
	01/19/01	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	5.72
	10/04/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	6.67
PZ-146	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.32
	10/27/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.88
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.85
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.19
	10/31/00	ND	ND	ND	7.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.13
	01/19/01	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
	04/24/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	2.26
	10/04/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	2.62
LW-1	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.74
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.58
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.68
	10/29/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.61
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.97
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.83
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.84
LW-2	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.93
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.6
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.93
	10/28/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.14
	04/18/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.91
	10/31/00	ND	ND	ND	ND	ND	ND	5.61	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.2
	01/18/01	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.6
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.8

Table 4
Ground Water Monitoring Analytical Data
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Well	Date	Toluene ug/l	Phenol ug/l	2-Chlorophenol ug/l	4-Chlorophenol ug/l	2,4-Dichlorophenol ug/l	2,6-Dichlorophenol ug/l	2,3,6-Trichlorophenol ug/l	2,4,5-Trichlorophenol ug/l	2,4,6-Trichlorophenol ug/l	2,4-D ug/l	2,6-D ug/l	2,4,5-T ug/l	2,4,6-T ug/l	2,4,5-TP ug/l	TCDD ng/l	Tetrachlorobenzene ug/l	Chloride mg/l
PCLs		9000		6000		2000			52000	100	210000		210000		84000	7		
MCLs		1000									70				50	0.03		250*
LW-3	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.44
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.3
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.3
	10/28/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.42
	04/19/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.76
	10/31/00	ND	ND	ND	10.4	ND	ND	8.31	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.31
	01/18/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
	04/24/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.33
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.48
LW-4	04/21/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	11.6	ND	ND	ND	ND	ND	ND	ND	11.2
LW-4R	04/19/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18.4
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20.8
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15.8
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.4
LW-5	04/23/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	166
	10/28/98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	135
	04/21/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	88.5
	10/28/99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	181
	04/19/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	48.4
	10/31/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	125
	04/25/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	44.3
	10/03/01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	105

ND - Not detected at sample quantitation limit
NA - Analyte not analyzed for in sample
J - estimated concentration
* - Secondary MCL

Table 5
Fish Monitoring Data, Bayou Meto and Rocky Branch Creek
Vertac Incorporated Superfund Site
Second Five-Year Review Report

Station	Species	2,3,7,8-TCDD (ppt)							TEQ* (ppt)					
		1994	1996	1998**	1998**	2000	2001***	2002	1994	1996	1998**	1998**	2000	2002
Ark Hwy 13	Bigmouth Buffalo Fish	1.90					0.65		2.43					
	Bigmouth Buffalo Fish						0.63							
	Bigmouth Buffalo Fish						0.72							
	Long Nose Gar						5.50							
	Long Nose Gar						2.10							
	Smallmouth Buffalo Fish						5.60							
	Smallmouth Buffalo Fish						0.77							
	Largemouth Bass	ND							0.18					
	White Crappie	0.76							0.87					
Ark Hwy 15	Bigmouth Buffalo Fish	12.05	10.40	16.00	89.00			3.42	12.94	10.80	17.00	90.00		3.73
	Bigmouth Buffalo Fish	13.90												
	Bigmouth Buffalo Fish	14.19												
	Smallmouth Buffalo Fish					7.97							8.75	
	Largemouth Bass	7.54	10.80	10.00	11.00	6.41		1.94	8.01	11.10	10.00	11.00	6.66	2.03
	Largemouth Bass			8.00	13.00	7.11		2.82			9.00	13.00	7.38	2.94
	White Crappie		6.90			4.85				7.16			5.11	
	Flathead Catfish		6.13							6.72				
	Channel Catfish			37.00	24.00						37.00	24.00		
IH-40	Smallmouth Buffalo Fish		18.60	14.00	14.00	17.70				19.60	14.00	14.00	18.80	
	Bigmouth Buffalo Fish							3.70						3.95
	Largemouth Bass		15.20			26.50		3.91		15.40			27.20	4.06
	Common Carp			21.00	38.00						21.00	38.00		
Ark Hwy 161	Bigmouth Buffalo Fish	24.03	20.60	34.00	31.00			15.90	26.78	21.20	34.00	32.00		16.60
	Smallmouth Buffalo Fish					27.30							28.10	
	Largemouth Bass	34.37	25.20	125.00	180.00	35.00		13.50	35.59	25.80	126.00	181.00	35.50	13.70
	White Crappie	21.32				23.10			22.06				23.50	
	Black Crappie		31.50							32.10				
US Hwy 67-167	Bigmouth Buffalo Fish	87.66	12.10	47.00	63.00	5.97		2.50	93.77	12.80	52.00	65.00	6.54	2.84
	Largemouth Bass		26.30	16.00	32.00	5.40		6.38		26.90	16.00	33.00	5.88	6.63
	White Crappie	24.04		16.00	41.00				25.97		17.00	44.00		
	Yellow Bullhead Catfish		10.80							11.00				
Rocky Branch Creek	Bigmouth Buffalo Fish	69.89	46.10						73.05	47.10				
	Largemouth Bass	18.02	33.90	126.00	110.00	36.70		14.70	18.71	34.70	126.00	110.00	37.20	14.90
	Bluegill Sunfish		50.70	113.00	120.00			12.40		52.30	114.00	120.00		12.60
	Warmouth Sunfish					28.30							28.60	
	Flathead Catfish		37.40							37.50				
Lake Dupree	Bigmouth Buffalo Fish		7.17							7.53				
	White Crappie		10.60							10.60				
	Channel Catfish							0.84						1.03
	Largemouth Bass		22.10			5.88		10.20		22.30			6.06	10.50

* 1994 values given as TEC (toxicity equivalent concentration)
** Samples analyzed twice due to QA/QC concerns
*** Samples collected by the Arkansas Game and Fish Commission on May 5, 2001, just south of the Highway 13 Bridge. No TEQ data was reported.

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Attachment 1a

Documents Reviewed

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Attachment 1a
List of Documents Reviewed

Agency for Toxic Substances and Disease Registry (ATSDR), 1997a. *Dioxin and Dioxin-Like Compounds in Soil, Part 1: ATSDR Interim Policy Guideline.* August 21, 1997.

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Arkansas Department of Environmental Quality (ADEQ), 2003. Letter from Masoud Arjmandi/ADEQ to Philip Allen/EPA, with copy to Bruce J. Hough/Hercules, Inc, dated February 12, 2003. Regarding ADEQ review comments on the Draft Sitewide Operations and Maintenance Manual, Vertac Superfund Site, Jacksonville, Arkansas.

Arkansas Department of Health (ADH), 2003. Letter from Dr. Fay Boozman/ADH to Myron O. Knudson/EPA Region 6 and Miguel I. Flores/EPA Region 6, dated October 28, 2003. Regarding fish consumption advisory.

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U. S. Environmental Protection Agency (EPA), 2003b. Letter from Myron O. Knudson/EPA Region 6 and Miguel I. Flores/EPA Region 6 to Dr. Fay Boozman/ADH, dated October 3, 2003. Regarding fish consumption advisory.

U. S. Environmental Protection Agency (EPA), 2001a. *Five-Year Review Report for the Vertac Incorporated Superfund Site, Jacksonville, Pulaski County, Arkansas.* July 2001.

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U. S. Environmental Protection Agency (EPA), 1998b. *Explanation of Significant Differences To The September 1996 Record Of Decision, Vertac, Inc. Superfund Site, Operable Unit 2, Jacksonville, Arkansas.* January 12, 1998.

U. S. Environmental Protection Agency (EPA), 1996a. *Unilateral Administrative Order For The Dismantling, Decontamination, And Consolidation Within The On-Site Hazardous Waste Landfill Of The On-Site Incinerator And Associated Structures And Debris, And Incinerator Ash And Pallets At The Vertac, Inc., Superfund Site.* CERCLA Docket No. CERCLA 06-04-97. December 31, 1996.

U. S. Environmental Protection Agency (EPA), 1996b. *Unilateral Administrative Order For The Remedial Design And Remedial Action At The Vertac, Inc., Superfund Site Operable Unit 3, Ground Water.* CERCLA Docket No. CERCLA 6-02-97. December 10, 1996.

U. S. Environmental Protection Agency (EPA), 1996c. *Unilateral Administrative Order For The Remedial Design and Remedial Action At The Vertac, Inc., Superfund Site Operable Unit 2, Soils And Underground Utilities.* CERCLA Docket No. CERCLA 6-01-97. December 10, 1996.

U. S. Environmental Protection Agency (EPA), 1996d. *Record of Decision, Vertac Superfund Site, Jacksonville, Arkansas, Operable Unit #3, Ground Water.* Final, September 17, 1996.

U. S. Environmental Protection Agency (EPA), 1996e. *Record of Decision, Vertac Superfund Site, Jacksonville, Arkansas, Operable Unit #2, Soils, Foundations and Underground Utilities.* Final, September 17, 1996.

U. S. Environmental Protection Agency (EPA), 1996f. *Declaration for the Amended Record of Decision* [amending the Vertac Superfund Site Off-Site Areas Record of Decision dated September 27, 1990]. September 17, 1996.

U. S. Environmental Protection Agency (EPA), 1996g. *Memorandum: Request for Approval of a Consistency Exemption to the Statutory $2 Million and Twelve Month Time Limits and for a Treatability Variance from Certain of the Land Disposal Restrictions for the Conduct of an Amended Non-Time Critical Removal Action at the Vertac Chemical Corporation Site, Jacksonville, Pulaski County, Arkansas.* July 18, 1996.

U. S. Environmental Protection Agency (EPA), 1995a. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1: Fish Sampling and Analysis.* Second Edition. EPA 823-R-95-007. September 1995.

U. S. Environmental Protection Agency (EPA), 1995b. *Explanation of Significant Differences* [regarding Operable Unit No. 1, Onsite Above-Ground Media]. May 25, 1995.

U. S. Environmental Protection Agency (EPA), 1994. *Unilateral Administrative Order For The Remedial Design and Remedial Action At The Vertac Inc. Superfund Site Onsite Operable Unit 1.* CERCLA Docket No. CERCLA 6-10-94. March 24, 1994.

U. S. Environmental Protection Agency (EPA), 1993a. *Record of Decision, Vertac Onsite Operable Unit 1.* Final, June 30, 1993.

U. S. Environmental Protection Agency (EPA), 1993b. *Unilateral Administrative Order For The Remedial Design and Remedial Action At The Vertac Inc. Superfund Site Off-Site Areas.* CERCLA Docket No. CERCLA 6-20-93. June 22, 1993.

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U. S. Environmental Protection Agency (EPA), 1989. *Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions.* Office of Solid Waste and Emergency Response (OSWER) Directive 9347.3-05FS. July 1989.

Environmental Resources Management (ERM), 1998a. *Remedial Action Report for Operable Units 1 and 2, Vertac Superfund Site, Jacksonville, Arkansas.* August 12, 1998.

Environmental Resources Management (ERM), 1998b. *Remedial Action Report for Rocky Branch Creek Floodplain Soils, Vertac Off-Site Areas, Vertac Superfund Site, Jacksonville, Arkansas.* July 1998.

Environmental Resources Management (ERM), 1998c. *Certification of Completion of Disposal Activities Report for Northern Area Incinerator Facility, Vertac Superfund Site, Jacksonville, Arkansas.* July 1998.

GMB & Associates, 2003. *Hercules Incorporated 2002 Bayou Meto Fish Flesh Monitoring Report.* May 20, 2003.

GMB & Associates, 1999. *Hercules Incorporated 1998 Bayou Meto Fish Flesh Monitoring Report.* October 26, 1999.

Hercules, Incorporated, 2003. Analytical Data Tables Containing Discharge Results From The Wastewater Treatment Plant, July 2001 through March 2003.

Hercules, Incorporated, 2002. Sitewide Operations and Maintenance Manual. Prepared for Hercules Incorporated by Genesis Environmental Consulting, Inc. December 2002.

Randall L. Maud Associates, Inc. (Maud), 2003. *Annual Progress Report, May 2001 to May 2002, Groundwater Monitoring, Operable Unit 3, Vertac Site, Jacksonville, Arkansas.* February 2003.

Randall L. Maud Associates, Inc. (Maud), 2001. *Annual Progress Report, May 2000 to May 2001, Groundwater Monitoring, Operable Unit 3, Vertac Site, Jacksonville, Arkansas.* December 2001.

Randall L. Maud Associates, Inc. (Maud), 1998. *Remedial Action Report, Operable Unit 3, Vertac Site, Jacksonville, Arkansas.* September 4, 1998.

Roy F. Weston, Inc. (Weston), 1996. *Request for Technical Impracticability Waiver for Operable Unit 3, Vertac Site, Jacksonville, Arkansas.* Final, September 1996.

Attachment 1b

Copies of Relevant Documents

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

Bruce J. Hough, Director
Environmental Engineering and Remediation
Safety, Health, Environment & Regulatory Affairs
Hercules Incorporated
Research Center
500 Hercules Road
Wilmington, Delaware 19808-1599

Re: EPA Comments on the Site-wide Operations and Maintenance Manual

Dear Mr. Hough:

Please find enclosed the U.S. Environmental Protection Agency's comments on the Vertac Site-wide Operations and Maintenance Manual (O&M Plan), which would constitute the O&M Plan required under the existing Site UAOs. I am sorry for the delay, but as we have discussed on the phone, I wanted the review of the O&M Plan to be performed in conjunction with the second Five-Year Review now in process for the Vertac Site. This "overlap" of review will help ensure that no comments will be inadvertently omitted during the performance of the Five Year Review. Please incorporate these comments and submit a final draft O&M Plan for review and approval.

If you have any questions or need anything further, please contact me at (214) 665-8516.

Sincerely yours,

Philip H. Allen, P. E.
Remedial Project Manager

Enclosure

cc: Massoud Arjmandi (ADEQ)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

OCT 3 2003

Fay Boozman, M.D.
Director
Arkansas Department of Health
4815 West Markham Street
Mail Slot #55
Little Rock, AR 72205

Dear Dr. Boozman:

The U.S. Environmental Protection Agency (EPA), Region 6 is in the process of performing the second "five-year review" for the Vertac Superfund Site, located in Jacksonville, Arkansas, as a statutory obligation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq. Several issues have been reviewed and addressed pertaining to the protectiveness of the Vertac Site remedy, except an issue pertaining to the Arkansas Department of Health (ADH) fishing advisory for Rocky Branch Creek and Bayou Meto, downstream of the Vertac Site.

As you may know, ADH imposed a fish consumption ban on two stream segments in Rocky Branch Creek and Bayou Meto as a part of the off-site CERCLA remedy adopted by the EPA for the Vertac Site in 1990 and amended in 1996. This issue came up during the first "five-year review" for the Vertac Site. In connection with that review, EPA sent a letter to Dr. Thomas McChesney (now retired from your department) on April 9, 2001, requesting that the ADH review the status of the fish consumption advisory for Rocky Branch Creek and Bayou Meto, including screening levels for dioxin in fish tissues using a risk based approach reflecting site specific considerations. The EPA also requested that ADH consider re-issuing the fish consumption ban in Bayou Meto below the Highway 13 bridge, which had been lifted by the ADH. These recommendations were then adopted by the EPA as part of the formal determinations contained in the final version of the first five-year review report on the Vertac Site released to the public on July 31, 2001. We have enclosed a copy of the letter for your reference.

On April 17, 2003, the EPA Vertac Site Remedial Project Manager (RPM), Philip Allen, met with Shirley Louie of your staff, along with several members of the Arkansas Department of Environmental Quality (ADEQ), in conjunction with the second five-year review. During this meeting, the fish consumption ban was discussed in depth. Ms. Louie stated that she was very aware of this issue, but was awaiting the analytical results from sampling of fish by Hercules as a part of biannual sampling and analyses of different species of fish at different points downstream of the Vertac Site. The EPA, ADEQ and ADH have received the Hercules biannual fish tissue analyses and have reviewed the information. A copy of those results has been provided to Ms. Louie and is also enclosed for your information.

During the past few months, Philip Allen and Shirley Louie have been in close contact with respect to this issue, and they agree that although the general trend of dioxin levels in fish tissue is declining, there are a number of reported dioxin concentration levels well above the screening levels contained in EPA's guidance. Also, the State of Arkansas conducted some additional analyses from fish just downstream of the Highway 13 bridge, and those results also indicate that some of the fish sampled contained levels of dioxin above the EPA screening levels.

The purpose of this letter is to encourage the ADH to complete its risk assessment downstream of Highway 13 and to seriously consider either re-issuing the fish consumption ban, or issuing a fish consumption advisory. In this matter, we recommend that the State consider guidance contained in the following sources for developing a risk-based approach to identify the need for a fish consumption advisory or other action:

(a) EPA-823-B-00-007, Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1- Fish Sampling and Analysis, 3rd ed.;

(b) EPA-823-B-00-008, Guidance for Assessing Chemical Contaminant Data for use in Fish Advisories, Volume 2 - Risk Assessment and Fish Consumption Limits, 3rd ed.; and

(c) EPA-823-F-99-015, Polychlorinated Dibenzo-p-dioxins and Related Compounds Update: Impact on Fish Advisories.

We appreciate your consideration of these recommendations and your effort to assess risk related to fish consumption in Bayou Meto. If you should have any questions regarding this issue, please do not hesitate to contact either Myron O. Knudson, P.E., at (214)-665-3136, or your staff can contact the Remedial Project Manager, Philip H. Allen, P.E., at 214-665-8516.

Sincerely yours,

Myron O. Knudson

Myron O. Knudson, P.E.
Director
Superfund Division

Miguel I. Flores

Miguel I. Flores
Director
Water Quality Protection Division

Enclosures (2)

cc: Marcus C. Devine, Director
Arkansas Department of Environmental Quality

Arkansas Department of Health

4815 West Markham Street • Little Rock, Arkansas 72205-3867 • Telephone (501) 661-2000
Fay W. Boozman, MD, MPH, Director
Mike Huckabee, Governor

October 28, 2003

Myron O. Knudson, P.E.
Director, Superfund Division
Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Mr. Miguel I. Flores
Director, Water Quality Protection Division
Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Knudson and Mr. Flores:

Thank you for your informative letter dated October 3, 2003. I have discussed EPA's request for the Arkansas Department of Health (ADH) to review the status of the fish consumption advisory for Rocky Branch Creek and Bayou Meto, including screening levels for dioxin in fish tissues using a risk-based approach reflecting site specific considerations with Shirley Louie of my staff as well as other scientists familiar with the complexities of these issues.

This Agency is keenly aware of the need for this reassessment and I have asked Ms. Louie to coordinate the development plans and approaches to address the concerns and recommendations articulated in your letter. These plans will consider the human health implications as well as possible economic, social and community ramifications of either re-issuing fish consumption advisories or fish consumption bans on Bayou Meto below Highway 13 and other bodies of water that could potentially be impacted.

The Arkansas Department of Health will consider all information contained in the guidance documents listed in your letter as we perform these site-specific evaluations. The State of Arkansas currently does not have funds available to conduct the reassessment that EPA has so strongly recommended. Ms. Louie and Mr. Philip Allen, the EPA Vertac Site Remedial Project Manager (RPM), have discussed these funding needs and the ADH will be requesting financial assistance from the Agency For Toxic Substance and Disease Registry (ATSDR).

We are grateful for your continued guidance in our efforts to assess the human health implications related to consumption of fish from Bayou Meto and Rocky Branch Creek.

Sincerely,

Fay Boozman, M.D., MPH
Director

Keeping Your Hometown Healthy

"An Equal Opportunity Employer"

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ADEQ

ARKANSAS
Department of Environmental Quality

February 12, 2003

Philip Allen (6SF-AP)
Superfund Division
U.S. EPA Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

RE: Draft Sitewide Operations and Maintenance Manual, Vertac Superfund Site, Jacksonville, Arkansas

Dear Mr. Allen:

The Draft Sitewide Operations and Maintenance Manual for the Vertac Superfund Site located in Jacksonville, Arkansas was received by ADEQ on January 10, 2003. The following are our review comments on this document.

1. **2.0 Site Description, page 3:** The location for the Vertac Site is given as 1907 Hill Road in Jacksonville. However, previously the address was 1010 Marshall Road in Jacksonville. Also, a review of the ADEQ files lists the location (address) as 1010 Marshall Road in Jacksonville. Please explain if Hercules has changed the address for the Vertac Site. If the address has been changed for the Vertac Site, Hercules must notify EPA and ADEQ of such changes so the files and databases can be updated.

2. **2.1 Site History, page 3**: According to the Phase I Remedial Investigation Report for Operable Unit 2 (December 1992), the Record of Decision for Operable Unit 2 (September 1996), and the Record of Decision for Operable Unit 3 (September 1996):

   - Hercules produced Agent Orange during 1964 – 1969, not 1967 – 1968.
   - Vertac Chemical Corporation operated the plant site until 1986 not 1987 and therefore, could not have continued to produce 2,4-D until 1987.
   - The Vertac Remedy was implemented in 1984 and completed in 1986, not 1996.
   - Vertac abandoned the Site on January 31, 1987, not February 1987.

   Please revise for these corrections.

3. **3.1 Fence, Gates, and Signage, page 6:**

   a. Please include the distance between the signs depicting "No Trespassing" (i.e., every 1000 feet). For example, "Signs depicting 'No Trespassing' are located along the perimeter fence every 1000 feet."

   b. Please state the Site is accessed via Hill Road.

4. **3.2 Communications, Page 6:** Appendix C does not contain an inspection form called, "monitoring the communication system." Throughout this manual, several names of the forms in the text do not match with the actual forms. In addition, inspection forms are scattered among several appendices. We recommend all inspection forms be included in one location. Moreover, make the names of the inspection forms consistent with the text. One way to reduce confusion is to number the forms and make reference to the form numbers as well as the form names.

5. **4.0 Leachate Collection System, page 7:** According to the Phase I Remedial Investigation Report for Operable Unit 2 (December 1992), the Record of Decision for Operable Unit 2 (September 1996), and the Record of Decision for Operable Unit 3 (September 1996), Vertac operated the plant site until 1986 not 1987. Vertac abandoned the site January 31, 1987. Please revise.

6. **4.1 Leachate Collection System Components, page 7**:

    a. Please submit a map(s) as a Figure(s) depicting the locations with labels of the french drain, manholes, pumping stations, leachate headers, and all other components of the Leachate Collection System.

    b. Thirteen (13) pump stations are specified in this section. Appendix E indicates a total of fourteen (14) pump stations. Make proper correction.

7. **4.2 Leachate Collection System Start-up Procedures, page 8:** Please define the acronym PLC. A list of all acronyms and their definitions should be included in the front of the document following the Table of Contents.

8. **4.3 Routine Maintenance and Inspection, page 8:**

    a. Please define the acronym LDS. A list of all acronyms and their definitions should be included in the front of the document following the table of contents.

    b. At the minimum a bi-weekly inspection schedule for the inspection of the french drains leachate collection system is recommended.

9. **5.0 Groundwater Recovery System, page 9:**

    a. Please submit a map(s) as a Figure(s) depicting all of the components of the Groundwater Recovery System.

    b. Second paragraph: Section 3.0 is Site Security not groundwater. Correct accordingly.

10. **5.1 Groundwater Recovery System Components, page 10:** Please change "exists" to "exits."

11. **5.1 Groundwater Recovery System Components and 5.2 Groundwater Recovery System Startup Procedures, pages 9 – 10:** Please revise for consistency and clarification when discussing the Groundwater Recovery System components. Is it the soils storage building, Groundwater Recovery Building, or Groundwater Transfer Building? Is it the groundwater collection tank, Groundwater storage tank, groundwater recovery tank, or groundwater transfer tank? Regardless of the names used for the components, they must be consistent throughout the document. The purpose of compiling this Operations and Maintenance (O&M) Manual is to provide documentation of the O&M procedures for the Vertac Site and to eliminate confusion, especially for new personnel unfamiliar with the Site.

12. **5.2.1 Groundwater Extraction Pump Start Up Sequence, page 11:** In checklist item number 6, please change "permissive" to "permission" and change "al" to "all" in the bullet.

13. **5.3 Routine Maintenance and Inspection, page 11:** Appendix C does not contain an inspection form for the Groundwater Recovery System (GRS) as stated. Please submit a GRS inspection form.

14. **6.0 Landfill Monitoring, page 13:** The location of the landfill on the Vertac Site is shown in Figure 3, not Figure 1 as stated. However, it is not labeled or identified as a landfill in Figure 3. Please revise the text and figures to correctly show the location of the landfill.

15. **6.0 Landfill Monitoring, pages 13 – 16:** Please include a discussion on groundwater monitoring for the landfill. Please provide a map with an adequate scale depicting the landfill groundwater monitoring system.

16. **6.2 Leachate Collection System and 6.3 Leak Detection System, pages 15 – 16:** Please explain in detail how damaged components of the Leachate Collection System (LCS) and the Leachate Detection System (LDS) will be repaired as necessary and clearly state that the design, plans and specifications for repairs will be submitted to EPA and ADEQ for approval should repairs be necessary.

17. **6.2 Leak Collection System; Page 15, Second Paragraph:** Revise to show only the present method of leachate collection and removal method. Once the pumping to the manhole or any other method is in place, revise this section to show modification to the system.

18. **6.3 Leak Detection System, Page 15:**

    a. Specify the frequency of pumping the LDS pump.

    b. Change LCS to LDS.

19. **7.0 Water Treatment System, pages 17 – 18:** Please provide a map as a figure depicting the locations of the French drain manholes, Leachate Header 1, Leachate Header 2, Leachate Header 3, and all other major components of the Water Treatment System. Please provide drawings depicting the components of the Water Treatment System within and adjacent to the Water Treatment System Building.

20. **7.2.1 Oil Water Separator Removal, Page 19:** Specify the problems with the oil water separator tank.

21. **8.0 Wastewater Discharge Monitoring, page 21:**

    c. Outfall locations are not located in Figure 1. Please provide a map as a figure depicting the outfall locations.

    d. It does not appear that Appendix G includes all relevant correspondence. For example, instead of the revised limits of 0.005ng/l, concentration limits of 0.001 ng/l and 0.002 ng/l for dioxin (2,3,7,8-TCDD) are reported.

22. **8.1 Treated Discharge Monitoring Limitations and Conditions, page 21:**

    a. A Table 7-1 is referenced. Please revise Table 7-1 to Table 8-1.

    b. Please provide a complete and detailed sampling and analysis plan for sampling treated wastewater discharges.

23. **8.2 Stormwater Discharge Monitoring Limitations and Conditions, pages 22 – 23:** Please provide a complete and detailed sampling and analysis plan for sampling stormwater discharges.

24. **8.3 Sample Containers and Handling, page 23:** In addition to individuals conducting the sampling having completed the 40 hours of OSHA 1910.120 (HAZWOPER) training, they also must maintain current status (i.e., 8-hour refresher courses) in the HAZWOPER training. Please revise to include the requirement of individuals maintaining current status in HAZWOPER training.

25. **10.0 Sitewide Groundwater Sampling, pages 28 – 29:** Randall Maud's name is misspelled. Please correct the spelling.

26. **10.1 Constituents For Analysis, page 28:** It should be clearly stated that the list of constituents for analysis may be reduced only if approved by EPA and ADEQ.

27. **10.4 Field Sampling Procedures, page 30:** Please add to the first bullet to read "Containerize all purge water and dispose on-site in the Waste Water Treatment Plant."

28. **10.6 Decontamination of Sampling Equipment, page 30:** Regardless of whether NAPLs are observed or not, all liquids must be collected during decontamination

procedures and must be treated at the Waste Water Treatment Plant. Please revise the bullets to clearly state that this will be done.

29. **10.9 Sample Containers and Handling, page 31:** In addition to individuals conducting the sampling having completed the 40 hours of OSHA 1910.120 (HAZWOPER) training, they also must maintain current status (i.e., 8-hour refresher courses) in the HAZWOPER training. Please revise to include the requirement of individuals maintaining current status in HAZWOPER training.

30. **10.10 Laboratory Quality Assurance/Quality Control, Page 32:** Change the sentence, "The state of Arkansas may certify the laboratory analyzing the samples," to, "laboratory analyzing the samples must be Arkansas state certified."

31. **10.11 Reporting, Page 32:** The text specifies that progress reports are sent to EPA and ADEQ on an annual basis. Table 12-1, Reporting Requirements, states semi-annually, annually. Modify Table 12-1 to annual basis.

32. **11.2.1 General, Page 33:**

    e. Change 2378 TCDD to 2,3,7,8-TCDD.

    f. **Table 11-1, Hazardous Waste Management:** Description and Storage/Disposal for the Leachate Interceptor Manholes are not accurate. They should be the same as the Landfill row. Revise accordingly.

33. **Appendix C Reporting Forms:** Appendix C does not contain an inspection form for the Groundwater Recovery System (GRS) as stated. Please submit an inspection form for the GRS.

34. **Appendix C Reporting Forms, North Landfill Inspection Form, Leachate Collection System:** Specify the method of measurement for leachate above 2-feet in the sumps.

35. **Appendix D WWTP Operations and Maintenance Manual:**

    a. **2.3 Performance Criteria:** In accordance with CERCLA 121(e)(1), a permit is not required but, the requirements of a permit must be met. Therefore, please explain why a permit number is listed and a permit is referenced.

    b. In the Sitewide Operations and Maintenance Manual, Section 7.2 System Modifications, page 19, it states that the Oil Water Separator Tank, Acidification Process, Spent Carbon Hold Tank, and Sock Filter System were all removed from the Waste Water Treatment System. Therefore, please revise throughout Appendix D to include these system modifications.

36. **Appendix E Leachate Collection System:** There should not be any handwritten strikeouts, revisions, or notes in the margins. Please rewrite Appendix E.

37. **Appendix F Groundwater Recovery System:** Appendix F is only a copy of Section 5, Operation and Maintenance Plan from the Final Remedial Design (July 1997). It clearly states that an O&M manual for the extraction and monitoring system (i.e., Groundwater Recovery System) will include, but not limited to a list of bulleted items. It also states that this O&M manual will be prepared and submitted to EPA after the system has been installed and is operational. Please submit a complete and detailed O&M manual for the Groundwater Recovery System which includes, but is not limited to the bulleted items in Section 5 of the Final Remedial Design.

38. **Appendix G Discharge Limits Rocky Branch Creek:** Please submit a sampling and analysis plan for the wastewater discharge monitoring.

39. **Appendix H Stormwater Pollution Prevention Plan:**

    a. **1.0 Introduction:** According to the Phase I Remedial Investigation Report for Operable Unit 2 (December 1992), the Record of Decision for Operable Unit 2 (September 1996), and the Record of Decision for Operable Unit 3 (September 1996);

    - Hercules produced Agent Orange during 1964 – 1969, not 1967 – 1968.
    - Vertac Chemical Corporation operated the plant site until 1986, not 1987 and therefore, could not have continued to produce 2,4-D until 1987.
    - The Vertac Remedy was implemented in 1984 and completed in 1986, not 1996.
    - Vertac abandoned the Site on January 31, 1987, not February 1987.

    Please revise for these corrections.

    b. **Table 1 Facility Data Sheet:** The location for the Vertac Site is given as 1907 Hill Road in Jacksonville. However, previously the address for the Vertac Site has been 1010 Marshall Road in Jacksonville. Also, a review of the ADEQ files lists the location (address) as 1010 Marshall Road in Jacksonville. Please explain if Hercules has changed the address for the Vertac Site. If the address has been changed for the Vertac Site, Hercules must notify EPA and ADEQ of such changes so the files and databases can be updated.

    c. **3.2.2 Drainage Area 2:** Based on observations during a site visit on July 19, 1995, slope failures had occurred on the northwest slope of the Sedimentation Vault (Mount Vertac). During the site visit, repairs were underway and the entire northwest slope was to be covered with riprap. Therefore, the entire northwest slope was not covered with riprap in 1988 as stated. Please revise.

    d. **3.2.3 Drainage Area 3:** change "eat" to "east."

    e. **3.4 Materials Inventory and Appendix F Materials Inventory:** According to the discussions with Genesis Environmental Consulting, Inc. (Hercules site contractor) during a May 14, 2002 site visit and in an October 25, 2002 meeting, the sulfuric

acid and caustic soda would be removed from the site or placed in the WWTP. Since the acidification process was removed from the WWTP (Section 7.2 System Modifications, page 19), explain why these chemicals are still present.

f. **4.4 Sedimentation and Erosion Control:** As stated previously, based on observations during a site visit on July 19, 1995, the entire northwest slope of Mount Vertac was undergoing repairs and was to be covered with riprap. Therefore, the entire northwest slope was not covered with riprap in 1988 as stated. Please revise.

40. **Appendix K Sitewide Groundwater Monitoring**: Do not include items marked out by hand or hand written changes on pages or in the margins. Please revise the Table of Contents to be consistent with the text of the Sitewide Groundwater Monitoring Plan. Please submit maps with an adequate scale for the groundwater recovery/containment and monitoring system and for the landfill groundwater monitoring system.

41. **Appendix L Final Remedial Design for OU#3:** Page 2-5 and Figure 2-10, page 2-24 were both misfed when copied. Please revise these pages. In addition, throughout the entire Sitewide Operations and Maintenance Manual there are some other pages that were miscopied but are somewhat readable. Please review the Sitewide Operations and Maintenance Manual and revise as necessary.

42. There are no Operation and Maintenance procedures for the Sedimentation Vault (Mount Vertac), the North Burial Area, and the Reasor-Hill Landfill Area. Please submit O&M procedures for these areas.

43. An issue that is important to ADEQ and EPA which was discussed with Genesis Environmental Consulting, Inc. during a May 14, 2002 site visit and in an October 25, 2002 meeting, is to be able to obtain and keep an accurate record for the date, pumping duration, and the volume of leachate pumped from each of the manhole sumps. Please make proper modifications to the system design to make it possible to collect the above data. Revise this manual accordingly.

If you have any questions, please call me at (501) 682-0852.

Sincerely,

Masoud Arjmandi
Engineer II, Inactive Sites Branch, Hazardous Waste Division

cc: Mike Bates, Chief, HWD
Kin Siew, Engineer Supervisor, Inactive Sites Branch, HWD
Jerry Neill, Geologist, P.G., Inactive Sites Branch, HWD
Bruce J. Hough, P.E., Hercules, Inc.

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Attachment 2

Interview Record Forms

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Five-Year Review Interview Record Vertac, Inc. Superfund Site Jacksonville, Arkansas	**Interviewee:** Masoud Arjmandi/ADEQ (PM) Jerry Neill/ADEQ (geologist) Phone: 501-682-0852 email: arjmandi@adeq.state.ar.us

Site Name	**EPA ID No.**	**Date of Interview**	**Interview Method**
Vertac Inc. Superfund Site	EPA ID# ARD000023440	04/15/2003	In person

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Philip Allen	EPA Region 6	214-665-8516	allen.philip@epa.gov	1445 Ross Ave Dallas, Texas 75202-2733
Margaret O'Hare	CH2M HILL, as rep of EPA	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Darren Davis	CH2M HILL, as rep of EPA	972-980-2170	ddavis9@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251

Interview Questions

1. What is your overall impression of the work conducted at the site since the first Five-Year Review period (ie. after December 2000)?

Response: ADEQ responded that there have been some maintenance problems, including an overflow in the cooling pond, faulty valve leading to 2 or 3 hits of dioxin in effluent, erosion on landfills, wrong well abandoned and replaced in 2001, etc., with lengthy time to repair (on order of 6 months). ADEQ was notified in annual progress reports, but should have been notified directly of each problem. ADEQ has submitted comments on the December 2002 Sitewide O&M document which address the repair and communication issues.

2. From your perspective, what effect have continued remedial operations at the site had on the surrounding community? Are you aware of any ongoing community concerns regarding the site or its operation and maintenance?

Response: ADEQ responded that there have been no comments from the community, positive or negative. They did have a request from someone who wanted to buy a hunting license along Bayou Meto, wondering about liability, and have received some enquires from real estate entities.

3.	Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.
Response:	ADEQ responded that they receive and review monthly effluent discharge reports and conduct inspections when issues come up.
4.	Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, or anything that required emergency response from local authorities? If so, please give details.
Response:	ADEQ responded that there have not been any incidents reported to them. Had heard about some deer hunters that were observed and asked to leave site.
5.	Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and result.
Response:	ADEQ responded that there have been no complaints, some requests to receive copies of correspondence.
6.	Are you aware of any problems or difficulties encountered since the first Five-Year Review which have impacted progress or resulted in a change in O&M procedures? Please describe changes and impacts.
Response:	ADEQ responded that there have been changes in procedures, which should be addressed by the Sitewide O&M Manual now in place. ADEQ has commented on the manual.
7.	In the first five-year review, it was identified that the Storm Water Pollution Prevention Plan needed to be finalized and implemented by the PRPs. What is the status of this plan? Have there been any changes in the wastewater treatment plant discharge limits?
Response:	ADEQ responded that the Storm Water Pollution Prevention Plan was included in the Sitewide O&M Manual submitted in December 2002. ADEQ has commented on the manual.
8.	Have there been any changes in state or federal environmental standards since the first five-year review period which may call into question the current protectiveness or effectiveness of the remedial action?
Response:	ADEQ responded no.

9.	Do you know of opportunities to optimize the operation, maintenance, or sampling efforts at the site, and have such changes been adopted?
Response:	ADEQ responded that there has been some optimization; such changes are described in the Sitewide O&M Manual.
10.	Do you feel well-informed about the site's activities and progress?
Response:	ADEQ responded that on certain levels, they do feel well-informed. The monthly reports are submitted and are acceptable quality. However, ADEQ would like more direct communication from the site regarding problems as they come up, and followup actions performed.
11.	Do you have any comments, suggestions, or recommendations regarding the site?
Response:	ADEQ would like to see the site operators take more initiative for communication and followup, and would like included in the Sitewide O&M Manual requirements that the agencies be notified of problems as they arise.

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Five-Year Review Interview Record Vertac Inc. Superfund Site Jacksonville, Arkansas			**Interviewee:** Shirley Louie Arkansas Department of Health		
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method**
Vertac Inc. Superfund Site		EPA ID# ARD000023440		04/17/2003	In Person
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Philip Allen	EPA Region 6	214-665-8516	Allen.Philip@epa.gov	1445 Ross Ave Dallas, Texas 75204	
Margaret O'Hare	CH2M HILL, as rep of EPA	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	
Darren Davis	CH2M HILL, as rep of EPA	972-980-2170	ddavis9@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	

Interview Questions

1. What is your overall impression of the work conducted at the site since the period covered by the first five-year review (since December 2000)?

Response: Ms. Louie responded that since the previous five-year revew, there has not been much activity within ADOH regarding the site. ADOH received in 2001 the results from the 2000 Bayou Meto fish sampling event, and have also received results from the 2001 fish tissue sampling performed by the Arkansas Game and Fish Commission Service in concert with ADOH and EPA near the State Highway 13 bridge. The 2002 fish tissue sampling event results have not yet been received. ADOH would like to receive sampling protocol; ADEQ responded they would look into it. ADOH would also like to receive ongoing site discharge results (there is currently no requirement for them to receive these data).

2. From your perspective, what effect have remedial operations at the site had on the surrounding community?

Response: Ms. Louie responded that the ADOH continues to see interest expressed by the community. ADOH receives an average of 1 to 2 calls per week during some active seasons (mostly revolving around recreational fishing season). The ongoing remedial operations are not visible to the community, and in general Ms. Louie feels the average community perception seems to be tracking about 5 to 7 years behind what's currently going on at the site. Calls come from Mayor Swaim, individual citizens and out-of-state parties. ADOH refers callers to EPA site status summary on the web for updates.

3.	Are you aware of any ongoing community health concerns regarding the site or its operation and administration?
Response:	Ms. Louie indicated there does not appear to be an ongoing organized concern, but individual concerns remain, usually when there has been some reminder about the site. For example, a report on dioxin in local newspapers, or some physical activity at the site, or during fishing season when people are reminded of the fish ban. From ADOH's perspective, the data from the last sampling seems to indicate a need to revisit the parameters of the fishing ban (including the limit of the ban to Highway 13), particularly in light of recent literature on dioxins. Ms. Louie would be interested to see a followup to the human assessment, to document the current levels of dioxin and if there have been changes since implementation of the remedial action. Ms. Louie also some question about the species of fish being monitored -- in terms of whether the species sampled are representative of those being consumed.
4.	Have there been any complaints or other comments related to the site that required a response by your office? If so, please give summarize the events and results of the responses.
Response:	Ms. Louie responded that some of the calls coming in reflect concerns about ongoing uncertainty in the regulatory community regarding the levels of dioxin considered safe in fish. The City of Jacksonville and interested citizens periodically express a desire for public reassurances from ADOH that the fish in Lake Dupree are safe.
5.	Are you aware of any developments which may require changes in the Record(s) of Decision or remedial action(s) performed?
Response:	Ms. Louie responded that there have been no changes in rules that might affect the decisions made at the site. However, she did indicate there has been a lot of information circulating in the literature in the past few years, particularly in terms of the chronic effects of low level dioxins, and a change in rules may be coming.
6.	Do you feel well-informed about the site's activities and progress?
Response:	Ms. Louie responded that currently they receive the fish tissue sampling results (with lag time of about 1 year or more), but she would like to receive more information about ongoing activities at the site, and other agencies' activities and response to ongoing operations. Ms. Louie requested in particular that ADOH receive copies of monthly sampling data for the wastewater treatment effluent discharge to Rocky Branch Creek, and the annual progress reports. ADEQ responded that they will request that Hercules add ADOH to the distribution list.

7.	What is the status of the fishing ban for Bayou Meto? Has the ADOH conducted further study regarding the health effects of fish consumption and dioxin levels for Bayou Meto?
Response:	Ms. Louie responded that the current fishing ban remains the same as it was at the time of the last five-year review (ban on fishing in Bayou Meto upstream of Highway 13; does not include Lake Dupree). Fish samples were collected by the Arkansas Game and Fish Commission in 2001, and analyzed by EPA in 2002. Ms. Louie acknowledged that these results and the results from the 2000 biannual sampling event indicate there may be a need to revisit the extent of the ban; this will be done upon receipt of the 2001 sampling event results, which are due. An ongoing concern remains that the fish being sampled may not be representative of the fish being caught and consumed from Bayou Meto.
8.	Do you have any comments, suggestions, or recommendations regarding the site?
Response:	Ms. Louie reiterated that ADOH would like more information about ongoing remedial operations, and Ms. Louie requests that they be added to the monthly discharge report and annual ground water report distribution lists.

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Five-Year Review Interview Record Vertac Inc. Superfund Site Jacksonville, Arkansas			**Interviewee:** Mayor Tommy Swaim City of Jacksonville		
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method**
Vertac Inc. Superfund Site		EPA ID# ARD000023440		04/15/2003	In Person
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Philip Allen	EPA Region 6	214-665-8516	Allen.Philip@epa.gov	1445 Ross Ave Dallas, Texas 75204	
Margaret O'Hare	CH2M HILL, as rep of EPA	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	
Darren Davis	CH2M HILL, as rep of EPA	972-980-2170	ddavis9@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	

Interview Questions

1. What is your overall impression of the work conducted at the site since the period covered by the first five-year review (since December 2000)?

Response: Mayor Swaim responded that the continued operations have been fine. He has visited the site on occasion.

2. From your perspective, what effect have continuing remedial operations at the site had on the surrounding community?

Response: Mayor Swaim responded that there have been no negative responses from the community. From the community perspective, the site is considered remediated, and thought of as a local commercial operation.

3. Are you aware of any ongoing community concerns regarding the site or its administration?

Response: Mayor Swaim responded that there appear to be no ongoing community concerns regarding the site; that most of the enquiries his office receives are from students researching the site, with some enquiries from commercial entities interested in the availability of the property for development.

4. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by the City regarding the site? If so, please describe purpose and results.

Response: Mayor Swaim responded that there did not appear to be a need for routine communications. The site is mostly automated and the gate remains locked and the fence secure. A contact at the site is available when needed.

5. Have there been any complaints, violations, or other incidents related to the site that required a response by your office, if applicable? If so, please give details of the events and results of the responses.

Response: None.

6. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?

Response: None.

7. Is your office aware of any plans to develop the site or any changes in land use at the site or portions of the site? What are the City's expectations or concerns about future land use at the site?

Response: The northern 70 acre portion of the site was acquired by the City in 2001 through the tax lien process for industrial use, and some of the buildings constructed by EPA on the property have been adapted for use as a recycling center and to house the sanitation department. The City and community are very pleased with the recycling center; the property's reuse has eliminated some of the stigma associated with being a Superfund site.

The City would still like to receive a release of liability letter for this property from EPA, requested previously. Without the letter, they will continue to use the property for City use only, and will not lease any portions of the property to other parties. A household chemical collection center is being added to the recycling center next year, and police academy training facilities may be added in the future (a public meeting on the training academy was anticipated at the time of the interview). Occasionally use of the property has been made available to private entities on the weekends (bow and arrow target practice).

8.	Are there any local community expectations or concerns about future land use/re-development at the site?
Response:	Mayor Swaim responded that different segments of the community have different ideas about how they would like to see the rest of the property eventually used. Developers would like to acquire the property and subdivide it. There has been a very positive response in the community to the recycling center, and the community will have the opportunity to comment on the potential for the addition of police academy training facilities in the near future.
9.	Do you feel well-informed about the site's activities and status?
Response:	Mayor Swaim indicated that yes, his office feels well-informed. Mayor Swaim noted the City receives results on the fish tissue monitoring program.
10.	Do you have any comments, suggestions, or recommendations regarding the site?
Response:	Mayor Swaim suggested that EPA use the Vertac site as a good example of reclamation and reuse within the Superfund process; site is considered a success in this community. A top-rated site on the NPL is now being reused to benefit the local community. Mayor Swaim also reiterated the City would still like to receive a release of liability letter from EPA for the portion of the property they have acquired.

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Five-Year Review Interview Record Vertac Inc. Superfund Site Jacksonville, Arkansas			**Interviewee:** Phillip Carlyle, Vice President Concerned Citizens Coalition (TAG recipient)		
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method**
Vertac Inc. Superfund Site		EPA ID# ARD000023440		04/17/2003	In Person
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Philip Allen	EPA Region 6	214-665-8516	Allen.Philip@epa.gov	1445 Ross Ave Dallas, Texas 75204	
Margaret O'Hare	CH2M HILL, as rep of EPA	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	
Darren Davis	CH2M HILL, as rep of EPA	972-980-2170	ddavis9@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	

Interview Questions

1. What is your overall impression of the remedial action work conducted at the site since the period covered by the first five-year review (ie. since December 2000)?

Response: Mr. Carlyle responded that he has not heard any news, and assumes the site is operating effectively.

2. From your perspective, what effect have continuing remedial actions at the site had on the surrounding community?

Response: Mr. Carlyle responded that the continuing remedial actions appear to have no effect on the community.

3. Are you aware of any ongoing community concerns regarding the remedial actions at the site?

Response: Mr. Carlyle responded that he knew of no community concerns regarding Superfund-related issues. However, there was some concern about the municipal sewage treatment requirements being more stringent for the community because of the Vertac site. Also, there was some concern expressed during clearing of undergrowth in front of the City's new recycling center, in an area where removals had previously taken place; although this was just landscaping, not related to contamination, the location of the activity raised some concerns.

4. Are you aware of community concerns regarding future use of the site? **Response:** Mr. Carlyle responded that there are some community concerns regarding when other portions of the site will be available for reuse.
5. Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities? **Response:** Mr. Carlyle responded that he was not aware of any such incidents.
6. Do you feel well-informed about the site's condition and status? **Response:** Mr. Carlyle responded that he would like to have more frequent communication regarding the site, updates on the site status. Mr. Philip Allen/EPA, a member of the interview team, replied that he is available to answer questions about the site at any time.
7. Do you have any comments, suggestions, or recommendations regarding the site? **Response:** Mr. Carlyle responded that the only suggestion would be more frequent communication regarding activities at the site.

Five-Year Review Interview Record Vertac Inc. Superfund Site Jacksonville, Arkansas			**Interviewee:** David Jaros/Genesis Earl Pilgrim/Genesis (onsite)		
Site Name		**EPA ID No.**		**Date of Interview**	**Interview Method**
Vertac Inc. Superfund Site		EPA ID# ARD000023440		04/16/2003	In Person
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**	
Philip Allen	EPA Region 6	214-665-8516	Allen.Philip@epa.gov	1445 Ross Ave Dallas, Texas 75204	
Margaret O'Hare	CH2M HILL, as rep of EPA	972-980-2170	mohare@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	
Darren Davis	CH2M HILL, as rep of EPA	972-980-2170	ddavis9@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251	

Interview Questions

1. What is your overall impression of the remedial action work conducted at the site since the period of the first five-year review (ie. since December 2000)?

Response: Majority of maintenance is keeping up with the older pumps. The site operations are now routine, and automation has improved the efficiency of the operators.

2. Please describe the reports available that document the remedy has been functioning as planned since the period covered by the first five-year review (ie. since December 2000).

Response: Monthly treatment plant effluent discharge reports are submitted to EPA/ADEQ. These reports provide analytical summary and the volume discharged.

Maintenance logs kept onsite document monthly water levels (in monitor wells, extraction wells and piezometers), monthly french drain inspections at each manhole, monthly cap/landfill inspections.

3. Please describe the onsite O&M staff and activities.

Response: O&M staff consists of 2 operators, one or both of whom is onsite 4 to 5 days per week. Status of water treatment plant is checked remotely by computer. The levels are checked each day, including weekends.

4.	Please describe any changes in O&M requirements, maintenance schedules, or sampling routines since the period covered by the first five-year review (ie. December 2000).
Response:	No significant changes have been implemented. Leachate has been detected in the RCRA landfill north cell leachate collection system since installation; the third carbon bed was discontinued because it was found to be not needed.
5.	Are you aware of any events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities?
Response:	None.
6.	Please describe any difficulties encountered or unanticipated costs demonstrated since the period covered by the first five-year review (ie. since December 2000).
Response:	No unanticipated maintenance issues. Fiberglass valves that had been causing problems have been replaced by steel valves (small expense).
7.	Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and desired and resultant cost savings and improved efficiency.
Response:	There have been optimizations including elimination of a redundant sample between the second and third carbon bed, and removal of the polymer feed after the filter socks (no advantage to keeping). Minor expenses; no significant change in cost has been noted as a result of these optimizations.
8.	Please cite each O&M manual update submitted since the period covered by the first five-year review (ie. since December 2000)?
Response:	The Sitewide O&M Manual was submitted in December 2002; operations at the site follow the procedures specified in this manual.
9.	Do you have any comments, suggestions, or recommendations regarding the site?
Response:	None. The site is being run efficiently and cost-effectively. Maintenance procedures have improved in the past couple of years, with implementation of optimizations and remote operation.

Attachment 3

Site Inspection Checklist

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Vertac, Incorporate, Jacksonville, Arkansas
Five-Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program. N/A means "not applicable."

I. SITE INFORMATION	
Site Name: Vertac, Incorporated Superfund Site	**EPA ID:** ARD000023440
City/State: Jacksonville, Arkansas	**Date of Inspection:** April 16, 2003
Agency Completing 5 Year Review: EPA	**Weather/temperature:** Cloudy, 60 degrees, some light rain

Remedy Includes: (Check all that apply)
- ■ Landfill cover/containment
- ■ Access controls
- ■ Institutional controls
- ■ Groundwater pump and treatment
- ■ Surface water collection and treatment
- □ Other:

Attachments: □ Inspection team roster attached □ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager**:
   Name: David Jaros
   Title:
   Date: April 16, 2003
   Interviewed: ■ at site □ at office □ by phone Phone Number:
   Problems, suggestions: ■ Additional report attached (if additional space required).

2. **O&M staff:**
   Name: Earl Pilgrim
   Title:
   Date: April 16, 2003
   Interviewed: ■ at site □ at office □ by phone Phone Number:
   Problems, suggestions: ■ Additional report attached (if additional space required).

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency: Arkansas Department of Environmental Quality
Contact:
Name: Mr. Jerry Neill
Title: Geologist
Date: April 15, 2003
Phone Number: 501-682-0846
Problems, suggestions: ■ Additional report attached (if additional space required).

Agency: Arkansas Department of Environmental Quality
Contact:
Name: Mr. Masoud Arjmandi
Title: Engineer
Date: April 15, 2003
Phone Number: 501-682-0852
Problems, suggestions: ■ Additional report attached (if additional space required).

Agency: Arkansas Department of Health
Contact:
Name: Ms. Shirley Louie
Title: Environmental Epidemiologist
Date: 501-661-2833
Phone Number:
Problems, suggestions: ■ Additional report attached (if additional space required).

Agency:
Contact:
Name:
Title:
Date:
Phone Number:
Problems, suggestions: □ Additional report attached (if additional space required).

4. **Other interviews** (optional) □ N/A ■ Additional report attached (if additional space required).

Interview Record Forms are provided in Attachment 2 to the Five-Year Review Report.
Masoud Arjmandi and Jerry Neill were interviewed together.
Earl Pilgrim provided additional comments during David Jaros' interview.

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents

■ O&M Manuals	■ Readily available	■ Up to date	□ N/A
□ As-Built Drawings	□ Readily available	□ Up to date	□ N/A
■ Maintenance Logs	■ Readily available	■ Up to date	□ N/A

Remarks: The O&M manual is currently in a revised draft version. This version is awaiting comments from the EPA and ADEQ. The site operators use this version for O&M at the site. Maintenance and inspections are recorded in logbooks and on inspection logs that are kept at the site.

2. Health and Safety Plan Documents

■ Site-Specific Health and Safety Plan	■ Readily available	■ Up to date	□ N/A
■ Contingency plan/emergency response plan	□ Readily available	■ Up to date	□ N/A

Remarks: Both are included in the O&M manual.

3. O&M and OSHA Training Records □ Readily available □ Up to date □ N/A

Remarks: OSHA training records are kept at the employer's office.

4. Permits and Service Agreements

□ Air discharge permit	□ Readily available	□ Up to date	■ N/A
■ Effluent discharge	■ Readily available	■ Up to date	□ N/A
□ Waste disposal, POTW	□ Readily available	□ Up to date	■ N/A
□ Other permits	□ Readily available	□ Up to date	■ N/A

Remarks: The effluent guidelines are established by the State of Arkansas. A copy of the criteria is kept at the site.

5. Gas Generation Records □ Readily available □ Up to date ■ N/A

Remarks:

6. Settlement Monument Records □ Readily available □ Up to date ■ N/A

Remarks:

7. Groundwater Monitoring Records ■ Readily available ■ Up to date □ N/A

Remarks: Ground water monitoring records are kept at the site.

8. Leachate Extraction Records ■ Readily available ■ Up to date □ N/A

Remarks: Leachate extraction records are kept in a logbook at the site.

9. Discharge Compliance Records ■ Readily available ■ Up to date □ N/A

Remarks: A monthly report is submitted to the ADEQ that contains the analytical data for the wastewater treatment plant's effluent. This data is kept at the site also.

10. Daily Access/Security Logs ■ Readily available ■ Up to date ☐ N/A
Remarks:

IV. O&M Costs ☐ Applicable ☐ N/A

1. O&M Organization
☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Other:

2. O&M Cost Records
☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
Original O&M cost estimate: ☐ Breakdown attached

Total annual cost by year for review period if available

From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period ☐ N/A
Describe costs and reasons: No unusually high costs were noted. There have been unanticipated costs related to a leaking valve in the wastewater treatment plant that was replaced. However, the replacement and repair costs were not high according to Mr. Jaros (approximately $300 for the new valve).

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on site map ■ Gates secured ☐ N/A
Remarks: All site fencing was still intact and maintained. The site fence is inspected once a month. All gates were locked and secured. The front gate can only be opened by the site operators using a security code or from inside the wastewater treatment plant.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks: Signs are posted along the outer perimeter site fence. Since they face outwards, most could not be read. However, it was noticed that some of the writing on signs along Marshall Road had faded and could not be read.

C. Institutional Controls

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented: ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced: ☐ Yes ■ No ☐ N/A
Type of monitoring (e.g, self-reporting, drive by): Drive-by/walk-through inspections of the site occur on a monthly basis. No reporting is required.
Frequency: Monthly
Responsible party/agency: PRP Contractor
Contact:
Name: David Jaros
Title:
Date:
Phone Number:
Reporting is up-to-date: ☐ Yes ☐ No ■ N/A
Reports are verified by the lead agency: ☐ Yes ☐ No ■ N/A
Specific requirements in deed or decision documents have been met: ☐ Yes ☐ No ■ N/A
Violations have been reported: ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Additional report attached (if additional space required).

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks: Only institutional controls include site access restrictions using fencing and a restriction on the installation of water supply wells at the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident
Remarks: It was reported that there were problems with hunters tresspassing on the site, but there have been no recent evidence that this is still occurring.

2. **Land use changes onsite** ☐ N/A
Remarks: The City of Jacksonville has located a drive-through recycling center and their Sanitation Department onto the northern portion of the site.

3. Land use changes offsite ☐ N/A

Remarks: None noted.

A. Roads ■ Applicable ☐ N/A

1. Roads damaged ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks:

B. Other Site Conditions

Remarks: There were trees growing on the caps of the old burial areas (North Burial area and Reasor Hill burial area). Tree roots could jeopardize the integrity of the clay caps placed over these areas. Note: During a followup site inspection conducted on August 5, 2003, by the EPA RPM, it was observed that the trees had since been removed by the site operators.

A. Landfill Surface

1. Settlement (Low spots) ☐ Location shown on site map ■ Settlement not evident

Areal extent: Depth:

Remarks:

2. Cracks ☐ Location shown on site map ☐ Cracking not evident

Lengths: less than a foot Widths: less than 1 mm Depths: Not observed

Remarks: Cracks that were noted were dessication cracks on the outer cover surface of the OU1 containment cells. These cracks are due to drying of the soils and do not impact the integrity of the cover.

3. Erosion ☐ Location shown on site map ☐ Erosion not evident

Areal extent: limited Depth:

Remarks: Minor, natural erosion was noted at the bottom of the containment cells. The filter fabric was exposed along the bottom edge on the northern edge of the containment cells.

4. Holes ☐ Location shown on site map ☐ Holes not evident

Areal extent: limited Depth: not measured

Remarks: A few animal burrows were observed on the containment cells

5. Vegetative Cover

☐ Cover properly established ■ No signs of stress ■ Grass ☐ Trees/Shrubs

Remarks: The vegetative cover was sparse in places. There were a few small pine trees (3-4 feet tall) growing on the western slope and on top of the containment cell caps. Note: During a followup site inspection conducted on August 5, 2003, by the EPA RPM, it was observed that the trees had since been removed by the site operators.

6.	**Alternative Cover (armored rock, concrete, etc.)** Remarks:		■ N/A
7.	**Bulges** Areal extent: Remarks:	□ Location shown on site map Height:	■ Bulges not evident
8.	**Wet Areas/Water Damage**		■ Wet areas/water damage not evident
	□ Wet areas	□ Location shown on site map	Areal extent:
	□ Ponding	□ Location shown on site map	Areal extent:
	□ Seeps	□ Location shown on site map	Areal extent:
	□ Soft subgrade Remarks:	□ Location shown on site map	Areal extent:
9.	**Slope Instability** Areal extent: Remarks:	□ Slides □ Location shown on site map	■ No evidence of slope instability
B.	**Benches** (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		□ Applicable ■ N/A
1.	**Flows Bypass Bench** Remarks:	□ Location shown on site map	□ N/A or okay
2.	**Bench Breached** Remarks:	□ Location shown on site map	□ N/A or okay
3.	**Bench Overtopped** Remarks:	□ Location shown on site map	□ N/A or okay
C.	**Letdown Channels**		■ Applicable □ N/A
1.	**Settlement** Areal extent: Remarks:	□ Location shown on site map Depth:	■ No evidence of settlement
2.	**Material Degradation** Material type: Remarks:	□ Location shown on site map Areal extent:	■ No evidence of degradation

3.	**Erosion** Areal extent: Remarks:	☐ Location shown on site map Depth:	■ No evidence of erosion
4.	**Undercutting** Areal extent: Remarks:	☐ Location shown on site map Depth:	■ No evidence of undercutting
5.	**Obstructions** Type: Areal extent: Remarks:	☐ Location shown on site map Height:	■ N/A
6.	**Excessive Vegetative Growth** ☐ Evidence of excessive growth ☐ Location shown on site map Remarks:	■ No evidence of excessive growth ☐ Vegetation in channels but does not obstruct flow Areal extent:	

D.	**Cover Penetrations**		■ Applicable	☐ N/A
1.	**Gas Vents**			☐ N/A
	☐ Active ■ Passive	☐ Routinely sampled		
	■ Properly secured/locked	■ Functioning	■ Good condition	
	☐ Evidence of leakage at penetration	☐ Needs O& M		
	Remarks: Two passive vents are located on top of the containment cells. The openings on both vents are screened to prevent animals from entering the vents.			
2.	**Gas Monitoring Probes**			■ N/A
	☐ Routinely sampled			
	☐ Properly secured/locked	☐ Functioning	☐ Good condition	
	☐ Evidence of leakage at penetration	☐ Needs O&M		
	Remarks:			
3.	**Monitoring Wells** (within surface area of landfill)			■ N/A
	☐ Routinely sampled			
	☐ Properly secured/locked	☐ Functioning	☐ Good condition	
	☐ Evidence of leakage at penetration	☐ Needs O&M		
	Remarks:			

4.	**Leachate Extraction Wells** ☐ Routinely sampled ■ Properly secured/locked ■ Functioning ■ Good condition ☐ Evidence of leakage at penetration ☐ Needs O&M Remarks: There are no leachate extraction wells, but there are leachate collection sumps.			☐ N/A
5.	**Settlement Monuments** ☐ Located ☐ Routinely surveyed Remarks:			■ N/A
E.	**Gas Collection and Treatment**		☐ Applicable	■ N/A
1.	**Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
2.	**Gas Collection Wells, Manifolds and Piping** ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
3.	**Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
F.	**Cover Drainage Layer**		☐ Applicable	■ N/A
1.	**Outlet Pipes Inspected** ☐ Functioning Remarks:			☐ N/A
2.	**Outlet Rock Inspected** ☐ Functioning Remarks:			☐ N/A
G.	**Detention/Sedimentation Ponds**		■ Applicable	☐ N/A
1.	**Siltation** ☐ Siltation evident Areal extent: Depth: Remarks:			■ N/A
2.	**Erosion** ☐ Erosion evident Areal extent: Depth: Remarks:			■ N/A

3.	**Outlet Works** Remarks:	■ Functioning	☐ N/A
4.	**Dam** Remarks:	■ Functioning	☐ N/A
H.	**Retaining Walls**		☐ Applicable ■ N/A
1.	**Deformations** Horizontal displacement: Remarks:	☐ Location shown on site map Vertical displacement:	☐ Deformation not evident Rotational displacement:
2.	**Degradation** Remarks:	☐ Location shown on site map	☐ Degradation not evident
I.	**Perimeter Ditches/Off-site discharge**		■ Applicable ☐ N/A
1.	**Siltation** Areal extent: Remarks:	☐ Location shown on site map Depth:	■ Siltation not evident
2.	**Vegetative Growth** Areal extent: Remarks:	☐ Location shown on site map Type:	■ Vegetation does not impede flow
3.	**Erosion** Areal extent: Remarks:	☐ Location shown on site map Depth:	■ Erosion not evident
4.	**Discharge Structure** ■ Functioning Remarks:	☐ Location shown on site map ■ Good Condition	☐ N/A
	VIII. VERTICAL BARRIER WALLS		☐ Applicable ■ N/A
1.	**Settlement** Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Settlement not evident

2. Performance Monitoring ☐ N/A

☐ Performance not monitored
☐ Performance monitored Frequency:
☐ Evidence of breaching Head differential:
Remarks:

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ■ Applicable ☐ N/A

1. Pumps, Wellhead Plumbing, and Electrical ☐ N/A

☐ All required wells located ■ Good condition ☐ Needs O& M
Remarks: Two extraction wells were inspected. Both were operating and in good condition.

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A

■ System located ■ Good condition ☐ Needs O& M
Remarks: System pipelines are buried underground. There is a maintenance building located near the ground water extraction system. This building contains pumps, valves for sampling wells, and an equalization tank for transferring the extracted ground water to the wastewater treatment plant.

3. Spare Parts and Equipment ☐ N/A

■ Readily available ☐ Good condition
☐ Requires Upgrade ☐ Needs to be provided
Remarks:

B. Surface Water Collection Structures, Pumps, and Pipelines ■ Applicable ☐ N/A

1. Collection Structures, Pumps, and Electrical ☐ N/A

■ Good condition ☐ Needs O& M
Remarks: Surface water is collected within the secondary containment area of the holding tanks on the outside of the wastewater treatment facility. These sumps transport the water into the wastewater treatment system.

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A

■ Good condition ☐ Needs O& M
Remarks: Not observed.

3. Spare Parts and Equipment ■ N/A

□ Readily available □ Good condition
□ Requires Upgrade □ Needs to be provided

Remarks: Only surface water collection is at sumps within the wastewater treatment plant area. These sumps catch water that is then sent to the wastewater treatment system.

C. Treatment System ■ Applicable □ N/A

1. Treatment Train (Check components that apply)

□ Metals removal □ Oil/water separation □ Bioremediation
□ Air stripping ■ Carbon adsorbers ■ Filters (list type): Sand
□ Additive (list type, e.g., chelation agent, flocculent)
□ Others (list): Reverse Osmosis Plant
■ Good condition □ Needs O&M
■ Sampling ports properly marked and functional
■ Sampling/maintenance log displayed and up to date
■ Equipment properly identified
□ Quantity of groundwater treated annually (list volume): 12,000,000 gallons
□ Quantity of surface water treated annually (list volume):

Remarks: The wastewater treatment plant is maintained in good condition. The actual amount of water treated annually is dependent upon the amount of rainfall.

2. Electrical Enclosures and Panels (properly rated and functional) □ N/A

■ Good condition □ Needs O& M
Remarks:

3. Tanks, Vaults, Storage Vessels □ N/A

■ Good condition ■ Proper secondary containment □ Needs O&M
Remarks:

4. Discharge Structure and Appurtenances □ N/A

■ Good condition □ Needs O& M
Remarks:

5. Treatment Building(s) □ N/A

■ Good condition (esp. roof and doorways) □ Needs Repair
■ Chemicals and equipment properly stored
Remarks:

6. Monitoring Wells (pump and treatment remedy) ☐ N/A

☐ All required wells located ■ Properly secured/locked ■ Functioning ■ Routinely sampled
■ Good condition ☐ Needs O&M

Remarks: Due to the large number of monitor wells at the site, not every well was observed. The wells that were observed appeared in very good condition, and all wells had locks on them.

D. Monitored Natural Attenuation ☐ Applicable ■ N/A

1. Monitoring Wells (natural attenuation remedy) ☐ N/A

☐ All required wells located ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Needs O&M
Remarks:

X. OTHER REMEDIES ☐ Applicable ■ N/A

Not applicable.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.)

The remedy contains several components. The first component is the OU1 landfill. The north and south containment cells of the OU1 landfill hold contaminated materials disposed of during various remedial actions. The leachate collection system is functioning, and leachate is removed from the sumps on a regular basis. At the time of the five-year review site inspection, the GEC operators indicated that a disparity in the volume of leachate was being observed between the north cell and the south cell of the OU1 landfill (with the north cell generating more leachate than the south cell). A leak in the top liner was suspected, although the leachate collection system continued to adequately collect the leachate. Also, trees were observed to be growing on the cap during the site inspection; however, during a followup site inspection conducted on August 5, 2003, by the EPA RPM, it was observed that the trees had since been removed by the site operators.

The next component of the remedy is the ground water extraction system, which is composed of a french drain and 5 extraction wells. This component's function is to contain contaminated ground water onsite. This system is functioning as designed.

The site remedy also has a wastewater treatment plant. This component treats the contaminated ground water from the french drain and the extraction wells and then discharges the treated water to Rocky Branch Creek. This component is functioning as designed.

Finally, the site also includes non-CERCLA burial areas and the Mount Vertac landfill. These burial areas contain sediments and wastes and are capped with clay. Trees were observed to be growing on the caps during the site inspection; however, during a followup site inspection conducted on August 5, 2003, by the EPA RPM, it was observed that the trees had since been removed by the site operators.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The O&M procedures are implemented as described by the December 2002 Sitewide O&M manual. Trees that grow on the RCRA containment cells and the burial areas need to be removed more frequently, but they were removed after the observation was made during the five-year review site inspection, and in general, the site is well maintained. The mechanical components of the remedy are in proper working condition. Inspection schedules are set and documented. The site O&M staff has been working at the site since the time of the first Five-Year Review and are very knowledgeable about the site and its operations. The O&M procedures for the site and their implementation appear to be adequate to ensure the long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Failure
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. No observations were noted that would indicate the remedy is not being implemented or functioning as intended by the RODs. The disparity in leachate volumes between the north and south leachate collection systems may indicate a potential problem with the top liner of the north cell; however, the leachate collection systems are able to handle the volume being collected, and no releases have occurred as a result. Nothing related to current operations at the site suggests that the protectiveness of the remedy is compromised or will be in the future.
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The site operators have eliminated several components of the wastewater treatment process deemed to be unnecessary, and effluent discharge data do not indicate that this has in any way compromised the remedy. One redundant sample of the treatment process was eliminated; this sample was collected between the third and final carbon beds, and provided no additional information beyond that already collected in the effluent sample and first and second carbon beds. In addition, the site has been automated. Site operators can remotely access the computer system that operates the ground water extraction system and wastewater treatment plant. This allows them to remotely examine and operate most components of the system, and as a result, the site no longer requires a person to be present daily. Maintenance at the site was observed to be good during the site inspection, and continued performance of routine maintenance is the best way to prevent compromising the remedy.

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Attachment 4

Site Inspection Photographs

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[filename: VI_DCP 4104.jpg]

Photo 1: View of Wastewater Treatment Plant, facing southeast. Two large tanks contain untreated water from the french drain and ground water extraction systems.

[filename: VI_DCP 4105.jpg]

Photo 2: View looking east at the site. The Wastewater Treatment Plant is to the left (just out of view). Object in center left of photograph is a decontamination pad for large equipment (arrow).

[filename: VI_DCP 4106.jpg]

Photo 3: View to the south along the west side of the Wastewater Treatment Plant.

[filename: VI_DCP 4107.jpg]

Photo 4: View of the former Central Process Area. View is to the southeast. The Wastewater Treatment Plant is in the background (Arrow).

[filename: VI_DCP 4108.jpg]

Photo 5: View of the former Central Process Area. View is to the south. The Wastewater Treatment Plant is in the background (Arrow).

[filename: VI_DCP 4109.jpg]

Photo 6: View across the North Burial Area from Sedimentation Vault (Mt. Vertac), facing north. Note trees growing on top of cap. Shed in background (at arrow) is a former storage shed used to store drums as part of the incineration (now used by City as part of recycling center).

[filename: VI_DCP 4110.jpg]

Photo 7: View across the North Burial Area from Sedimentation Vault (Mt. Vertac), facing north. Note trees growing on top of cap.

[filename: VI_DCP 4112.jpg]

Photo 9: View of the OU1 landfill from Mt. Vertac. View is to the northwest. Two sumps for the french drain are visible in the foreground (black arrows). The leachate collection and detection system sumps are visible on the landfill (blue arrow).

[filename: VI_DCP 4113.jpg]

Photo 10: View of the OU1 landfill from Mt. Vertac. View is to the northwest.

[filename: VI_DCP 4114.jpg]

Photo 11: View of the OU1 landfill from Mt. Vertac. View is to the west.

[filename: VI_DCP 4115.jpg]

Photo 12: View of Manhole 2A of the french drain. The manhole contains a sump and pump to collect and remove leachate. The controller box for the pump and leachate level detector system is mounted on the pole in the background (at arrow).

[filename: VI_DCP 4116.jpg]

Photo 13: View of leachate sump installed in former cooling pond. This sump is located west of the french drain and east of the OU1 landfill.

[filename: VI_DCP 4117.jpg]

Photo 14: View of the OU1 landfill. View is facing west. The leachate collection and detection system sumps are visible near the top of the landfill (arrows).

[filename: VI_DCP 4118.jpg]

Photo 15: View of a french drain manhole. Controllers for pump and leachate level detectors are mounted on the pole to the left (arrow).

[filename: VI_DCP 4119.jpg]

Photo 16: View of one of the site access roads and the site security fence.

[filename: VI_DCP 4120.jpg]

Photo 17: View of the Reasor Hill Burial Area. View is facing south. Note trees growing on the capped area.

[filename: VI_DCP 4121.jpg]

Photo 18: View of the Reasor Hill Burial Area. View is facing south. Note trees growing on the capped area. Building in background at left is the Wastewater Treatment Plant (at arrow).

[filename: VI_DCP 4122.jpg]

Photo 19: View of the stormwater runoff into Rocky Branch Creek west of the Reasor Hill Burial Area.

[filename: VI_DCP 4123.jpg]

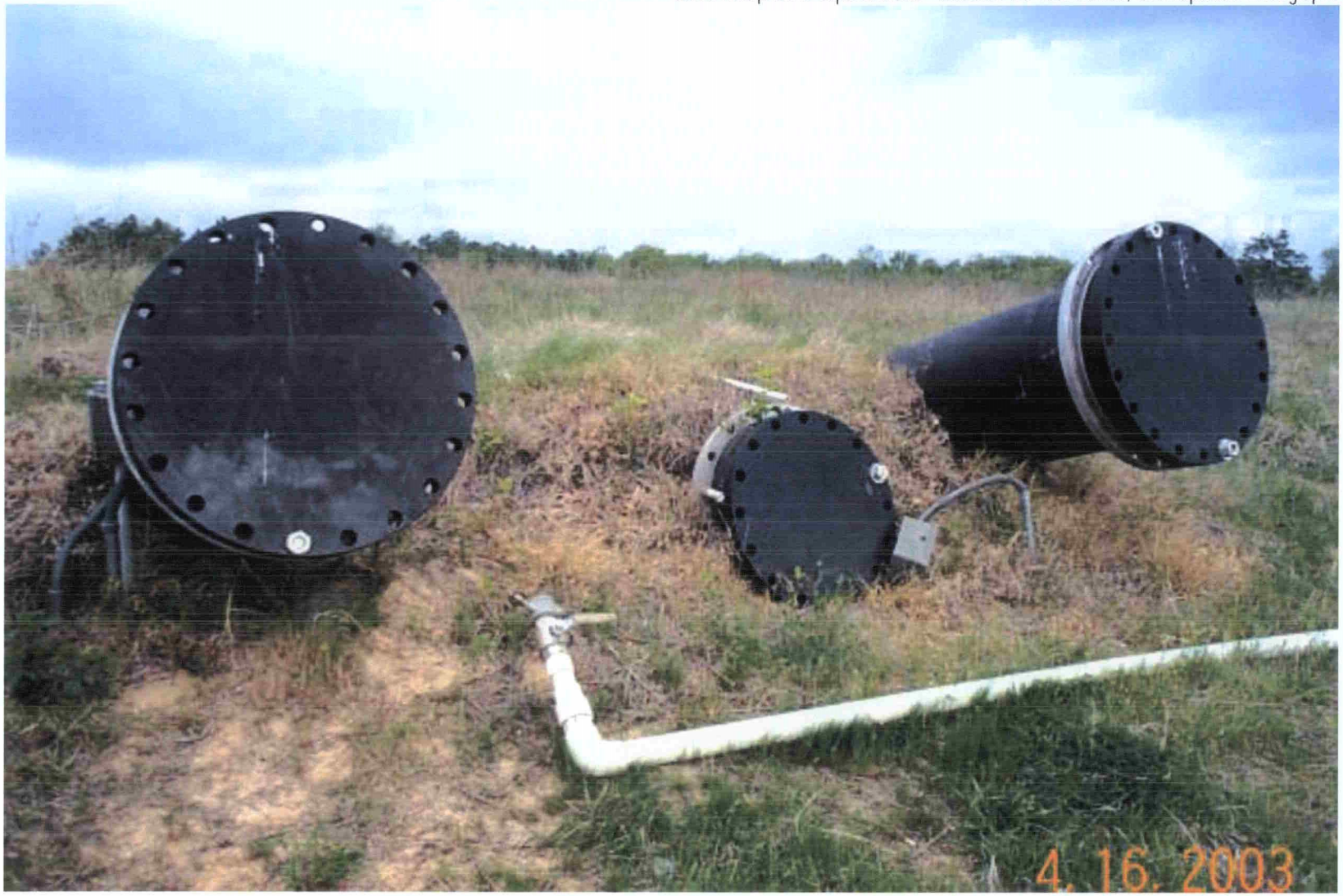
Photo 20: View of sedimentation basin at the south end of the OU1 landfill. View is to the east. Rock lined structures (black arrows) are letdown channels. Metal structure (blue arrow) is drainage pipe for the sedimentation basin.

[filename: VI_DCP 4124.jpg]

Photo 21: View of rock lined letdown channel (at arrow) at the OU1 landfill. These channels drain water from the top of the landfill cap.
Note small tree growing along letdown channel in the center foreground.

[filename: VI_DCP 4125.jpg]

Photo 22: View of letdown channel (black arrow) from the top of the cap at the OU1 landfill. Berms (blue arrows) around outside edge of cap direct runoff to the letdown channels.



[filename: VI_DCP 4126.jpg]

Photo 23: Access outlets for leachate collection and leachate detection sumps at the OU1 landfill.

[filename: VI_DCP 4127.jpg]

Photo 24: Access outlets for leachate collection and leachate detection sumps at the OU1 landfill.

[filename: VI_DCP 4128.jpg]

Photo 25: View of the east side of the OU1 landfill. View is facing south. Note small trees growing on the cap.

[filename: VI_DCP 4129.jpg]

Photo 26: View of the north side of the OU1 landfill. View is facing west. Note small trees growing on the cap.

[filename: VI_DCP 4130.jpg]

Photo 27: View of the north side of the OU1 landfill. View is facing east. Note small trees growing on the cap.

[filename: VI_DCP 4131.jpg]

Photo 28: View of the top of the cap at the OU1 landfill. Note area of sparse vegetation (black arrow).

[filename: VI_DCP 4132.jpg]

Photo 29: View of the top of the cap at the OU1 landfill. Note area of sparse vegetation (black arrow). Blue arrows are pointing to passive gas vents.

[filename: VI_DCP 4133.jpg]

Photo 30: View of the west side of the OU1 landfill. View is facing north. Note small trees growing on the cap (black arrow) and area of sparse vegetation (blue arrow).

[filename: VI_DCP 4134.jpg]

Photo 31: View facing north toward Mt. Vertac, across Reasor Hill Burial Area in center of photo. Yellow bucket is sump installed to collected observed surface seep.

[filename: VI_DCP 4135.jpg]

Photograph 32: View of Rocky Branch Creek near discharge pipe from the Wastewater Treatment Plant.

[filename: VI_DCP 4136.jpg]

Photograph 33: View of Rocky Branch Creek near discharge pipe from the Wastewater Treatment Plant.

[filename: VI_DCP 4137.jpg]

Photograph 34: View of Rocky Branch Creek near discharge pipe from the Wastewater Treatment Plant.

[filename: VI_DCP 4138.jpg]

Photo 35: View of discharge pipe from the Wastewater Treatment Plant (blue arrow).

[filename: VI_DCP 4139.jpg]

Photo 36: View of Rocky Branch Creek, upstream from Wastewater Treatment Plant discharge outfall.

[filename: VI_DCP 4140.jpg]

Photo 37: View of Manhole 12 of the french drain system. Manhole cover has been removed for inspection.

[filename: VI_DCP 4141.jpg]

Photo 38: View of Manhole 14 of the french drain system. Manhole cover has been removed for inspection. The controller box for the pump and leachate level indicator are mounted on the pole at left (arrow).

[filename: VI_DCP 4142.jpg]

Photo 39: View of fence and gate along the east perimeter of the site. View is to the north.

[filename: VI_DCP 4143.jpg]

Photo 40: View of the inside of the well vault of a ground water extraction well.

[filename: VI_DCP 4144.jpg]

Photo 41: View of locked gate along north perimeter fence. View is to the north. The building on the other side of the gate is used by the City of Jacksonville for the Sanitation Department and as a drive-through recycling center.

[filename: VI_DCP 4145.jpg]

Photo 42: View of the inside of the well vault of a ground water extraction well.

[filename: VI_DCP 4146.jpg]

Photo 43: View inside the Groundwater Recovery Building. Tank to the right (black arrow) is used to store extracted ground water prior to transfer to the Wastewater Treatment Plant. The room at the back (blue arrow) contains valves for sampling monitor wells and extraction wells. Note dirt on the floor from leaking wall.

[filename: VI_DCP 4147.jpg]

Photo 44: View of Manhole 3B of the french drain. The controller for the leachate level indicator and pump is on the pole behind the manhole (black arrow).

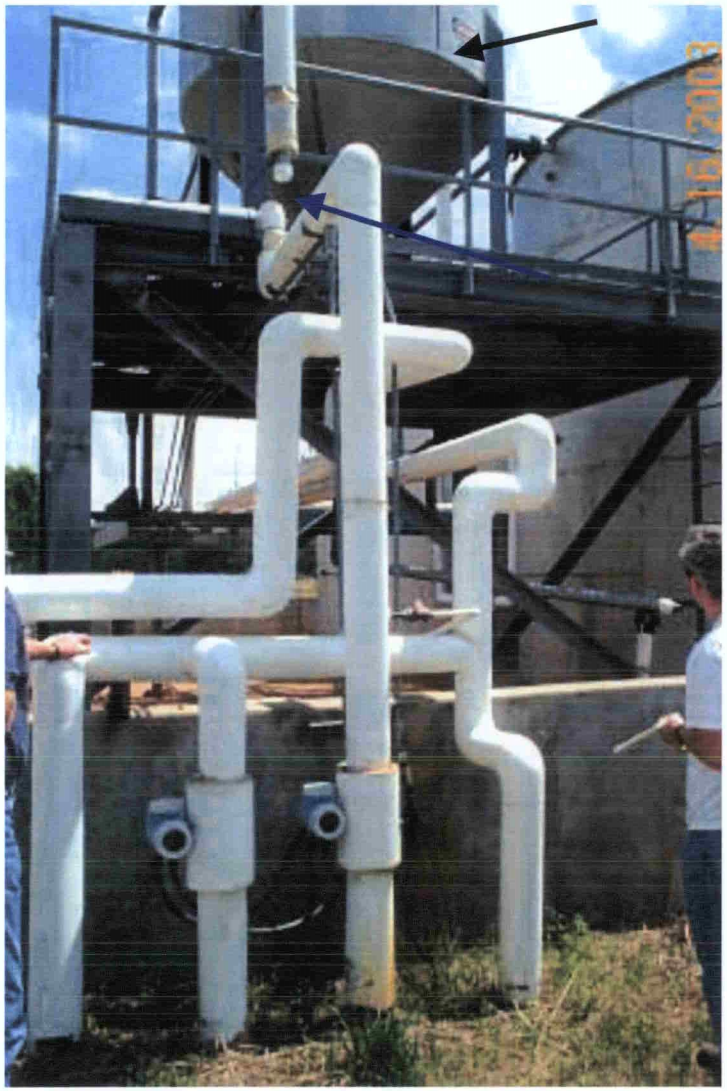


Photo 45: View of inlet pipes from french drain and ground water extraction systems at the waste Wastewater Treatment Plant. Tank at top of photo is the oil/water separator (black arrows). Note that the inlet pipes are no longer connected to the oil/water separator (blue arrow).

[filename: VI_DCP 4148.jpg]

[filename: VI_DCP 4149.jpg]

Photo 46: View of equalization tanks outside the Wastewater Treatment Plant. Tanks store contaminated water and leachate prior to treatment.

[filename: VI_DCP 4150.jpg]

Photo 47: View inside Wastewater Treatment Plant. The pumps are on the floor next to the back wall (black arrows).

[filename: VI_DCP 4151.jpg]

Photo 48: View inside Wastewater Treatment Plant. The two large blue tanks are the sand filters.

[filename: VI_DCP 4152.jpg]

Photo 49: View inside Wastewater Treatment Plant. The three large tanks are the carbon treatment units (black arrows).

Photo 50: View inside Wastewater Treatment Plant. The large tank on top of the platform in the rear is the pH neutralization tank (black arrow). The tank to the left is the treated water tank (blue arrow).

[filename: VI_DCP 4153.jpg]

Photo 51: View of the automatic sampler unit (black arrow) inside the Wastewater Treatment Plant. This unit collects samples of the treated water prior to discharge.

[filename: VI_DCP 4154.jpg]

[filename: VI_DCP 4155.jpg]

Photo 52: View of main gate outside the Vertac Incorporated Superfund Site. View is to the west.

[filename: VI_DCP 4156.jpg]

Photo 53: View of the City of Jacksonville's Sanitation Department and drive-through recycling center. These facilities are located in a shed on the northern portion of the site. View is to the west.

[filename: VI_DCP 4157.jpg]

Photo 54: View of drop-off bins for recyclable materials at the City of Jacksonville's drive-through recycling center.

Attachment 5

Notices to the Public Regarding the Five-Year Review

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VERTAC, INC. SUPERFUND SITE

U.S. EPA Begins Second Five-Year Review of Site Remedy

The U.S. Environmental Protection Agency (EPA) Region 6 is conducting the Second Five-Year Review at the Vertac Superfund Site. This review is required by section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act, also known as "CERCLA" or "Superfund," 42 U.S.C. §9621(c). The purpose of this review is to assure that human health and the environment are being protected by remedial actions taken at the Vertac Site.

The Vertac Superfund Site is located in Jacksonville, Arkansas, and was an herbicide manufacturing facility from the 1950s to 1987. During that time frame, the Vertac facility manufactured 2,4- dichlorophenoxy acetic acid (2,4-D). From 1957 to 1979, it manufactured 2,4,5- trichlorophenoxy acetic acid (2,4,5-T), as well as the *Agent Orange* blend of these two chemicals from 1964 through 1968. Production of 2,4,5-T produces dioxin, and the facility was contaminated with it. The site was the subject of both State and EPA enforcement and cleanup actions. In 1990, EPA approved a remedial action for the Vertac Off-Site areas. Additional EPA remedial actions were approved in 1993 for process equipment and buildings; in 1996 for on-site soils and debris; and in 1996 for ground water. Remedial action began in late 1993. EPA and the State performed site stabilization and incineration of over 28,000 dioxin contaminated drums, both on and off-site, through a series of removal and other response actions, from 1987 to 1998. All site response was completed by September 1, 1998.

The EPA will publish a second public notice when the review is completed and the results are available for review at the following information repositories:

Jacksonville City Hall, 1 Municipal Drive, Jacksonville, AR 72078 Tel: (501) 982-3181.

Arkansas Department of Environmental Quality, 8001 National Drive, Little Rock, AR 72219 Tel: (501) 682-0744.

U.S. Environmental Protection Agency Region 6, 7th Floor Reception Area, 1445 Ross Avenue, Ste. 12D13, Dallas, TX 75202 Tel: (214) 665-6424.

Questions concerning the Vertac site should be directed to Philip Allen at (214) 665-8516 or 1-800-533-3508 (toll-free). Information on the Vertac Inc., Superfund Site can be found in the Internet at www.epa.gov/earth1r6/6sf/pdffiles/vertac.pdf

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VERTAC, INC. SUPERFUND SITE
U.S. EPA Completes Second Five-Year Review of Site Remedy - December 2003

The U.S. Environmental Protection Agency (EPA) has completed the second Five-Year Review at the Vertac Superfund Site, located on Marshall Road near the western edge of Jacksonville, Arkansas. This review is required by section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act, also known as "CERCLA" or "Superfund," 42 U.S.C. §9621(c). The purpose of this review is to assure that human health and the environment are being protected by remedial actions taken at the Vertac Site.

Summary of Review Findings

The second Five-Year Review findings are that the remedy completed for the Vertac Incorporated Superfund Site continues to function generally as intended by the decision documents prepared for the site, and is currently considered protective of human health and the environment. The report describes several actions that are required to ensure that the remedy remains protective. The *Second Five-Year Review Report*, which provides detailed findings of the second Five-Year Review and describes future actions required, is available to the public at the information repositories listed in this notice.

Information Repositories

Jacksonville City Hall, 1 Municipal Drive, Jacksonville, AR 72078 Tel: (501) 982-3181.

Arkansas Department of Environmental Quality, 8001 National Drive, Little Rock, AR 72219 Tel: (501) 682-0744.

U.S. Environmental Protection Agency, Region 6, Superfund Division, 1445 Ross Avenue, Dallas, TX 75202 Tel: (214) 665-6424.

Questions concerning the Vertac site should be directed to Philip Allen at (214) 665-8516, or Beverly Negri at (214) 665-8517 or 1-800-533-3508 (toll-free). The *Second Five-Year Review Report* is available in the Information Repositories and on the EPA web site at the following address: www.epa.gov/earth1r6/6sf/6sf-5_year_reviews.htm.

Site Background

The Vertac Superfund Site is located in Jacksonville, Arkansas, and was an herbicide manufacturing facility from the 1950s to 1987. Chemicals manufactured at this site produced dioxin, and environmental media became contaminated. Remedial action for the site began in late 1993, and was completed September 1, 1998. Groundwater treatment and monitoring is ongoing.

For publication in the Arkansas Democrat-Gazette (date)
North Pulaski Leader (date)
Jacksonville Patriot (date)
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