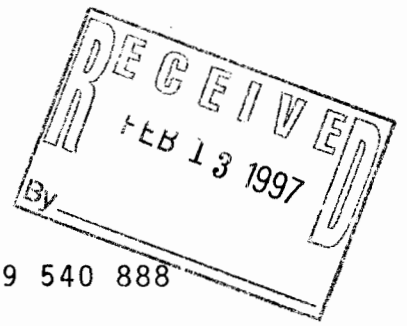
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

February 10, 1998



CERTIFIED MAIL - RETURN RECEIPT REQUESTED P 239 540 888

Mr. Richard D. Mico
Vice President and General Manager
Sparton Technology, Inc.
4901 Rockaway Blvd., SE
Rio Rancho, NM 87124

RE: Final Administrative Order under Section 3008(h) of RCRA
Sparton Technology, Inc., Docket No. RCRA-VI-001(h)96-H
EPA ID No. NMD083212332

Dear Mr. Mico:

Enclosed please find a copy of a Final Administrative Order (Order) issued by the United States Environmental Protection Agency - Region 6 (EPA) to Sparton Technology, Inc., (Sparton), concerning Sparton's facility located at 9621 Coors Road NW, Albuquerque, New Mexico. This Order has been modified and is issued in accordance with the Final Decision of the EPA Regional Administrator dated September 3, 1997. This Order becomes effective upon written receipt by Sparton, as provided by 40 Code of Federal Regulations (CFR) Sections 24.04(e) and 24.19.

In addition, pursuant to Section VI of the Order, Sparton must designate a project manager within ten (10) days of the effective date of this Order. EPA designates the following person as EPA's project manager:

Michael A. Hebert
Technical Section (6EN-HX)
Hazardous Waste Enforcement Branch
U.S. Environmental Protection Agency - Region 6
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 665-8315
FAX - (214) 665-7446

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If you have any legal or technical questions, please call Gloria Moran, Senior Enforcement Counsel, at (214) 665-8074, or Michael A. Hebert at (214) 665-8315, of my staff, respectively.

Sincerely yours,

Samuel Coleman, P.E.
Director
Compliance Assurance and
Enforcement Division

Enclosure

cc w/Enclosure:
Mr. R. Jan Appel, Vice President &
General Counsel, Sparton Corporation
Mr. James B. Harris, Thompson & Knight
Mr. Benito Garcia, Hazardous & Radioactive
Materials Bureau, New Mexico Environment
Department
Mr. Dennis McQuillan, Ground Water Quality
Bureau, New Mexico Environment Department
Ms. Ana Marie Ortiz, Assistant General Counsel,
New Mexico Environment Department
Mr. Gary O'Dea, Assistant City Attorney,
City of Albuquerque, New Mexico
Mr. John Stomp, Albuquerque Public Works Department
Mr. Charles de Saillan, Assistant Attorney General,
New Mexico Attorney General's Office
Mr. Steve Cary, Deputy Director, New Mexico
Office of Natural Resources Trustee
Mr. Patrick Trujillo, Assistant Bernalillo
County Attorney, County of Bernalillo, New Mexico
Mr. Richard Brusuelas, Director, Bernalillo County
Environmental Health Department
Mr. Michael Donnellan, U.S. Department of Justice
Ms. Wendy Blake, U.S. Department of Justice

FILED

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REGIONAL HEARING CLERK
EPA REGION VI

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 6
DALLAS, TEXAS

IN THE MATTER OF:	
SPARTON TECHNOLOGY, INC.	
9621 COORS ROAD NW ALBUQUERQUE, NM 87114	U.S. EPA DOCKET NO. RCRA-VI-001(h)-96-H
EPA I.D. NO. NMD083212332	
RESPONDENT	

FINAL ADMINISTRATIVE ORDER UNDER SECTION 3008(H) OF THE RESOURCE CONSERVATION AND RECOVERY ACT, AS AMENDED 42 U.S.C. § 6928(H)

TABLE OF CONTENTS

I. JURISDICTION

1. This Final Administrative Order (Order) is issued pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency (EPA) by Section 3008(h) of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, (RCRA), and further amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. § 6928(h). The authority to issue this Order has been delegated to the Regional Administrator by EPA Delegation Nos. 8-31 and 8-32, dated May 11, 1994, and further delegated to the Director of the Compliance Assurance and Enforcement Division, Region 6 (Director) by EPA Delegation Nos. R6-8-31 and R6-8-32, dated July 27, 1995.

2. This Order is issued to Sparton Technology, Inc. (Respondent), the owner and operator of the facility located at 9621 Coors Road NW, Albuquerque, New Mexico 87114 (Facility). This Order is based on the administrative record complied by EPA and incorporated herein by reference. The administrative record has been filed with the Regional Hearing Clerk, and is available for review by Respondent and the public at EPA's Region 6 office at 1445 Ross Avenue, Dallas, Texas 75202-2733.

II. STATEMENT OF PURPOSE

1. The purpose of this Order is to require Respondent to: (a) identify, investigate, and remediate the releases of hazardous wastes and/or hazardous waste constituents to the environment; (b) implement the corrective measures selected by EPA for the Facility; and (c) perform any other activities necessary to correct or evaluate actual or potential threats to human health and/or the environment resulting from the releases of hazardous waste and/or hazardous waste constituents at or from the Facility.

2. This Order requires Respondent to: (a) operate the existing on-site ground water extraction and treatment system and monitor existing ground water monitoring wells; (b) further characterize the extent of contamination in the ground water and vadose zone; (c) install and operate an on-site soil vapor extraction system; and (d) install and operate additional ground water extraction well(s) and a treatment and disposal system.

III. PARTIES BOUND

1. This Order is issued to Sparton Technology, Inc. (Respondent), the owner and operator of the Facility located at 9621 Coors Road NW, Albuquerque, New Mexico 87114.

2. This Order shall apply to and be binding upon Respondent, its officers, directors, employees, agents, receivers, successors and assigns, heirs, trustees, and all other persons, including, but not limited to, contractors, and consultants acting under or on behalf of Respondent in connection with the implementation of this Order.

3. No change in ownership, corporate, or partnership status relating to the Facility will in any way alter the status or responsibility of Respondent under this Order. Any conveyance of title, easement, or other interest in Respondent's Facility or a portion of Respondent's Facility shall not affect Respondent's obligations under this Order. Respondent shall be responsible for and liable for any failure to carry out all activities required of Respondent by this Order, irrespective of its use of employees, agents, contractors, or consultants to perform any such tasks.

4. Respondent shall provide a copy of this Order to all contractors, subcontractors, laboratories, and consultants retained to conduct or monitor any portion of the work performed pursuant to this Order within seven (7) days of the effective date of this Order or date of such retention of services, and shall condition all such contracts on compliance with the terms of this Order.

5. Any documents transferring ownership and/or operations of the Facility from Respondent to a successor-in-interest shall include written notice of this Order; however, Respondent shall, no less than thirty (30) days prior to transfer of ownership or operation of the Facility, provide written notice of this Order to its successor-in-interest, and written notice of said transfer of ownership and/or operation to EPA and the New Mexico Environment Department (NMED).

IV. FINDINGS OF FACT

1. Sparton Technology, Inc. (Respondent), is a corporation incorporated under the laws of the State of New Mexico.

2. Respondent is the owner and operator of a hazardous waste management facility (Facility) located at 9621 Coors Road NW, Albuquerque, Bernalillo County, New Mexico 87114.

3. Respondent is a generator of hazardous waste, and engaged in the treatment, storage, or disposal of hazardous waste at the Facility subject to the interim status requirements of 40 C.F.R. Part 265, and New Mexico's authorized RCRA program.

4. Respondent owned and operated the Facility as a hazardous waste management facility on or after November 19, 1980, the applicable date which renders facilities subject to the interim status requirements, or the requirement to have a permit, under Sections 3004 and 3005 of RCRA, 42 U.S.C. §§ 6924 and 6925.

5. Pursuant to Section 3010(a) of RCRA, 42 U.S.C. § 6930(a), Sparton Southwest, Inc. (the predecessor corporation to the Respondent) notified EPA of its hazardous waste activity. In its Notification dated August 12, 1980, Sparton Southwest, Inc. identified itself as a generator of hazardous waste, and as an owner and operator of a hazardous waste treatment, storage, or disposal facility located at 9621 Coors Road NW, Albuquerque, New Mexico.

6. In its Notification, Sparton Southwest, Inc. notified EPA that it handled the following hazardous waste:

    a. Characteristic hazardous wastes identified at 40 C.F.R. Part 261, Subpart C: ignitable, corrosive, reactive, and toxic;

    b. Hazardous wastes from non-specific sources identified at 40 C.F.R. § 261.31: F001, F002, F003, F005, F006, F007, F008, and F009; and

    c. Commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products identified at 40 C.F.R. § 261.33(f): P030, P098, U002, U057, U108, U122, U134, U154, U159, U162, U220, U226, U228, U238, and U239.

7. Pursuant to Section 3005(e) of RCRA, 42 U.S.C. § 6925(e), on or about November 17, 1980, Sparton Southwest, Inc. submitted its RCRA Part A permit application, and identified itself as a Facility generating and treating, storing, or disposing of the following hazardous wastes:

    a. Hazardous wastes from non-specific sources identified at 40 C.F.R. § 261.31: F001, F002, F003, F005, F006, F007, F008, and F009; and

    b. Commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products identified at 40 C.F.R. § 261.33(f): U002, U122, U134, U159, U226, and U228.

8. On or about June 30, 1987, the Facility's interim status was terminated by the New Mexico Health and Environment Department.

9. From 1983 - 1988, one or more of the following hazardous wastes and/or hazardous waste constituents were detected in ground water monitoring wells at the Facility: trichloroethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, methylene chloride, tetrachloroethylene, toluene, benzene, and chromium.

10. On October 1, 1988, EPA and Respondent entered into a corrective action Consent Order (RFI/CMS Order), U.S. EPA Docket No. VI-004(h)-87-H, pursuant to Section 3008(h) of RCRA, 42 U.S.C. § 6928(h). The RFI/CMS Order required Respondent to conduct interim measures, a RCRA Facility Investigation (RFI), and a Corrective Measures Study (CMS) for the Facility.

11. On or about May 21, 1992, Respondent submitted a Final RFI Report to EPA for approval. EPA approved the Final RFI Report on July 1, 1992.

12. On or about December 8, 1995, EPA issued for public comment, a Statement of Basis which described the various remedial alternatives for the Facility. The Statement of Basis and the administrative record for the Facility were made available to the public for review and comment from December 8, 1995, to February 8, 1996. A public hearing to receive comments on the remedial alternatives was held on February 1, 1996.

13. Based on analyses of ground water samples collected in January 1996, trichloroethylene (TCE) contamination resulting from Facility operations ranges from 7,600 ppb at the Facility, 3,200 ppb near the center of the off-site contaminant plume, to less than 5 ppb at a distance of at least ½ mile from the Facility.

14. The ground water contaminant plume originating from the Facility is in an aquifer utilized by the City of Albuquerque and New Mexico Utilities as a public drinking water supply. A public drinking water supply well, New Mexico Utilities Well No. 2, is approximately two (2) miles downgradient from the leading edge of the ground water contaminant plume.

15. On or about May 13, 1996, Respondent submitted a Final CMS Report to EPA for approval. EPA approved the Final CMS Report with concerns on June 24, 1996.

16. Section IV.A.3 and Task IX of the Corrective Action Plan (CAP) of the RFI/CMS Order provided that EPA would select the remedy for the Facility.

17. On June 24, 1996, EPA issued a Final Decision and Response to Comments (FDRTC) which identified the selected remedy for implementation at the Facility, and provided responses to all significant comments received at the public hearing, and all significant written comments received during the public comment period. The FDRTC (excluding the index to the administrative record) is attached as Exhibit A and incorporated by reference into this Order.

18. In the FDRTC, EPA concluded that due to the release of hazardous waste into the environment, corrective action is necessary to protect human health and the environment. EPA selected Alternative 4 - Expanded Ground Water Extraction and Soil Vapor Extraction, as the remedy for the Facility.

19. On June 24, 1996, EPA terminated the RFI/CMS Order.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

1. Respondent is a "person" as that term is defined at Section 1004(15) of RCRA, 42 U.S.C. § 6903(15), and 40 C.F.R. § 260.10.

2. Respondent is the owner and operator of an "existing hazardous waste management facility" as that term is defined at 40 C.F.R. § 260.10.

3. Respondent was authorized to operate under interim status pursuant to Section 3005(e) of RCRA, 42 U.S.C. § 6925(e).

4. Certain wastes and constituents found at the Facility are "hazardous wastes" or "hazardous waste constituents" as those terms are defined or set forth by Section 1004(5) and 3001 of RCRA, 42 U.S.C. §§ 6903(5) and 6921, and 40 C.F.R. Part 261.

5. "Hazardous waste" or "hazardous waste constituents", as those terms are defined or set forth by Sections 1004(5) and 3001 of RCRA, 42 U.S.C. §§ 6903(15) and 6921, and 40 C.F.R. Part 261, were released into the environment from the Facility.

6. Based on the release of hazardous waste and/or hazardous waste constituents into the environment from the Facility, the Director has determined that the actions required by this Order are consistent with RCRA, and the actions ordered below are necessary to protect human health and/or the environment.

7. Based on the foregoing, it is hereby ORDERED that Respondent perform the actions set forth in this Order in the manner and by the dates specified therein.

VI. PROJECT MANAGER

1. Within ten (10) days of the effective date of this Order, EPA and Respondent shall each designate a Project Manager, and notify each other and the New Mexico Environment Department (NMED) in writing of the Project Manager it has selected. Each Project Manager shall be responsible for overseeing the implementation of this Order. The EPA Project Manager will be EPA's designated representative for the Facility. Except as otherwise provided in this Order, all communications between Respondent and EPA, including all documents, reports, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the Project Managers, or counsel.

2. The Parties shall provide written notice within five (5) days after changing Project Managers.

3. The absence of the EPA Project Manager from the Facility shall not be cause for the stoppage or delay of work.

VII. WORK TO BE PERFORMED

Respondent shall undertake, continue to take, and complete each of the following actions to the satisfaction of EPA and in accordance with the terms, procedures, and schedules set forth in Attachment I - Corrective Action Plan (CAP). The CAP is hereby incorporated into this Order by reference as if reproduced in full herein.

TASK I: OPERATION OF EXISTING ON-SITE GROUND WATER EXTRACTION SYSTEM AND TREATMENT SYSTEM AND CONTINUED MONITORING OF EXISTING GROUND WATER MONITORING WELLS

1. Effective upon the date of this Order, Respondent shall operate, and maintain continuous operation of the existing ground water recovery well network and treatment system at the Facility. This ground water recovery well network consists of the following recovery wells: PW-1, MW-18, MW-23, MW-24, MW-25, MW-26, MW-27, and MW-28. Respondent shall perform the reporting and sampling and analyses set forth in the CAP. Treatment and disposal of recovered waters under this provision shall be performed in compliance with all Federal, State, or local laws, regulations, permits, or ordinances. Operation of the existing ground water recovery well network and treatment system shall be incorporated into, and modified as necessary to be

consistent with, the operation of the Ground Water Extraction Measure set forth in Task V of the CAP.

2. Within twenty (20) days of the effective date of this Order, Respondent shall submit a Ground Water Monitoring Plan for the existing on-site and off-site ground water monitoring wells, capable of determining: (a) the concentration of the hazardous waste or hazardous waste constituents in the ground water; and (b) the ground water elevations. EPA will approve or modify the Ground Water Monitoring Plan. The Ground Water Monitoring Plan, as approved or modified by EPA, shall become the Final Ground Water Monitoring Plan for the existing on-site and off-site ground water monitoring wells.

   Effective upon the 10th day of the first full month following EPA approval of the Ground Water Monitoring Plan, and every three months thereafter, Respondent shall conduct quarterly sampling and analyses of the existing on-site and off-site ground water monitoring wells.

3. Concurrent with the submission of the Operations and Maintenance Plan for the Ground Water Extraction Corrective Measure in Task V.B.4 of the CAP, Respondent shall submit a revised Ground Water Monitoring Plan for integration into the Operations and Monitoring Plan for the Ground Water Extraction Corrective Measure. EPA will approve or modify the revised Ground Water Monitoring Plan. The revised Ground Water Monitoring Plan, as approved or modified by EPA, shall become the Final Ground Water Monitoring Plan for the ground water monitoring well system.

TASK II: HEALTH AND SAFETY PLAN

4. Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Health and Safety Plan to EPA for all field activity associated with the Vadose Zone Investigation Workplan and the Ground Water Investigation Workplan. EPA does not approve or disapprove the Health and Safety Plan, but does review it to assure its existence.

TASK III: PUBLIC INVOLVEMENT PLAN

5. Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Public Involvement Plan to EPA for review and approval. A schedule for community relations activities shall be included in the Public Involvement Plan. EPA will approve or modify the Public Involvement Plan. The Public Involvement Plan, as approved or modified by EPA, shall become the Final Public Involvement Plan.

TASK IV: SOIL VAPOR EXTRACTION CORRECTIVE MEASURE

6. Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Vadose Zone Investigation Workplan to EPA for review and approval. EPA will approve or modify the Vadose Zone Investigation Workplan. The Vadose Zone Investigation Workplan, as approved or modified by EPA, shall become the Final Vadose Zone Investigation Workplan. Respondent shall implement the Final Vadose Zone Investigation Workplan according to the schedule set forth in the Workplan. The Vadose Zone Investigation Workplan shall, at a minimum, include the following plans: (1) a Project Management Plan; (2) a Data Collection Quality Assurance Plan; and (3) a Data Management Plan.

7. Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit a Vadose Zone Investigation Report to EPA for review and approval. EPA will approve or modify the Vadose Zone Investigation Report. The Vadose Zone Investigation Report, as approved or modified by EPA, shall become the Final Vadose Zone Investigation Report.

8. Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit the Design Plans and Specifications for the Soil Vapor Extraction Corrective Measure to EPA for review and approval. EPA will approve or modify the design package. The design package, as approved or modified by EPA, shall become the Final Design Plans and Specifications.

9. Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit a Construction Workplan for the Soil Vapor Extraction Corrective Measure to EPA for review and approval. EPA will approve or modify the Construction Workplan. The Construction Workplan, as approved or modified by EPA, shall become the Final Construction Workplan.

10. Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit an Operations and Maintenance (O&M) Plan for the Soil Vapor Extraction Project to EPA for review and approval. EPA will approve or modify the O&M Plan. The O&M Plan, as approved or modified by EPA, shall become the Final O&M Plan.

11. Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation

Workplan, Respondent shall submit an updated Health and Safety Plan for the Soil Vapor Extraction Corrective Measure to EPA. EPA does not approve or disapprove the Health and Safety Plan, but does review it to assure its existence. The Health and Safety Plan shall be developed as a stand alone document.

12. Upon receipt of written notification from EPA, Respondent shall commence the construction process for the Soil Vapor Extraction Corrective Measure and implement the Construction Workplan in accordance with the schedule and provisions contained therein.

13. Within ninety (90) days following completion of the construction of the Soil Vapor Extraction Corrective Measure, Respondent shall submit a Construction Completion Report to EPA for review and approval. EPA will approve or modify the Construction Completion Report. The Construction Completion Report, as approved or modified by EPA, shall become the Final Construction Completion Report.

14. Respondent shall prepare and submit a Corrective Measure Completion Report to EPA for review and approval when the corrective measure completion criteria have been achieved for the Soil Vapor Extraction Corrective Measure. EPA will approve or modify the Corrective Measure Completion Report. The Corrective Measure Completion Report, as approved or modified by EPA, shall become the Final Corrective Measure Completion Report.

TASK V: GROUND WATER EXTRACTION CORRECTIVE MEASURE

15. Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Ground Water Investigation Workplan to EPA for review and approval. EPA will approve or modify the Ground Water Investigation Workplan. The Ground Water Investigation Workplan, as approved or modified by EPA, shall become the Final Ground Water Investigation Workplan. Respondent shall implement the Final Ground Water Investigation Workplan according to the schedule set forth in the Workplan. The Ground Water Investigation Workplan shall, at a minimum, include the following plans: (1) a Project Management Plan; (2) a Data Collection Quality Assurance Plan; and (3) a Data Management Plan.

16. Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit a Ground Water Investigation Report to EPA for review and approval. EPA will approve or modify the Ground Water Investigation Report. The Ground Water Investigation Report, as approved

or modified by EPA, shall become the Final Ground Water Investigation Report.

17. Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit the Design Plans and Specifications for the Ground Water Extraction Corrective Measure to EPA for review and approval. EPA will approve or modify the design package. The design package, as approved or modified by EPA, shall become the Final Design Plans and Specifications.

18. Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit a Construction Workplan for the Ground Water Extraction Corrective Measure to EPA for review and approval. EPA will approve or modify the Construction Workplan. The Construction Workplan, as approved or modified by EPA, shall become the Final Construction Workplan.

19. Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit an Operations and Maintenance (O&M) Plan for the Ground Water Extraction Corrective Measure to EPA for review and approval. EPA will approve or modify the O&M Plan. The O&M Plan, as approved or modified by EPA, shall become the Final O&M Plan.

20. Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit an updated Health and Safety Plan for the Ground Water Extraction Corrective Measure to EPA. EPA does not approve or disapprove the Health and Safety Plan, but does review it to assure its existence. The Health and Safety Plan shall be developed as a stand alone document.

21. Upon receipt of written notification from EPA, Respondent shall commence the construction process for the Ground Water Extraction Corrective Measure and implement the Construction Workplan in accordance with the schedule and provisions contained therein.

22. Within ninety (90) days following completion of the construction of the Ground Water Extraction Corrective Measure, and/or upon written notice from EPA regarding completion of the construction of one or more components in the Ground Water Extraction Corrective Measure (e.g., containment well system, treatment system, etc.,), Respondent shall submit a Construction Completion Report to

EPA for review and approval. EPA will approve or modify the Construction Completion Report. The Construction Completion Report, as approved or modified by EPA, shall become the Final Construction Completion Report.

23. Within sixty (60) days of receipt of written notification from EPA, Respondent shall submit a Corrective Measure Assessment Report for the Ground Water Extraction Corrective Measure to EPA for review and approval. The Corrective Measure Assessment Report shall thereafter be submitted to EPA for review and approval annually for a period of two (2) years, and every five years thereafter until this Order is terminated pursuant to Section XXVI of this Order. EPA will approve or modify the Corrective Measure Assessment Report. The Corrective Measure Assessment Report, as approved or modified by EPA, shall become the Final Corrective Measure Assessment Report for the time period covered by the Report.

24. Respondent shall prepare and submit a Corrective Measure Completion Report to EPA for review and approval when the corrective measure completion criteria have been achieved for the Ground Water Extraction Corrective Measure. EPA will approve or modify the Corrective Measure Completion Report. The Corrective Measure Completion Report, as approved or modified by EPA, shall become the Final Corrective Measure Completion Report.

VIII. SUBMISSIONS / AGENCY APPROVAL / ADDITIONAL WORK

1. Within five (5) days of receipt of approval or modification by EPA of any Workplan(s), Respondent shall commence work and implement the tasks required by the Workplan(s), in accordance with the standards, specifications, and schedule stated in the Workplan(s), as approved or modified by EPA.

2. Beginning with the month following the effective date of this Order, Respondent shall provide EPA with the progress reports every month, due on the tenth (10th) day of the following month. The progress reports shall conform to requirements in relevant Scopes of Work contained in the CAP.

3. Respondent shall provide EPA with the results of all sampling and tests or other data generated by its employees, contractors, and/or consultants which in any way relates to the Facility and/or off-site contamination, regardless of whether such sampling or testing is required by this Order, in the monthly progress reports, as specified in Sections VIII.2 and X of this Order. Respondent shall submit to EPA the results of all sampling and tests or other data generated by its employees, contractors, and/or consultants

which in any way relates to the five additional groundwater monitoring wells installed after selection of EPA's remedy.

4. EPA will review all reports, workplans, or other submittals required under this Order, and notify Respondent in writing of EPA's approval or modification of the deliverables or any part thereof. Upon EPA approval or modification, the submittal shall be deemed incorporated into and part of this Order.

   Notwithstanding the foregoing, EPA reserves the right to disapprove of, or provide comments on, any deliverable or any part thereof. Within thirty (30) days of receipt of EPA's disapproval or comments on any deliverable, Respondent shall address the deficiencies to EPA's satisfaction and submit a revised submittal. EPA shall approve or modify the revised submittal. Upon EPA approval or modification, the submittal shall be deemed incorporated into and part of this Order.

5. Any noncompliance with such EPA approved plans, reports, specifications, schedules, and attachments shall be construed as a violation(s) of the terms of this Order, and subject to the penalty provisions of Section XVI. Oral advice or approvals given by EPA representatives shall not relieve Respondent of its obligation to obtain any formal, written approvals required by this Order.

6. Four (4) copies of all deliverables shall be sent to the EPA Project Manager. An additional one (1) copy shall be sent to NMED, addressed to the following:

   Ed Kelly, Director
   Water and Waste Management Division
   New Mexico Environment Department
   P.O. Box 26110
   Santa Fe, New Mexico 87502-6110

   Unless otherwise specified in this Order, or otherwise notified in writing by EPA, all notifications to NMED shall be made to the aforementioned person.

7. In all instances which this Order requires written submissions to EPA, each submission must be accompanied by the following certification signed by a "responsible official":

   I certify that the information contained in or accompanying this submission is true, accurate, and complete. As to those identified portions of this submission for which I cannot personally verify the truth and accuracy, I certify as the

Facility Official having supervisory responsibility for the person(s) who, acting upon my direct instructions, made the verification, that this information is true, accurate, and complete.

For the purpose of this certification, a "responsible official" means person in charge of a principal Facility function, or any other person who performs similar decision-making functions for the Facility.

8. EPA may determine, or Respondent may propose that certain tasks, including investigatory work, engineering evaluation, procedure/methodology modifications, or construction are necessary in addition to or in lieu of the tasks included in any EPA-approved workplan, when such additional work is necessary to meet the purposes set forth in Section II: Statement of Purpose. If EPA determines that Respondent shall perform additional work, EPA will notify Respondent in writing and specify the basis for its determination that the additional work is necessary. Within fifteen (15) days after the receipt of such determination, Respondent shall have the opportunity to meet or confer with EPA to discuss the additional work. If required by EPA, Respondent shall submit for EPA approval, a workplan for the additional work. EPA will specify the contents of such workplan. Such workplan shall be submitted within thirty (30) days of receipt of EPA's determination that additional work is necessary, or according to an alternative schedule established by EPA. Upon approval or modification of a workplan by EPA, Respondent shall implement it in accordance with the schedule and provisions contained therein.

IX. FACILITY ACCESS AND RECORD RETENTION

1. EPA and any EPA authorized-representative(s), are authorized, allowed, and permitted pursuant to Section 3007(a) of RCRA, 42 U.S.C. § 6927(a), to enter and freely move about all property at the Facility, and all other property owned or operated by Respondent which in any way relates to the implementation of the corrective measures, at all reasonable times, for the purposes of enforcing the requirements of RCRA and this Order, including:

   a. interviewing site personnel and contractors, inspecting records, operating logs, and contracts related to the Facility;

   b. reviewing the progress of Respondent in carrying out the terms of this Order;

   c. conducting such tests as EPA deems necessary;

d. using a camera, video camcorder, sound recorder, or other documentary type equipment; and

e. verifying the reports and data submitted to EPA by Respondent.

2. Respondent shall permit EPA to inspect and copy all documents, and other writings, including all sampling and monitoring data, which in any way pertains to work undertaken pursuant to this Order.

3. To the extent that work being performed pursuant to this Order must be done beyond the Facility property boundary, Respondent shall use its best efforts to obtain site access agreements from the present owners to perform work pursuant to this Order no later than thirty (30) days from the date that the need for such access becomes known to Respondent. Best efforts shall include, but not be limited to, requiring Respondent to pay reasonable rental costs and compensation for losses sustained by the owner or occupant of the realty. Access agreements shall provide access to Respondent, its contractor(s), the United States, EPA, the State of New Mexico, NMED, and their representatives, including contractors. Any such access agreements shall be submitted to the Project Manager and incorporated by reference into this Order. In the event that site access agreements are not obtained within thirty (30) days of approval of any workplan for which access is required, or of the date that the need for access became known to Respondent, Respondent shall notify EPA by telephone within twenty-four (24) hours after expiration of the above thirty (30) day period, and shall within seven (7) days of the oral notification, submit a complete report to EPA in writing regarding its efforts to obtain access agreements, including the names, dates, addresses, and phone numbers of the person(s) it contacted in order to obtain access. If EPA is able to obtain access, Respondent shall perform work described in this Order.

4. Nothing in this subsection is intended to limit, affect or otherwise constrain EPA's or NMED's right of access to property pursuant to applicable law.

5. All data, information, and records created or maintained in connection with the implementation of work under this Order, including Respondent's employees and Respondent's contractors, shall be made available to EPA upon request. Respondent shall retain all such data, information, or records for five (5) years after termination of the Order, and provide notification to EPA and NMED sixty (60) days prior to the destruction of any such documents.

X. SAMPLING AND DATA/DOCUMENT AVAILABILITY

1. Respondent shall submit to EPA and NMED the results of all sampling and tests or other data generated by its employees, contractors, and/or consultants which in any way relates to the Facility and/or off-site contamination, regardless of whether such sampling or testing is required by this Order. Data which has not yet undergone QA/QC, shall be submitted with the monthly progress reports stamped "Subject to Revision".

2. Respondent shall submit these results in monthly progress reports as described in Task VI of the CAP, and Section VIII.2 of this Order, or upon request of the Project Manager.

3. Respondent shall specify the name and address of the laboratory to be used for sample analysis. EPA reserves the right to conduct a performance and QA/QC audit of the above specified laboratory. If the audit reveals deficiencies in lab performance or QA/QC, resampling and analysis shall be required.

4. At the request of EPA, Respondent shall allow split or duplicate samples to be collected by EPA, and/or its authorized representatives, of any samples collected by Respondent. Respondent shall notify EPA not less than fourteen (14) days in advance of any field sampling or installation activity.

XI. QUALITY ASSURANCE

Throughout all sample collections and analysis activities, Respondent shall use EPA-approved quality assurance, quality control, and chain-of-custody procedures, which shall be part of proposed and approved plans. In addition, Respondent shall:

1. Follow all EPA guidance for sampling and analysis unless determined by EPA not to be applicable;

2. Ensure that EPA and NMED receive written notification not less than fourteen (14) days in advance of any field sampling or installation activity;

3. Ensure that EPA receives written notification not less than fourteen (14) days in advance which laboratories will be used by Respondent, and use its best efforts to ensure that EPA personnel and EPA authorized representatives have reasonable access to the laboratories and personnel used for analysis;

4. Ensure that laboratories used by Respondent for analyses perform such analyses according to EPA methods (SW-846, 3rd Edition or as superseded) or other methods deemed satisfactory to EPA. If methods other than EPA methods are to be used, Respondent shall submit all protocols to be used for analyses to EPA for approval at least thirty (30) days prior to the commencement of analyses; and

5. Ensure that laboratories used by Respondent for analyses participate in a quality assurance/quality control program equivalent to that which is followed by EPA. As part of such a program, and upon request by EPA, such laboratories shall perform analysis on known samples provided by EPA to demonstrate the quality of the analytical data.

XII. DISPUTE RESOLUTION

1. The Parties to this Order shall make reasonable efforts to informally resolve disputes at the Project Manager or immediate supervisor level. If resolution can not be achieved informally, the procedures of this section shall be implemented to resolve a dispute. The failure to invoke these Dispute Resolution procedures shall constitute a waiver of the right to contest a specific requirement of this Order.

2. If Respondent disagrees, in whole or in part, with any EPA disapproval, modification of a submittal, decision, or directive made by EPA pursuant to this Order, Respondent shall notify the Chief of the Hazardous Waste Enforcement Branch (Branch Chief) or his successor, in writing of its objections and the basis therefore within ten (10) days of receipt of EPA's disapproval, modification, decision, or directive. Said notice shall set forth the specific points of the dispute, the position Respondent is maintaining should be adopted as consistent with the requirements of this Order, the basis for Respondent's position, and any matters which it considers necessary for EPA's determination. Within ten (10) days of EPA's receipt of such written notice, the Branch Chief shall provide to Respondent his decision on the pending dispute.

3. EPA's decision pursuant to paragraph two (2) of this Section shall be binding upon both Parties to this Order, unless within ten (10) days of receipt of such written notice, Respondent notifies EPA in writing of its continued objection(s), and requests the Director, or his designee, to convene an informal conference for the purpose of discussing Respondent's objections and the reasons for EPA's determination. The Regional Administrator will review the Respondent's written dispute regarding submissions, including plans or reports, and the Director's written

decision concerning the dispute. If the Regional Administrator finds modification of the written decision is necessary, then the Director shall make all required changes. The final written decision will be signed by the Regional Administrator. The final decision will be issued to the Respondent within 20 days from the date of the informal conference, and shall be binding on both Parties to this Order. The final written decision will be incorporated by reference into this Order. The Regional Administrator may consult with the Regional Counsel or her/his designee in connection with any dispute involving the Respondent.

4. In any dispute, Respondent shall have the burden of showing that EPA's position, including without limitation, any interpretation of the terms and conditions of this Order, and of applicable Federal and State law and regulations, was arbitrary and capricious, and not in accordance with the law.

5. The existence of a dispute as defined herein, and EPA's consideration of such matters as placed into dispute, shall not excuse, toll, or suspend any compliance obligation or deadline required pursuant to this Order.

XIII. RESERVATION OF RIGHTS

1. EPA expressly reserves all statutory and regulatory powers, authorities, rights, remedies, both legal and equitable, which may pertain to Respondent's failure to comply with any of the requirements of this Order, including without limitation, the assessment of penalties under Section 3008(h)(2) of RCRA, 42 U.S.C. § 6928(h)(2). This Order shall not be construed as a waiver or limitation of any rights, remedies, powers and/or authorities, civil or criminal, which EPA has under RCRA, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Safe Drinking Water Act (SDWA), or any other statutory, regulatory, or common law enforcement authority of the United States.

2. EPA reserves the right to perform any portion of the work consented to herein, or any additional site characterization, feasibility study, and remedial work as it deems necessary to protect human health and/or the environment. EPA may exercise its authority under CERCLA to undertake response actions at any time. In any event, the United States reserves its right to seek reimbursement from Respondent for costs incurred by the United States. Notwithstanding compliance with the terms of this Order,

Respondent is not released from liability, if any, for the costs of any response actions taken or authorized by EPA.

3. This Order shall not be construed as a ruling or determination of any issue related to any Federal, State, or local permit whether required in order to implement this Order, or required in order to continue or alter operations of the Facility (including, but not limited to, construction, operation, or closure permits required under RCRA), and Respondent shall remain subject to all such permitting requirements. EPA's approval of any workplan does not constitute a warranty or representation that the workplans will achieve the required cleanup or performance standards. Compliance by Respondent with the terms of this Order shall not relieve Respondent of its obligations to comply with RCRA, or any other applicable Federal, State, or local laws, regulations, permits, and ordinances.

4. Nothing in this Order is intended to release or waive any claim, cause of action, demand, or defense in law or equity, administrative or judicial, that any party to this Order may have against any person(s) or entity not a party to this Order, or that any person or entity not a party to this Order may have against any party to this Order.

5. EPA expressly reserves all rights and defenses that it may have, including the right both to disapprove of work performed by Respondent pursuant to this Order, and to order that Respondent perform additional tasks.

6. In any action brought by EPA for a violation of this Order, Respondent shall bear the burden of proving that EPA's actions were arbitrary and capricious and not in accordance with the law.

7. If EPA determines that activities in compliance or noncompliance with this Order have caused or may cause a release of hazardous waste and/or hazardous waste constituents, or is a threat to human health or the environment, or that Respondent is not capable of undertaking any studies or corrective measure ordered, EPA may order Respondent to discontinue work being conducted pursuant to this Order for such period of time as EPA determines may be needed to abate any such releases or threats, and/or to undertake any action which EPA determines is necessary to abate such releases or threats. Failure to comply with EPA's stop work order may result in a penalty of not to exceed $25,000 per day of continued non-compliance with EPA's stop work order, pursuant to Section 3008(h)(2) of RCRA, 42 U.S.C. § 6928(h)(2).

8. In the event EPA suspends the work or any other activity at the Facility, EPA may extend affected schedules under this Order for a period of time equal to that of the suspension of the Work or other activities, plus reasonable additional time for resumption of activities. Any extensions in the schedules set out in this Order or its attachments must be made by EPA in writing, and incorporated by reference into this Order.

XIV. FINANCIAL ASSURANCE

1. Within thirty (30) days of the effective date of this Order, Respondent shall submit to EPA for review and approval, an assurance of its financial ability to meet the present worth cost estimate for Alternative 4 - Expanded Ground Water Extraction and Soil Vapor Extraction (Without Ion Exchange for Metals Removal), as described in the Final Decision and Response to Comments document (Exhibit A). Respondent's financial assurance shall be in one or a combination of the following forms: (a) a performance or surety bond; (b) a letter of credit from an FDIC regulated financial institution; (c) a corporate guarantee by a third party; (d) an escrow performance guarantee account; (e) a trust fund; or (f) a financial test which allows EPA to determine that Respondent has sufficient financial assets available to perform the requirements of the Order. Respondent shall utilize 40 C.F.R. Part 265, Subpart H, as guidance in preparing the financial assurance submittal.

2. Concurrent with the submittal of the Construction Workplan for the Ground Water Extraction Corrective Measure (Task V.B.3), Respondent shall submit to EPA for review and approval, an updated assurance of its financial ability to meet the current cost estimate for the Corrective Measures Implementation, including both capital costs and operation and maintenance costs. Respondent's financial assurance shall be in one of the forms set forth in Paragraph 1 of this Section.

3. If Respondent chooses one or a combination of the instruments described in Paragraphs 1(a) through 1(e) of this Section, Respondent shall submit a copy of the instrument(s), and describe the nature and extent to which the instrument(s) is available for access by EPA for the purpose of ensuring the completion of all requirements of this Order. If Respondent chooses the instrument described in Paragraph 1(f) of this Section, Respondent shall submit audited financial reports or other reliable evidence, as deemed appropriate by EPA, of Respondent's financial assets.

4. EPA shall review the submittals described in Paragraphs 1, 2, and 3 of this Section, and shall provide written notice

to Respondent as to the adequacy of the existing financial assurance measures, and shall indicate what additional financial assurances, if any, must be provided by Respondent to ensure compliance with the terms of this Order.

5. Within thirty (30) days of receipt of EPA's notice that Respondent's financial assurance measures are inadequate, Respondent shall establish additional financial assurances according to the terms provided in said notice, and submit the additional financial assurances to EPA for review and approval.

6. Annually, on the anniversary of EPA's approval of the financial assurance required by this Section, Respondent shall submit an updated financial assurance, as described in Paragraphs 2 and 3 of this Section, that accounts for the rate of inflation. EPA will follow the procedures in Paragraphs 4 and 5 of this Section to determine if Respondent's updated financial assurance measures are adequate.

7. In the event that Respondent determines at any time that it is unable, or reasonably expects that it will be unable to maintain the financial assurance provided pursuant to this Section, Respondent shall obtain and submit to EPA for approval, one or a combination of the other forms of financial assurance listed in Paragraph 1 of this Section within thirty (30) days of the earlier of: (a) the event that causes such inability; or (b) receipt of information that gives rise to the reasonable expectation of such inability.

8. Respondent's inability to demonstrate financial ability to complete the Corrective Measures Implementation shall not excuse performance of any activities required under this Order.

9. This Order in no way negates Respondent's obligation to establish and/or maintain financial assurances for closure care, post-closure care, and liability requirements under 40 C.F.R. Part 265, Subpart H.

XV. INDEMNIFICATION OF THE UNITED STATES

Respondent shall indemnify, save, and hold harmless the United States, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of acts or omissions of Respondent or its officers, directors, employees, agents, receivers, successors and assigns, heirs, trustees, contractors, and consultants in carrying out activities required by this Order. This indemnification shall not be construed in any way as affecting or limiting the rights or

obligations of Respondent or the United States under their various contracts.

XVI. PENALTY PROVISIONS

Failure or refusal to carry out the terms of this Order in a manner deemed satisfactory to EPA may subject Respondent to a civil penalty in an amount not to exceed $25,000 for each day of non-compliance with this Order, in accordance with Section 3008(h)(2) of RCRA, 42 U.S.C. § 6928(h)(2).

XVII. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to this Order shall be undertaken in accordance with the requirements of all applicable Federal, State, and local laws, regulations, permits, and ordinances. Respondent shall obtain or cause its representatives to obtain all permits and approvals necessary under such laws and regulations. This Order does not relieve Respondent of any duty to obtain any Federal, State, or local permits needed to carry out its terms.

XVIII. REPORTING AND PUBLIC ACCESS TO DOCUMENTS AND SAMPLING DATA

1. Respondent may assert a business confidentiality claim covering all or part of any information submitted to EPA pursuant to this Order. Analytical data generated pursuant to this Order shall not be claimed as confidential. Confidentiality claims shall be submitted to EPA in accordance with the procedures outlined in 40 C.F.R. Part 2 [originally published in the Federal Register at 41 Fed. Reg. 36902 (September 1, 1976)], in particular, 40 C.F.R. § 2.203(b), and shall include a written statement explaining how the information claimed to be confidential meets the substantive criteria for use in confidentiality determinations found in 40 C.F.R. § 2.208, or such claim shall be deemed waived. If EPA approves the claim, EPA will afford the information confidential status, as specified in 40 C.F.R. Part 2, Subpart B. Information determined not to be confidential may be made available to the public without further notice to Respondent. If Respondent makes no claim of confidentiality for information submitted pursuant to this Order, EPA may make the information available without further notice to Respondent.

2. If Respondent asserts a business confidentiality claim, it shall clearly mark each page of each document included in its claim with the term "Confidential", and shall provide a redacted version of the information with all confidential business information deleted.

3. The information requested by EPA by this Order is not subject to the Paperwork Reduction Act of 1980, as amended, 44 U.S.C. § 3501 et seq.

XIX. OTHER CLAIMS

Nothing in this Order shall constitute or be construed as a release from any claim, cause of action, demand, or defense in law or equity, against any person, firm, partnership, or corporation for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous waste constituents, hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or migrating from the Facility. Additionally, this Order does not constitute any decision on preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2).

XX. SUBSEQUENT MODIFICATION OF ORDER

1. This Order may be modified by EPA to ensure protection of human health and/or the environment. Such amendments shall be in writing, and shall be effective and incorporated into this Order thirty (30) days after service of the amendment on Respondent, unless Respondent files an objection to the modification with EPA and the Regional Hearing Clerk. 40 C.F.R. Part 24 shall govern the proceedings under this section, and the hearing shall be limited to the scope of the proposed amendment.

2. This Order may also be modified by mutual agreement of EPA and Respondent. Any agreed modifications shall be in writing, signed by both parties, shall have as their effective date the date on which they are signed by EPA, and shall be incorporated into this Order. Upon request of Respondent, EPA may extend the deadlines set forth in this Order.

XXI. FINAL AGENCY ACTION

Notwithstanding any other provision of this Order, no action or decision by EPA pursuant to this Order, shall constitute final agency action giving rise to any right of judicial review prior to EPA's initiation of a judicial action to enforce this Order, including an action for penalties or an action to compel Respondent's compliance with the terms and conditions of this Order.

XXII. SURVIVABILITY/PERMIT INTEGRATION

Except as otherwise expressly provided in this section, this Order shall survive the issuance or denial of a RCRA permit or

post-closure order for the Facility, and this Order shall continue in full force and effect after either the issuance or denial of such permit or order. Accordingly, Respondent shall continue to be liable for the performance of obligations under this Order notwithstanding the issuance or denial of such permit or order. If the Facility is issued a permit or order, and that permit or order expressly incorporates all or a part of the requirements of this Order, or expressly states that its requirements are intended to replace some or all of the requirements of this Order, Respondent may request a modification of this Order and shall, with EPA approval, be relieved of liability under this Order for those specific obligations.

XXIII. STATEMENT OF SEVERABILITY

If any provision or authority of this Order, or the application of this Order to any party or circumstances, is held by any judicial or administrative authority to be invalid, the application of such provisions to other Parties or circumstances and the remainder of the Order shall not be effected thereby.

XXIV. PARTICIPATION IN COMMUNITY RELATIONS ACTIVITIES

Respondent shall be given notice of, provide support, and shall participate in public meetings, as appropriate, which may be held or sponsored by EPA to explain activities at or concerning the Facility.

XXV. COSTS

Each party shall bear its own costs and attorneys' fees.

XXVI. TERMINATION AND SATISFACTION

1. Respondent may seek termination of this Order by submitting to EPA a written document which indicates Respondent's compliance with all requirements of this Order, and the associated dates of approval correspondence from EPA. The provisions of this Order shall be deemed satisfied upon Respondent's and EPA's execution of an "Acknowledgment of Termination and Agreement for Record Preservation and Reservation of Rights" (Acknowledgment). The Acknowledgment shall specify that Respondent has demonstrated to the satisfaction of EPA that the terms of this Order, including any additional tasks determined by EPA to be required pursuant to this Order, have been satisfactorily completed. Respondent's execution of the Acknowledgment will affirm Respondent's continuing obligation: (1) to preserve all records as required in Section IX - Facility Access and Record Retention; and (2) to recognize EPA's reservation of rights as provided in Section XIII - Reservation of Rights, after all other requirements of the Order are satisfied.

2. This Order may also be terminated upon Respondent's receipt of written notice from EPA that Respondent has demonstrated to the satisfaction of EPA, that the terms of the Order, including any additional tasks determined by EPA to be required pursuant to this Order, have been satisfactorily completed. This notice shall also affirm Respondent's continuing obligation: (1) to preserve all records as required in Section IX - Facility Access and Record Retention; and (2) recognize EPA's reservation of rights as provided in Section XIII - Reservation of Rights.

XXVII. EFFECTIVE DATE

This Order shall become effective upon receipt by the Respondent, as provided by 40 C.F.R. §§ 24.04(e) and 24.19.

IT IS SO ORDERED:

Dated: 9 February 1998

Samuel Coleman, P.E.
Director
Compliance Assurance and Enforcement Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

CERTIFICATE OF SERVICE

I hereby certify that on the 10th day of February 1998, the original of the foregoing Final Administrative Order was hand delivered to the Regional Hearing Clerk, U.S. Environmental Protection Agency, Region 6, First Interstate Bank Tower, 1445 Ross Avenue, Dallas, Texas 75202-2733, and that true and correct copies of the Final Administrative Order were sent to the following by the method indicated below:

CERTIFIED MAIL - RETURN RECEIPT REQUESTED P 239 540 886

Richard D. Mico
Vice President and General Manager
Sparton Technology, Inc.
4901 Rockaway Blvd., SE
Rio Rancho, New Mexico 87124

CERTIFIED MAIL - RETURN RECEIPT REQUESTED P 239 540 887

James B. Harris
Thompson & Knight
1700 Pacific Avenue
Suite 3300
Dallas, Texas 75210-4693

ATTACHMENT I

CORRECTIVE ACTION PLAN

SCOPE OF WORK
CORRECTIVE MEASURES IMPLEMENTATION
SPARTON TECHNOLOGY, INC.

PURPOSE

The purpose of the Corrective Measures Implementation (CMI) Scope of Work (SOW) is to set forth the requirements for the design, construction, operation, maintenance, and monitoring of the Corrective Measures selected by EPA in the RCRA Final Decision and Response to Comments (FDRTC) dated June 24, 1996, for the Sparton Technology, Inc. facility located at 9621 Coors Road NW in Albuquerque, New Mexico (Facility). Respondent shall furnish all personnel, materials, and services necessary to implement the CMI program. EPA may require Respondent to conduct additional tasks beyond what is discussed in the following tasks in order to support the CMI program. Respondent shall furnish all personnel, materials, and services necessary to conduct the additional tasks.

PERFORMANCE STANDARDS

The Performance Standards for the CMI shall include remediation goals, cleanup levels, remedial objectives, and other substantive requirements, criteria, or limitations set forth in the FDRTC for the Facility or in this Order. The selected remedy, as described in the FDRTC, has four distinct components:

1. Continued operation of the existing on-site ground water extraction and treatment system, and continued monitoring of existing ground water monitoring wells;

2. Further characterization of the extent of contamination in the ground water and vadose zone;

3. Installation and operation of an on-site soil vapor extraction and treatment(SVE) system; and

4. Installation and operation of additional ground water extraction well(s) and a treatment and disposal system.

EPA will use the Performance Standards to determine if the Corrective Measures Implementation has been completed.

SCOPE

The Scope of Work (SOW) for each document is specified below. The SOWs are intended to be flexible documents capable of addressing both simple and complex site situations. If Respondent can justify to the satisfaction of EPA, that a plan and/or report or portion(s) thereof is not needed in the given site-specific situation, then EPA may waive that requirement.

The CMI program consists of the following tasks:

Task I: Operation of Existing On-Site Ground Water Extraction and Treatment System and Continued Monitoring of Existing Ground Water Monitoring Wells

Task II: Health and Safety Plan

Task III: Public Involvement Plan

Task IV: Soil Vapor Extraction Corrective Measure

- A. Vadose Zone Investigation Workplan
- B. Soil Vapor Extraction Project
    1. Vadose Zone Investigation Report
    2. Design Plans and Specifications
    3. Construction Workplan
    4. Operation and Maintenance Plan
    5. Health and Safety Plan
    6. Commencement of Construction
- C. Construction Completion Report
- D. Corrective Measure Completion Report

Task V: Ground Water Extraction Corrective Measure

- A. Ground Water Investigation Workplan
- B. Ground Water Extraction and Treatment Project
    1. Ground Water Investigation Report
    2. Design Plans and Specifications
    3. Construction Workplan
    4. Operation and Maintenance Plan
    5. Health and Safety Plan
    6. Commencement of Construction
- C. Construction Completion Report
- D. Corrective Measure Assessment Reports
- E. Corrective Measure Completion Report

Task VI: Progress Reports

TASK I - CONTINUED OPERATION OF THE EXISTING ON-SITE GROUND WATER EXTRACTION AND TREATMENT SYSTEM AND CONTINUED MONITORING OF EXISTING GROUND WATER MONITORING WELLS

A. Operation of the Existing On-Site Ground Water Extraction and Treatment System

Effective upon the date of this Order, Respondent shall operate, and maintain continuous operation of the existing ground water recovery well network and treatment system at the Facility. This ground water recovery well network consists of the following recovery wells: PW-1, MW-18, MW-23, MW-24, MW-25, MW-26, MW-27, and MW-28. Respondent shall report the total monthly volume of recovered ground water from each recovery well in the Monthly Progress Reports.

At a minimum, Respondent shall conduct monthly sampling and analyses of the recovered ground water both prior to treatment, and following treatment, for the following constituents:

- Volatile organic constituents as listed in 40 C.F.R. Part 264, Appendix IX; and
- Hexavalent Chromium.

The efficiency of the treatment system as measured by the percent reduction of hazardous waste constituents will be monitored on a monthly basis. Treatment and disposal of recovered waters under this provision shall be performed in compliance with all Federal, State, or local laws, regulations, permits, or ordinances. Operation of the existing ground water recovery well network and treatment system shall be incorporated into, and modified as necessary to be consistent with, operation of the Ground Water Extraction Corrective Measure set forth in Task V.

B. Ground Water Monitoring Plan

Within twenty (20) days of the effective date of this Order, Respondent shall submit a Ground Water Monitoring Plan for the existing on-site and off-site ground water monitoring wells, capable of determining: 1) the concentration of the hazardous waste or hazardous waste constituents in the ground water; and 2) the ground water elevations. EPA will approve or modify the Ground Water Monitoring Plan. The Ground Water Monitoring Plan, as approved or modified by EPA, shall become the Final Ground Water Monitoring Plan for the existing on-site and off-site ground water monitoring wells.

Effective upon the 10th day of the first full month following EPA approval of the Ground Water Monitoring Plan, and every three months thereafter, Respondent shall conduct quarterly sampling and analyses of the existing on-site and off-site ground water monitoring wells. Respondent shall have the samples analyzed for the following constituents:

- Volatile organic constituents as listed in 40 C.F.R. Part 264, Appendix IX;
- Total metals as listed in 40 C.F.R. Part 264, Appendix IX; and
- Hexavalent Chromium.

The sample analyses results and ground water elevations shall be included in the Monthly Progress Reports (Task VI). Potentiometric surface maps and contaminant concentration contour maps shall be prepared for each of the flow zones in the aquifer (e.g., upper, upper lower, etc.) and included in the Monthly Progress Reports.

C. Concurrent with the submission of the Operation and Maintenance Plan for the Ground Water Extraction Corrective Measure in Task V.B.4, Respondent shall submit a revised Ground Water Monitoring Plan for integration into the Operation and Monitoring Plan for the Ground Water Extraction Corrective Measure. EPA will approve or modify the revised Ground Water Monitoring Plan. The revised Ground Water Monitoring Plan, as approved or modified by EPA, shall become the Final Ground Water Monitoring Plan for the ground water monitoring well system.

TASK II: HEALTH AND SAFETY PLAN

Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Health and Safety Plan to EPA for all field activity associated with the Vadose Zone Investigation Workplan and the Ground Water Investigation Workplan. EPA does not approve or disapprove the Health and Safety Plan, but does review it to assure its existence. The Health and Safety Plan shall, at a minimum, include the following elements:

A. Objectives: Describe the goals and objectives of the health and safety program (must apply to both on-site and off-site personnel and visitors). The Health and Safety Plan shall be consistent with the OSHA Regulations, NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985), all state and local regulations, and other EPA guidance as provided.

B. Hazard Assessment: List and describe the known hazardous substances that could be encountered by field personnel during construction and/or operation and maintenance activities. Respondent shall, at a minimum, discuss the following:

- Inhalation Hazards
- Dermal Exposure
- Ingestion Hazards
- Physical Hazards
- Overall Hazard Rating

Respondent shall include a table that, at a minimum, lists: known hazardous substances, highest observed concentration, media, and symptoms/effects of acute exposure.

C. Personal Protection/Monitoring Equipment

- Describe personal protection levels and identify all monitoring equipment for each operational task.
- Describe any action levels and corresponding response actions (i.e., when will levels of safety be upgraded).
- Describe decontamination procedures and areas.

D. Site Organization and Emergency Contacts

List and identify all contacts (include phone numbers). Identify the nearest hospital and provide a regional map showing the shortest route from the Facility to the hospital. Describe site emergency procedures and any site safety organizations. Include evacuation procedures for neighbors (where applicable). Include a Facility map showing emergency station locations (first aid, eye wash areas, etc.).

TASK III: PUBLIC INVOLVEMENT PLAN

Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Public Involvement Plan to EPA for review and approval. The purpose of the Public Involvement Plan is to disseminate information to the public regarding the investigation and remedial activities and results. A schedule for community relations activities shall be included in the Public Involvement Plan. EPA will approve or modify the Public Involvement Plan. The Public Involvement Plan, as approved or modified by EPA, shall become the Final Public Involvement Plan.

Respondent shall never appear to represent or speak for the EPA before the public, other government officials, or the media.

Public Involvement activities that may be required of Respondent include the following:

A. Providing written and/or verbal notification to local residents or businesses prior to conducting field investigation or construction activities under this Order. Such notification shall include, but not be limited to, a description and estimated duration of the field investigation or construction activity, and contact person for the Respondent (including phone number).

B. Conducting an open house or informal meeting (i.e., availability session) in a public location where people can talk to Agency officials and Respondent on a one-to-one basis;

C. Preparing fact sheets summarizing current or proposed corrective action activities (all fact sheets shall be reviewed by the EPA prior to public distribution);

D. Communicating effectively with people who have vested interest in the corrective action activities, (e.g., providing written or verbal information in the foreign language of a predominantly non-English-speaking community); and

E. Maintaining an easily accessible repository of information on the facility-specific corrective action program, including this Order, approved workplans, and/or other reports at the Taylor Ranch Branch Library, 5700 Bogart Street, N.W., Albuquerque, New Mexico 87120. EPA may designate another repository as a replacement for the Taylor Ranch Branch library.

TASK IV: SOIL VAPOR EXTRACTION CORRECTIVE MEASURE

Task IV sets forth the plans and schedules for those activities to be undertaken by Respondent in order to develop the final plans, drawings, specifications, general provisions, and special requirements necessary to design, construct, operate, and monitor the performance of the Soil Vapor Extraction Corrective Measure selected in the FDRTC. Information on the design, construction, operation, and performance monitoring of the soil vapor extraction system can be found in the following EPA publications:

U.S. EPA. Guide for Conducting Treatability Studies under CERCLA: Soil Vapor Extraction; EPA/540/2-91/019A.

U.S. EPA. Soil Vapor Extraction Technology: Reference Handbook; EPA/540/2-91/003.

U.S. EPA. Evaluation of Soil Venting Application; Ground Water Issue; EPA/540/S-92/004.

U.S. EPA. Decision-Support Software for Soil Vapor Extraction Technology Application: HyperVentilate; EPA/600/R-93/028.

U.S. EPA. Innovative Site Remediation Technology: Vacuum Vapor Extraction, Volume 8; EPA/542/B-94/002.

U.S. EPA. Review of Mathematical Modeling for Evaluating Soil Vapor Extraction Systems; EPA/540/R-95/513.

A. Vadose Zone Investigation Workplan

Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Vadose Zone Investigation Workplan to EPA for review and approval. The objectives of the Vadose Zone Investigation Workplan are to define the location and extent of the lithologic units which may control the fate and transport of contaminants in the vadose zone, to define the nature and extent, both horizontally and vertically, of contamination in the vadose zone, and to collect the appropriate data required to design, construct, operate, and monitor the performance of the Soil Vapor Extraction Corrective Measure selected in the FDRTC. EPA will approve or modify the Vadose Zone Investigation Workplan. The Vadose Zone Investigation Workplan, as approved or modified by EPA, shall become the Final Vadose Zone Investigation Workplan. Respondent shall implement the Final Vadose Zone Investigation Workplan according to the schedule set forth in the Workplan. The Vadose Zone Investigation Workplan shall, at a minimum, include the following plans:

1. Project Management Plan

Respondent shall prepare a Project Management Plan which shall include a discussion of the technical approach, schedules, budget, and an outline of proposed activities necessary to complete the design of the soil vapor extraction system. The technical approach shall address all the requirements necessary to implement the requirements of this Task.

2. Data Collection Quality Assurance Plan

Respondent shall prepare a plan to document all monitoring procedures: sampling, field measurements, and sample analysis performed during the investigation, so as to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented. This plan shall, at a minimum, address the following:

a. Data Collection Strategy

The Data Collection Strategy shall, at a minimum, include the following:

(1) Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

(2) Description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data; and

(3) Description of the methodology used to assure that the data accurately and precisely represents the characteristics of a population, parameter variations at a sampling point, and process conditions or environmental conditions. Examples of factors which shall be considered and discussed include:

(a) Environmental conditions at the time of sampling;
(b) Number of sampling points;
(c) Representativeness of selected media; and
(d) Representativeness of selected analytical parameters.

b. Sampling

The sampling section shall, at a minimum, discuss the following:

(1) Selecting appropriate sampling locations, depths, etc.;
(2) Determining a statistically sufficient number of sampling sites;
(3) Determining which media are to be sampled (e.g., soil, soil gas, etc.);
(4) Determining which parameters are to be measured and where;
(5) Selecting the frequency of sampling and length of sampling period;
(6) Selecting the types of samples and number of samples to be collected;
(7) Documenting field sampling operations and procedures, including:

    (a) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;
    (b) Calibration of field devices;
    (c) Collection of replicate samples;
    (d) Construction materials and techniques associated with soil vapor monitoring probes/wells;
    (e) Field equipment listing and sample containers; and
    (f) Decontamination procedures.

(8) Selecting appropriate sample containers; and
(9) Chain-of-custody, including:

    (a) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and
    (b) Pre-prepared sample labels containing all information necessary for effective sample tracking.

c. Field Measurements

The Field Measurements section shall, at a minimum, discuss the following:

(1) Selecting appropriate field measurement locations, depths, etc.;

(2) Providing a statistically sufficient number of field measurements;
(3) Measuring all necessary ancillary data;
(4) Determining conditions under which field measurement should be conducted;
(5) Determining which media are to be addressed by appropriate field measurements (e.g., soil, soil gas, etc.);
(6) Determining which parameters are to be measured and where;
(7) Selecting the frequency of field measurement and length of field measurements period; and
(8) Documenting field measurement operations and procedures, including:

(a) Procedures and forms for recording raw data, and the exact location, time, and facility-specific considerations associated with the data acquisition;
(b) Calibration of field devices;
(c) Collection of replicate measurements;
(d) Construction materials and techniques associated with soil vapor monitoring wells used to collect field data;
(e) Field equipment listing;
(f) Order in which field measurements were made; and
(g) Decontamination procedures.

d. Contaminated Material Disposal

All contaminated material generated by activities required in the CMI shall be disposed of in accordance with all Federal and State laws and regulations.

e. Sample Analysis

The Sample Analysis section shall, at a minimum, specify the following:

(1) Chain-of-custody procedures, including:

(a) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

(b) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and
(c) Specification of laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.

(2) Sample storage procedures and holding times;
(3) Sample preparation methods;
(4) Analytical procedures, including:

(a) Scope and application of the procedure;
(b) Sample matrix;
(c) Potential interferences;
(d) Precision and accuracy of the methodology;
(e) Method detection limits;
(f) Calibration procedures and frequency;
(g) Data reduction, validation, and reporting;
(h) Internal quality control checks, laboratory performance, and systems audits and frequency, including:

1) Method blank(s);
2) Laboratory control sample(s);
3) Calibration check sample(s);
4) Replicate sample(s);
5) Matrix-spiked sample(s);
6) Blind quality control sample(s);
7) Control charts;
8) Surrogate samples;
9) Zero and span gases; and
10) Reagent quality control checks.

(i) Preventive maintenance procedures and schedules;
(j) Corrective action (for laboratory problems); and
(k) Turnaround time.

3. Data Management Plan

Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and the

conclusions of the investigation. The plan shall, at a minimum, address the following:

a. Data Record

The data record shall, at a minimum, include the following:

(1) Unique sample or field measurement code;
(2) Sampling or field measurement location and sample or measurement type;
(3) Sampling or field measurement raw data;
(4) Laboratory analysis ID number;
(5) Property or component measured; and
(6) Result of analysis (e.g., concentration).

b. Tabular Displays

The following data shall be presented in tabular displays:

(1) Unsorted (raw) data;
(2) Results for each medium, or for each constituent monitored;
(3) Data reduction for statistical analysis;
(4) Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and
(5) Summary data.

c. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

(1) Display sampling locations and sampling grids;
(2) Contaminant concentrations at each sampling location;
(3) Display average and maxima contaminant concentrations;
(4) Geographical extent of contamination and illustrate changes in concentration in relation to distance from the source and depth;
(5) Indicate features affecting intramedia transport; and
(6) Illustrate the stratigraphy in the area of the vadose zone contamination.

B. Soil Vapor Extraction Project

1. Vadose Zone Investigation Report

Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit a Vadose Zone Investigation Report to EPA for review and approval. EPA will approve or modify the Vadose Zone Investigation Report. The Vadose Zone Investigation Report, as approved or modified by EPA, shall become the Final Vadose Zone Investigation Report. This Report shall, at a minimum, include the following:

a. The location and extent of lithologic units which may control the fate and transport of contaminants in the vadose zone. Based on field data and tests, a representative and accurate description of the subsurface stratigraphy in the vadose zone which is a part of the migration pathways at the Facility, including:

(1) Lithology, grain size, sorting;
(2) Zones of higher permeability or lower permeability that might direct and restrict the flow of contaminants; and
(3) Cross sections showing the extent (depth, thickness, lateral extent) of units which may be part of the migration pathways;

b. A description of the nature and extent, both horizontally and vertically, of contamination in the vadose zone. The description shall include maps of the horizontal and vertical extent, including concentration profiles of the contaminants originating from the source area(s) at the Facility in both the soil matrix and soil gas; and

c. The appropriate data for the design and implementation of a soil vapor extraction system. This shall include a field pilot test to provide data to determine design parameters and projected effectiveness of the full-scale soil vapor extraction sytem.

2. Design Plans and Specifications

Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit the Design Plans and Specifications for the Soil Vapor

Extraction Corrective Measure to EPA for review and approval. The design package shall consist of the detailed drawings and specifications needed to construct the corrective measure(s). EPA will approve or modify the design package. The design package, as approved or modified by EPA, shall become the Final Design Plans and Specifications. The Design Plans and Specifications shall, at a minimum, include the following documents:

a. General Site Plans;
b. Process Flow Diagrams;
c. Mechanical Drawings;
d. Electrical Drawings;
e. Piping and Instrumentation Diagrams;
f. Structural Drawings;
g. Excavation and Earthwork Drawings;
h. Site Preparation and Field Work Standards;
i. Construction Drawings;
j. Installation Drawings;
k. Equipment Lists; and
l. Specifications for Equipment and Material.

3. Construction Workplan

Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit a Construction Workplan for the Soil Vapor Extraction Corrective Measure to EPA for review and approval. The purpose of the Construction Workplan is to document the overall management strategy, construction quality assurance procedures, and schedule for constructing the corrective measure. EPA will approve or modify the Construction Workplan. The Construction Workplan, as approved or modified by EPA, shall become the Final Construction Workplan. The Construction Workplan shall, at a minimum, include the following elements:

a. Project Management: Describe the construction management approach including levels of authority and responsibility (include organization chart).

b. Project Schedule: The project schedule shall specify all significant steps in the process, including the timing for key elements of the bidding process, the timing for initiation and completion of all construction tasks as specified in the Design Plans and Specifications.

c. Waste Management Practices: Describe the wastes generated by the construction of the corrective measure, and how they will be managed.

d. Required Permits: List and describe the permits needed to construct and operate the corrective measure. Indicate on the project schedule when the permit applications will be submitted to the applicable agencies, and an estimate of the permit issuance date.

e. Quality Assurance Project Plan: The purpose of construction quality assurance is to ensure, with a reasonable degree of certainty, that a completed corrective measure will meet or exceed all design criteria, plans, and specifications. Sampling and monitoring activities may also be needed for construction quality assurance/quality control and/or other construction related purposes. To ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented, Respondent shall prepare a Quality Assurance Project Plan (QAPjP) to document all monitoring procedures, sampling, field measurements, and sample analysis performed during these activities. Respondent shall use quality assurance, quality control, and chain-of-custody procedures approved by the EPA. These procedures are described in EPA's Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980, or as superseded by EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5).

f. Construction Contingency Procedures:

(1) Changes to the design and/or specifications may be needed during construction to address unforeseen problems encountered in the field. Procedures to address such circumstances, including notification of EPA, shall be included in the Construction Workplan.

(2) The Construction Workplan shall specify that in the event of a construction emergency (e.g. fire, earthwork failure, etc.), Respondent shall orally notify the EPA within twenty-four (24) hours of the event, and shall notify the EPA in writing within seven (7) days of the event. The written notification shall, at a minimum, specify

what happened, what response action is being taken and/or is planned, and any potential impacts on human health and/or the environment; and

(3) Procedures to be implemented if unforeseen events prevent corrective measure construction.

g. Cost Estimate

Respondent shall develop a cost estimate that includes both corrective measure construction and operation and maintenance costs. The purpose of the cost estimate is to assure that Respondent has the financial resources necessary to construct and implement the corrective measure(s).

h. Documentation Requirements

Respondent shall describe how analytical data and results will be evaluated, documented, and managed, consistent with SW-846, 3rd Edition, or as superseded.

i. Appendices, including:

(1) Design Data - Tabulations of significant data used in the design effort;

(2) Equations - List and describe the source of major equations used in the design process;

(3) Sample Calculations - Present and explain at least one example calculation for significant or unique design calculations; and

(4) Laboratory or Field Test Results.

4. Operation and Maintenance Plan

Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit an Operation and Maintenance (O&M) Plan for the Soil Vapor Extraction Project to EPA for review and approval. The O&M Plan shall outline the procedures for performing operations, long term maintenance, and monitoring of the corrective measure. EPA will approve or modify the O&M Plan. The O&M Plan, as approved or modified by EPA, shall become the Final O&M Plan. The O&M plan shall, at a minimum, include the following elements:

a. Project Management: Describe the management approach, including levels of authority and responsibility (include organization chart), during the operation and management phases of the remedy implementation.

b. System Description: Describe the soil vapor extraction and treatment system and identify and describe significant equipment.

c. Start-Up Procedures: Describe system start-up procedures including any operational testing.

d. Operation and Maintenance Procedures: Describe normal operation and maintenance procedures, including:

   (1) Description of tasks for operation;

   (2) Description of tasks for maintenance;

   (3) Description of prescribed treatment or operation conditions; and

   (4) Schedule showing frequency of each O&M task.

e. Replacement schedule for equipment and installed components.

f. Waste Management Practices: Describe the wastes generated by operation of the corrective measure and how they will be managed.

g. Quality Assurance Project Plan: Sampling and monitoring activities may be needed for effective operation and maintenance of the corrective measure. To ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented, Respondent shall prepare a Quality Assurance Project Plan (QAPjP) to document all monitoring procedures, sampling, field measurements, and sample analyses performed during these activities. Respondent shall use quality assurance, quality control, and chain-of-custody procedures approved by the EPA. These procedures are described in EPA's Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980, or as superseded by EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5).

h. Corrective Measure Monitoring: Describe the following:

(1) monitoring objectives;
(2) the types of measurements to be made (e.g., vapor pressure, contaminant concentrations, etc.);
(3) measurement locations;
(4) measurement methods, equipment, and procedures;
(5) measurement schedules; and
(6) record-keeping and reporting requirements.

This data and information shall be used to prepare Progress Reports and the Corrective Measure Completion Report.

i. O&M Contingency Procedures:

(1) Procedures to address system breakdowns and operational problems, including a list of redundant and emergency back-up equipment and procedures;

(2) Alternate procedures to be implemented if the corrective measure suffers complete failure. The alternate procedures must be able to prevent release or threatened releases of hazardous wastes and/or hazardous waste constituents which may endanger human health and/or the environment or exceed media cleanup standards;

(3) The O&M Plan shall specify that in the event of a major breakdown and/or complete failure of the corrective measure (includes emergency situations), Respondent shall orally notify the EPA within twenty-four (24) hours of the event, and shall notify the EPA in writing within seven (7) days of the event. Written notification shall, at a minimum, specify what happened, what response action is being taken and/or is planned, and any potential impacts on human health and/or the environment; and

(4) Procedures to be implemented in the event that the corrective measure is experiencing major operational problems, is not performing to design specifications, and/or will not achieve the remediation goals, objectives, or cleanup levels in the expected time frame.

j. Data Management and Documentation Requirements: The O&M Plan shall specify that Respondent collect and maintain the following information:

(1) Progress Report Information;

(2) Monitoring and laboratory data;

(3) Records of operating costs; and

(4) Maintenance and inspection records.

This data and information shall be used to prepare Progress Reports and the Corrective Measure Completion Report.

5. Health and Safety Plan

Within two hundred and ten (210) days after receipt of EPA's approval or modification of the Vadose Zone Investigation Workplan, Respondent shall submit an updated Health and Safety Plan for the Soil Vapor Extraction Corrective Measure, as set forth in Task II, to EPA. EPA does not approve or disapprove the Health and Safety Plan, but does review it to assure its existence. The Health and Safety Plan shall be developed as a stand alone document.

6. Commencement of Construction

Upon receipt of written notification from the EPA, Respondent shall commence the construction process and implement the Construction Workplan in accordance with the schedule and provisions contained therein.

C. Construction Completion Report - Soil Vapor Extraction Project

Within ninety (90) days following completion of the construction of the Soil Vapor Extraction Corrective Measure, Respondent shall submit a Construction Completion Report to EPA for review and approval. The Construction Completion Report shall document how the completed project is consistent with the Final Design Plans and Specifications. EPA will approve or modify the Construction Completion Report. The Construction Completion Report, as approved or modified by EPA, shall become the Final Construction Completion Report. The Construction Completion Report shall, at a minimum, include the following elements:

1. Synopsis of the corrective measure, design criteria, and certification that the corrective measure was

constructed in accordance with the Final Design Plans and Specifications;

2. Explanation and description of any modifications to the Final Design Plans and Specifications, and why these were necessary for the project;

3. Results of any operational testing and/or monitoring, indicating how initial operation of the corrective measure compares to the design criteria;

4. Summary of significant activities that occurred during construction. Include a discussion of problems encountered and how they were addressed;

5. As built drawings; and

6. Schedule indicating when any treatment systems will begin full scale operations.

D. Corrective Measure Completion Report

Respondent shall prepare and submit a Corrective Measure Completion Report to EPA for review and approval when the Performance Standards have been achieved for the Soil Vapor Extraction Corrective Measure. The purpose of the Corrective Measure Completion Report is to fully document how the Performance Standards have been satisfied, and to justify why the corrective measure and/or monitoring may cease. EPA will approve or modify the Corrective Measure Completion Report. The Corrective Measure Completion Report, as approved or modified by EPA, shall become the Final Corrective Measure Completion Report. The Corrective Measure Completion Report shall, at a minimum, include the following elements:

1. Synopsis of the corrective measure;

2. Demonstration that the Performance Standards have been met. Include results of testing and/or monitoring, indicating how operation of the corrective measure compares to the completion criteria;

3. Summary of work accomplishments (e.g., performance levels achieved, total hours of treatment operation, total treated and/or excavated volumes, nature and volume of wastes generated, etc.);

4. Summary of significant activities that occurred during operations. Include a discussion of problems encountered and how they were addressed;

5. Summary of inspection findings (include copies of key inspection documents in appendices);

6. Summary of total operation and maintenance costs; and

7. An evaluation of implementing additional source control measures to further reduce the remaining source material in the aquifer and soil beneath the Facility. Such measures could include the implementation of additional measures (e.g., incorporating an air sparging system with the soil vapor extraction system) in the aquifer where possible nonaqueous phase liquid (NAPL) contaminants remain relatively unaffected by ground water extraction.

TASK V: GROUND WATER EXTRACTION CORRECTIVE MEASURE

Task V sets forth the plans and schedules for those activities to be undertaken by Respondent in order to develop the final plans, drawings, specifications, general provisions, and special requirements necessary to design, construct, operate, and monitor the performance of the Ground Water Extraction Corrective Measure selected in the FDRTC. Respondent may draft the Design Plans and Specifications, the Construction Workplan, the Operation and Maintenance Plan, and the accompanying schedules so as to implement the Ground Water Extraction Corrective Measure in a phased approach, as outlined in the FDRTC. Information on the design, construction, operation, and performance monitoring of the ground water extraction system can be found in the following EPA publications:

U.S. EPA. Basics of Pump-and-Treat Ground Water Remediation Technology; EPA/600/8-90/003.

U.S. EPA. Methods for Evaluating the Attainment of Cleanup Standards, Volume 2: Ground Water; EPA/230/R-92/014.

U.S. EPA. Methods for Monitoring Pump-and-Treat Performance; EPA/600/R-94/123.

U.S. EPA. Ground-Water and Leachate Treatment Systems Manual; EPa/625/R-94/005.

A. Ground Water Investigation Workplan

Within forty-five (45) days of the effective date of this Order, Respondent shall submit a Ground Water Investigation Workplan to EPA for review and approval. The objectives of the Ground Water Investigation Workplan are to define the location and extent of the lithologic units which may control the fate and transport of contaminant in the aquifer, define the nature and extent, both horizontally and vertically, of contamination in the aquifer, and to collect the appropriate data required to design, construct, operate, and monitor the performance of the Ground Water Extraction Corrective Measure selected in the FDRTC. EPA will approve or modify the Ground Water Investigation Workplan. The Ground Water Investigation Workplan, as approved or modified by EPA, shall become the Final Ground Water Investigation Workplan. Respondent shall implement the Final Ground Water Investigation Workplan according to the schedule set forth in the Workplan. The Ground Water Investigation Workplan shall, at a minimum, include the following:

1. Project Management Plan

Respondent shall prepare a Project Management Plan which will include a discussion of the technical approach, schedules, budget, and an outline of proposed activities necessary to complete the design of the ground water extraction system. The technical approach shall address all the requirements necessary to implement the requirements of this Task.

2. Data Collection Quality Assurance Plan

Respondent shall prepare a plan to document all monitoring procedures: sampling, field measurements, and sample analysis performed during the investigation so as to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented. This plan shall, at a minimum, include the following:

a. Data Collection Strategy

The Data Collection Strategy shall, at a minimum, include the following:

(1) Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

(2) Description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data; and

(3) Description of the methodology used to assure that the data accurately and precisely represents the characteristics of a population, parameter variations at a sampling point, and process conditions or environmental conditions. Examples of factors which shall be considered and discussed include:

(a) Environmental conditions at the time of sampling;
(b) Number of sampling points;
(c) Representativeness of selected media; and
(d) Representativeness of selected analytical parameters.

b. Sampling

The sampling section shall, at a minimum, discuss the following:

(1) Selecting appropriate sampling locations, depths, etc.;
(2) Determining a statistically sufficient number of sampling sites;
(3) Determining which media are to be sampled (e.g., ground water, etc.);
(4) Determining which parameters are to be measured and where;
(5) Selecting the frequency of sampling and length of sampling period;
(6) Selecting the types of samples and number of samples;
(7) Documenting field sampling operations and procedures, including;

    (a) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, and adsorbing reagents);
    (b) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;
    (c) Documentation of specific sample preservation method;
    (d) Calibration of field devices;
    (e) Collection of replicate samples;
    (f) Submission of field blanks, where appropriate;
    (g) Construction materials and techniques associated with monitoring wells and piezometers;
    (h) Field equipment listing and sample containers;
    (i) Sampling order; and
    (j) Decontamination procedures.

(8) Selecting appropriate sample containers;
(9) Sample preservation; and
(10) Chain-of-custody, including:

    (a) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

(b) Pre-prepared sample labels containing all information necessary for effective sample tracking.

c. Field Measurements

The Field Measurements section shall, at a minimum, discuss the following:

(1) Selecting appropriate field measurement locations, depths, etc.;
(2) Providing a statistically sufficient number of field measurements;
(3) Measuring all necessary ancillary data;
(4) Determining conditions under which field measurement should be conducted;
(5) Determining which media are to be addressed by appropriate field measurements (e.g., ground water, etc.);
(6) Determining which parameters are to be measured and where;
(7) Selecting the frequency of field measurement and length of field measurements period; and
(8) Documenting field measurement operations and procedures, including:

(a) Procedures and forms for recording raw data, and the exact location, time, and facility-specific considerations associated with the data acquisition;
(b) Calibration of field devices;
(c) Collection of replicate measurements;
(d) Submission of field blanks, where appropriate;
(e) Construction materials and techniques associated with monitoring wells and piezometers used to collect field data;
(f) Field equipment listing;
(g) Order in which field measurements were made; and
(h) Decontamination procedures.

d. Contaminated Material Disposal

All contaminated material generated by activities required in the CMI shall be disposed of in accordance with all Federal and State laws and regulations.

e. Sample Analysis

The Sample Analysis section shall, at a minimum, specify the following:

(1) Chain-of-custody procedures, including:

(a) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;
(b) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and
(c) Specification of laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.

(2) Sample storage procedures and holding times;
(3) Sample preparation methods;
(4) Analytical procedures, including:

(a) Scope and application of the procedure;
(b) Sample matrix;
(c) Potential interferences;
(d) Precision and accuracy of the methodology;
(e) Method detection limits;
(f) Calibration procedures and frequency;
(g) Data reduction, validation, and reporting;
(h) Internal quality control checks, laboratory performance, and systems audits and frequency, including:

1) Method blank(s);
2) Laboratory control sample(s);
3) Calibration check sample(s);
4) Replicate sample(s);
5) Matrix-spiked sample(s);
6) Blind quality control sample(s);
7) Control charts;
8) Surrogate samples;
9) Zero and span gases; and
10) Reagent quality control checks.

(i) Preventive maintenance procedures and schedules;

(j) Corrective action (for laboratory problems); and
(k) Turnaround time.

3. Data Management Plan

Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation. The plan shall, at a minimum, include the following:

a. Data Record

The data record shall, at a minimum, include the following:

(1) Unique sample or field measurement code;
(2) Sampling or field measurement location and sample or measurement type;
(3) Sampling or field measurement raw data;
(4) Laboratory analysis ID number;
(5) Property or component measured; and
(6) Result of analysis (e.g., concentration).

b. Tabular Displays

The following data shall be presented in tabular displays:

(1) Unsorted (raw) data;
(2) Results for each medium, or for each constituent monitored;
(3) Data reduction for statistical analysis;
(4) Sorting of data by potential stratification factors [e.g., location, ground water flow zone (upper, upper lower, etc.)]; and
(5) Summary data.

c. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

(1) Display sampling locations and sampling grids;

(2) Contaminant concentrations at each sampling location;
(3) Display average and maxima contaminant concentrations;
(4) Geographical extent of contamination and illustrate changes in concentration in relation to distance from the source and depth;
(5) Indicate features affecting intramedia transport; and
(6) Illustrate the stratigraphy in the area of the ground water contamination.

B. Ground Water Extraction and Treatment Project

1. Ground Water Investigation Report

Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit a Ground Water Investigation Report to EPA for review and approval. EPA will approve or modify the Ground Water Investigation Report. The Ground Water Investigation Report, as approved or modified by EPA, shall become the Final Ground Water Investigation Report. This Report shall, at a minimum, include the following:

a. A description, including maps, of the horizontal and vertical extent, including concentration profiles, of the contaminants in the ground water originating from the Facility;

b. Based on field data and aquifer tests, a representative and accurate description of the hydrogeologic units which are a part of the migration pathways for the contaminant plume, including:

(1) Hydraulic conductivity;
(2) Lithology, grain size, sorting;
(3) Velocity of ground water;
(4) Zones of higher permeability or lower permeability that might direct and restrict the flow of contaminants;
(5) Cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways;
(6) Water-level contour and/or potentiometric maps; and

(7) Hydrologic cross sections showing vertical gradients.

c. Definition of the containment area (two-dimensional) and volume (three-dimensional);

d. Appropriate data and analyses for the design and implementation of a ground water extraction system, treatment system, and disposal system. This shall include the appropriate field pilot test(s), aquifer test(s), etc., to provide data to determine design parameters and projected effectiveness of the full-scale ground water extraction system, treatment system, and disposal system. The ground water extraction system shall be capable of hydraulically containing the contaminant plume, and reducing contaminant concentrations to comply with the cleanup goals by maximizing contaminant mass removal and minimizing cleanup time.

e. The necessary contaminant reductions (e.g., volatile organic compounds, chromium, etc.), in the extracted ground water to comply with Federal, State, and local standards prior to disposal; and

f. The recommended disposal method for the treated ground water which is consistent with the criteria in the FDRTC document for conservation of the ground water resource.

2. Design Plans and Specifications

Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit the Design Plans and Specifications for the Ground Water Extraction Corrective Measure to EPA for review and approval. The design package shall consist of the detailed drawings and specifications needed to construct the corrective measure(s). EPA will approve or modify the design package. The design package, as approved or modified by EPA, shall become the Final Design Plans and Specifications. The Design Plans and Specifications shall, at a minimum, include the following documents:

a. General Site Plans;
b. Process Flow Diagrams;
c. Mechanical Drawings;
d. Electrical Drawings;
e. Piping and Instrumentation Diagrams;

f. Structural Drawings;
g. Excavation and Earthwork Drawings;
h. Site Preparation and Field Work Standards;
i. Construction Drawings;
j. Installation Drawings;
k. Equipment Lists; and
l. Specifications for Equipment and Material.

3. Construction Workplan

Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit a Construction Workplan for the Ground Water Extraction Corrective Measure to EPA for review and approval. The purpose of the Construction Workplan is to document the overall management strategy, construction quality assurance procedures, and schedule for constructing the corrective measure. EPA will approve or modify the Construction Workplan. The Construction Workplan, as approved or modified by EPA, shall become the Final Construction Workplan. The Construction Workplan shall, at a minimum, include the following elements:

a. Project Management: Describe the construction management approach including levels of authority and responsibility (include organization chart).

b. Project Schedule: The project schedule shall specify all significant steps in the process, including the timing for key elements of the bidding process, the timing for initiation and completion of all construction tasks as specified in the Design Plans and Specifications.

c. Waste Management Practices: Describe the wastes generated by the construction of the corrective measure, and how they will be managed.

d. Required Permits: List and describe the permits needed to construct and operate the corrective measure. Indicate on the project schedule when the permit applications will be submitted to the applicable agencies and an estimate of the permit issuance date.

e. Quality Assurance Project Plan: The purpose of construction quality assurance is to ensure, with a reasonable degree of certainty, that a completed corrective measure will meet or exceed all design criteria, plans, and specifications. Sampling and monitoring activities may also be needed for

construction quality assurance/quality control and/or other construction related purposes. To ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented, Respondent shall prepare a Quality Assurance Project Plan (QAPjP) to document all monitoring procedures, sampling, field measurements, and sample analysis performed during these activities. Respondent shall use quality assurance, quality control, and chain-of-custody procedures approved by the EPA. These procedures are described in EPA's Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980, or as superseded by EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5).

f. Construction Contingency Procedures:

(1) Changes to the design and/or specifications may be needed during construction to address unforeseen problems encountered in the field. Procedures to address such circumstances, including notification of EPA, shall be included in the Construction Workplan.

(2) The Construction Workplan shall specify that in the event of a construction emergency (e.g. fire, earthwork failure, etc.), Respondent shall orally notify the EPA within twenty-four (24) hours of the event, and shall notify the EPA in writing within seven (7) days of the event. The written notification shall, at a minimum, specify what happened, what response action is being taken and/or is planned, and any potential impacts on human health and/or the environment; and

(3) Procedures to be implemented if unforeseen events prevent corrective measure construction.

g. Cost Estimate

Respondent shall develop a cost estimate that includes both corrective measure construction and operation and maintenance costs. The purpose of the cost estimate is to assure that Respondent has the financial resources necessary to construct and implement the corrective measure(s).

h. Documentation Requirements

Respondent shall describe how analytical data and results will be evaluated, documented, and managed, consistent with SW-846, 3rd Edition, or as superseded.

i. Appendices, including:

(1) Design Data - Tabulations of significant data used in the design effort;

(2) Equations - List and describe the source of major equations used in the design process;

(3) Sample Calculations - Present and explain at least one example calculation for significant or unique design calculations; and

(4) Laboratory or Field Test Results.

4. Operation and Maintenance Plan

Within three hundred and thirty (330) days after receipt of EPA's approval or modification of the Ground Water Investigation Workplan, Respondent shall submit an Operation and Maintenance (O&M) Plan for the Ground Water Extraction Corrective Measure to EPA for review and approval. The O&M Plan shall outline the procedures for performing operations, long term maintenance, and monitoring of the corrective measure. EPA will approve or modify the O&M Plan. The O&M Plan, as approved or modified by EPA, shall become the Final O&M Plan. The O&M plan shall, at a minimum, include the following elements:

a. Project Management: Describe the management approach, including levels of authority and responsibility (include organization chart), during the operation and management phase of the remedy implementation.

b. System Description: Describe the ground water extraction, treatment, and disposal systems, and identify and describe significant equipment (e.g., pumps, controllers, piping, wiring, treatment system parts, alarms, etc.).

c. Start-Up Procedures: Describe system start-up procedures including any operational testing.

d. Operation and Maintenance Procedures: Describe normal operation and maintenance procedures, including:

(1) Description of tasks for operation;

(2) Description of tasks for maintenance;

(3) Description of prescribed treatment or operation conditions; and

(4) Schedule showing frequency of each O&M task.

e. Replacement schedule for equipment and installed components.

f. Waste Management Practices: Describe the wastes generated by operation of the corrective measure and how they will be managed.

g. Quality Assurance Project Plan: Sampling and monitoring activities may be needed for effective operation and maintenance of the corrective measure. To ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented, Respondent shall prepare a Quality Assurance Project Plan (QAPjP) to document all monitoring procedures, sampling, field measurements, and sample analyses performed during these activities. Respondent shall use quality assurance, quality control, and chain-of-custody procedures approved by the EPA. These procedures are described in EPA's Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980, or as superseded by EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5).

h. Corrective Measure Monitoring: Describe the following:

(1) monitoring objectives;
(2) the types of measurements to be made (e.g., pumping rates, hydraulic heads, contaminant concentrations, ground water chemistry, precipitation, etc.);
(3) measurement locations;
(4) measurement methods, equipment, and procedures;
(5) measurement schedules; and
(6) record-keeping and reporting requirements.

This data and information shall be used to prepare Progress Reports and the Corrective Measure Assessment and Completion Reports.

i. O&M Contingency Procedures:

(1) Procedures to address system breakdowns and operational problems, including a list of redundant and emergency back-up equipment and procedures;

(2) Alternate procedures to be implemented if the corrective measure suffers complete failure. The alternate procedures must be able to prevent release or threatened releases of hazardous wastes and/or hazardous waste constituents which may endanger human health and/or the environment or exceed media cleanup standards;

(3) The O&M Plan shall specify that in the event of a major breakdown and/or complete failure of the corrective measure (includes emergency situations), Respondent shall orally notify the EPA within twenty-four (24) hours of the event, and shall notify the EPA in writing within seven (7) days of the event. Written notification shall, at a minimum, specify what happened, what response action is being taken and/or is planned, and any potential impacts on human health and/or the environment; and

(4) Procedures to be implemented in the event that the corrective measure is experiencing major operational problems, is not performing to design specifications, and/or will not achieve the remediation goals, objectives, or cleanup levels, in the expected time frame.

j. Data Management and Documentation Requirements: The O&M Plan shall specify that Respondent collect and maintain the following information:

(1) Progress Report Information;

(2) Monitoring and laboratory data;

(3) Records of operating costs; and

(4) Maintenance and inspection records.

This data and information shall be used to prepare Progress Reports and the Corrective Measure Assessment and Completion Reports.

5. Health and Safety Plan

Within three hundred and thirty (330) days after receipt of EPA's approval and/or modification of the Ground Water Investigation Workplan, Respondent shall submit an updated Health and Safety Plan for the Ground Water Extraction Corrective Measure, as set forth in Task II, to EPA. EPA does not approve or disapprove the Health and Safety Plan, but does review it to assure its existence. The Health and Safety Plan shall be developed as a stand alone document.

6. Commencement of Construction

Upon receipt of written notification from the EPA, Respondent shall commence the construction process and implement the Construction Workplan in accordance with the schedule and provisions contained therein.

C. Construction Completion Report

Within ninety (90) days following completion of the construction of the Ground Water Extraction Corrective Measure, and/or upon written notice from EPA regarding completion of the construction of one or more components in the Ground Water Extraction Corrective Measure (e.g., containment well system, treatment system, etc.,), Respondent shall submit a Construction Completion Report to EPA for review and approval. The Construction Completion Report shall document how the completed project or component is consistent with the Final Design Plans and Specifications. EPA will approve or modify the Construction Completion Report. The Construction Completion Report, as approved or modified by EPA, shall become the Final Construction Completion Report for the project or component. The Construction Completion Report shall, at a minimum, include the following elements:

1. Synopsis of the corrective measure, design criteria, and certification that the corrective measure was constructed in accordance with the Final Design Plans and Specifications;

2. Explanation and description of any modifications to the Final Design Plans and Specifications and why these were necessary for the project;

3. Results of any operational testing and/or monitoring, indicating how initial operation of the corrective measure compares to the design criteria;

4. Summary of significant activities that occurred during construction. Include a discussion of problems encountered and how they were addressed;

5. As built drawings; and

6. Schedule indicating when any treatment systems will begin full scale operations.

D. Corrective Measure Assessment Reports

Within sixty (60) days of receipt of written notification from EPA, Respondent shall submit a Corrective Measure Assessment Report to EPA for review and approval. The Corrective Measure Assessment Report shall thereafter be submitted to EPA for review and approval annually for a period of two (2) years, and every five years thereafter until this Order is terminated pursuant to Section XXVI of this Order. The Corrective Measure Assessment Report shall contain an evaluation of the past and projected future effectiveness of the corrective measure in attaining the remedial objectives of: (1) contaminant plume containment; and (2) restoration of the contaminated ground water to the media cleanup standards set forth in the FDRTC or in this Order. The evaluation shall follow EPA guidance in evaluating the performance of the ground water extraction system in meeting these two objectives. EPA will approve or modify the Corrective Measure Assessment Report. The Corrective Measure Assessment Report, as approved or modified by EPA, shall become the Final Corrective Measure Assessment Report for the time period covered by the Report. The Corrective Measure Assessment Report shall, at a minimum, include the following elements:

1. Synopsis of the corrective measure;

2. Describe the progress in attaining the remedial objectives of: (a) contaminant plume containment; and (b) restoration of the contaminated ground water.

3. Summarize data obtained during the preceding time interval of systems operation and evaluate trends in the system operating conditions indicating how operation of the corrective measure compares to the remedial objectives;

4. Summary of work accomplishments (e.g., performance levels achieved, total hours of treatment operation,

total treated and/or excavated volumes, nature and volume of wastes generated, etc.);

5. Summary of significant activities that occurred during operations. Include a discussion of problems encountered and how they were addressed;

6. Summary of inspection findings (include copies of key inspection documents in appendices);

7. Summary of total operation and maintenance costs; and

8. An evaluation of implementing post-construction refinements to the ground water extraction system such as, but not limited to:

   - adjusting the pumping rate in some or all of the ground water extraction wells;

   - installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume;

   - initiating a pulsed pumping schedule in some or all of the ground water extraction wells to eliminate flow stagnation areas, or otherwise facilitate recovery of contaminants from the aquifer;

   - discontinuing pumping at individual extraction wells where cleanup goals have been attained; monitoring of the aquifer would be continued to ensure that media cleanup goals are maintained; and

   - refining the treatment and disposal components of the system.

9. An evaluation of implementing additional source control measures to further reduce the remaining source material in the aquifer and soil beneath the facility. Such measures could include the implementation of additional measures in the aquifer where possible NAPL contaminants remain relatively unaffected by ground water extraction.

Respondent may at any time request that EPA select an alternative and/or supplemental corrective measure(s) (which may include requiring Respondent to achieve alternative clean up standards in lieu of the media cleanup standards set forth in the FDRTC or in this Order). Respondent may also at any time submit a Technical Impracticability

Demonstration to EPA. In addition to demonstrating technical impracticability, Respondent shall also submit an alternative remedial strategy that is: (1) technically practicable; (2) consistent with the overall objectives of the remedy; (3) controls the source(s) of the contamination; and (4) controls human and environmental exposure. An alternative remedial strategy shall be imposed if a determination of technical impracticability is made by EPA.

E. Corrective Measure Completion Report

Respondent shall prepare and submit a Corrective Measure Completion Report to EPA for review and approval when the Performance Standards have been achieved for the Ground Water Extraction Corrective Measure. The purpose of the Corrective Measure Completion Report is to fully document how the Performance Standards have been satisfied and to justify why the corrective measure and/or monitoring may cease. EPA will approve or modify the revised Corrective Measure Completion Report. The revised Corrective Measure Completion Report, as approved or modified by EPA, shall become the Final Corrective Measure Completion Report. The Corrective Measure Completion Report shall, at a minimum, include the following elements:

1. Synopsis of the corrective measure;

2. Demonstration that the Performance Standards have been met. Include results of testing and/or monitoring, indicating how operation of the corrective measure compares to the completion criteria;

3. Summary of work accomplishments (e.g., performance levels achieved, total hours of treatment operation, total treated and/or excavated volumes, nature and volume of wastes generated, etc.);

4. Summary of significant activities that occurred during operations. Include a discussion of problems encountered and how they were addressed;

5. Summary of inspection findings (include copies of key inspection documents in appendices); and

6. Summary of total operation and maintenance costs.

TASK VI: MONTHLY PROGRESS REPORTS

Respondent shall, at a minimum, provide EPA with signed monthly progress reports during the corrective measures design, construction, operation and maintenance. EPA may adjust the frequency of progress reporting to address site-specific needs. For example, more frequent progress reports may be needed to track critical activities such as corrective measure construction and start-up.

Progress reports shall, at a minimum, include the following elements:

A. A description of significant activities (e.g., sampling events, inspections, etc.) and work completed/work accomplishments (e.g., performance levels achieved, hours of treatment operation, treated and/or excavated volumes, concentration of contaminants in treated and/or excavated volumes, nature and volume of wastes generated, etc.) during the reporting period;

B. Summary of system effectiveness. Provide a comparison of system operation to predicted performance levels (applicable only during operation of the corrective measure);

C. Summaries of all findings (including any inspection results);

D. Summaries of all contacts with representatives of the local community, public interest groups or State government during the reporting period;

E. Summaries of all problems or potential problems encountered during the reporting period;

F. Actions being taken and/or planned to rectify problems;

G. Projected work for the next reporting period; and

H. The results of any sampling tests and/or other data generated during the reporting period.

EXHIBIT A

FINAL DECISION AND RESPONSE TO COMMENTS

DATED JUNE 24, 1996

FINAL DECISION
RCRA CORRECTIVE ACTION

SITE NAME AND LOCATION

Sparton Technology, Inc.
Coors Road Facility
9621 Coors Road, N.W.
Albuquerque, New Mexico 87114

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for the Sparton Technology, Inc., Coors Road facility, in Albuquerque, New Mexico, chosen in accordance with the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA). This decision is based on the administrative record for the site.

DESCRIPTION OF REMEDY

The selected remedy consists of an expanded ground water extraction system and soil vapor extraction system. The major components of the selected remedy include:

1. Continued operation of the existing on-site ground water extraction and treatment system;

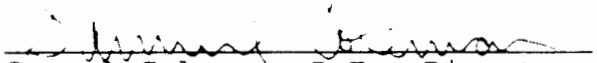
2. Further characterization of the extent of contamination in the ground water and vadose zone;

3. Installation and operation of additional ground water extraction well(s); and

4. Installation and operation of on-site soil vapor extraction (SVE) system;

STATUTORY DETERMINATIONS

Sparton Technology, Inc., is the owner or operator of a facility which was authorized to operate under interim status pursuant to Section 3005(e) of RCRA, 42 U.S.C. § 6925(e). Hazardous waste has been released into the environment from the facility. Corrective action is necessary to protect human health and/or the environment. The selected remedy is protective of human health and the environment.



June 24, 1996

Samuel Coleman, P.E., Director
Compliance Assurance and
Enforcement Division
U.S. Environmental Protection
Agency - Region 6
Dallas, Texas

Date

FINAL DECISION AND RESPONSE TO COMMENTS RCRA CORRECTIVE ACTION

SPARTON TECHNOLOGY, INC. COORS ROAD FACILITY ALBUQUERQUE, NEW MEXICO

June 24, 1996

INTRODUCTION

In this Final Decision and Response to Comments (FDRTC), the U.S. Environmental Protection Agency (EPA) describes the selected remedy, as well as the other remedial alternatives evaluated for addressing the ground water and soil contamination at the Sparton Technology Coors Road facility located in Albuquerque, New Mexico. This document also explains EPA's rationale for the remedy selected to address the release of hazardous waste. EPA has also prepared a Response to Comments to provide written responses to comments submitted regarding the EPA Statement of Basis for the Coors Road facility. The Response to Comments is included as Attachment 1. The Final Decision summarizes information that can be found in greater detail in the Administrative Record. The index for the Administrative Record in support of the Final Decision is included as Attachment 2.

FACILITY BACKGROUND

A. Site Description

The Sparton Technology, Inc., Coors Road Plant (Facility), at 9621 Coors Road, NW, consists of a 64,000-square-foot building on a 12-acre parcel of land on the northwest side of Albuquerque, New Mexico (Figure 1). The Facility is located on the edge of a terrace approximately 60 feet above the adjacent Rio Grande floodplain, and approximately 0.5 mile west of the Rio Grande. The Corrales Main Canal, a man-made hydraulic structure used for irrigation, is approximately 300 feet east of the Facility, and contains flowing water eight months out of the year. The Calabacillas Arroyo is located about 1,000 feet north of the site. West of Irving Boulevard, the elevation rises some 250 feet from the terrace to form the surrounding hills.

Currently, land use in the area immediately adjacent to the Facility consists of commercial developments, and undeveloped tracts along the west side of Coors Road. Further south and west of the Facility along Irving Boulevard, residential developments

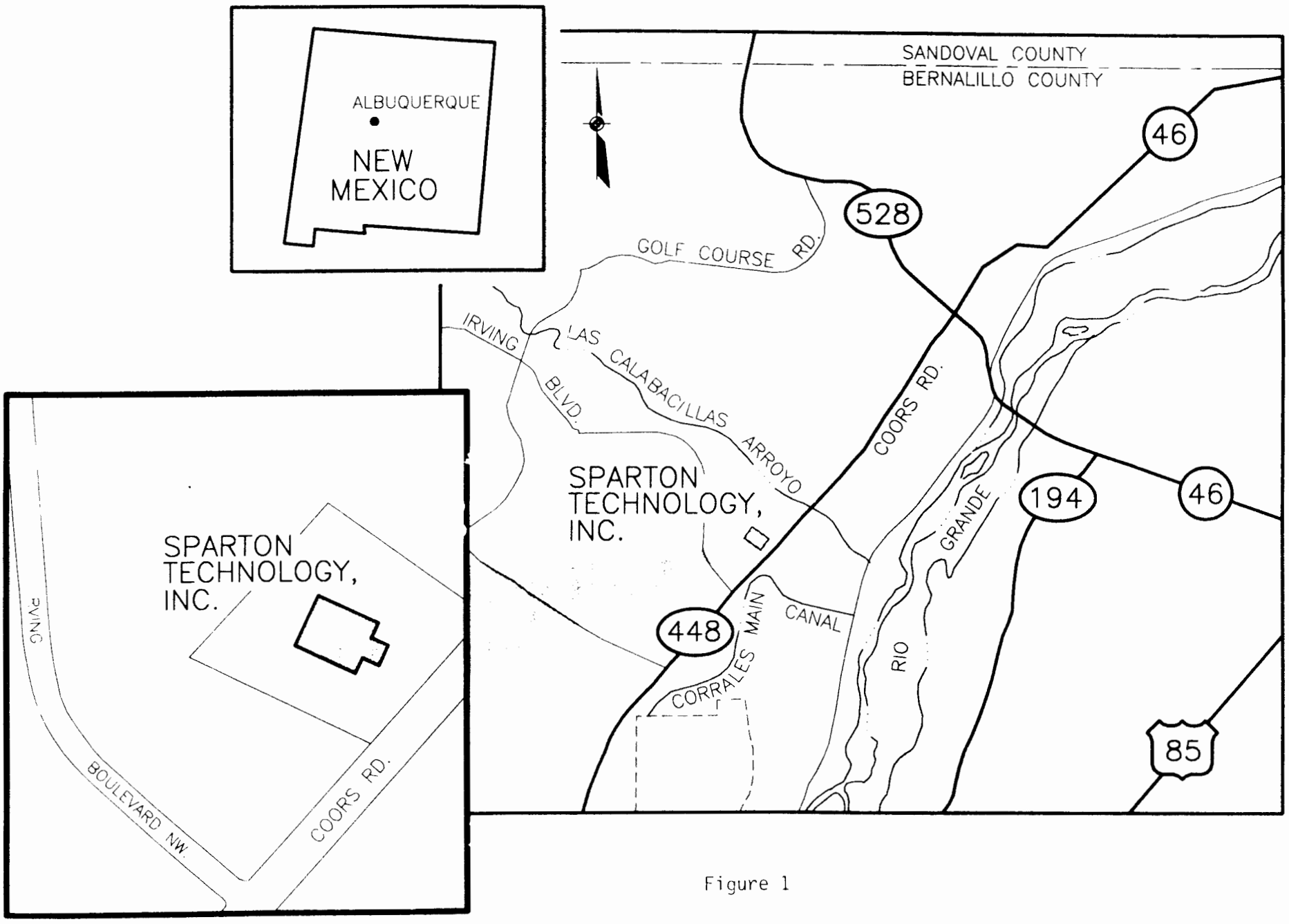

ALBUQUERQUE
NEW MEXICO
SANDOVAL COUNTY
BERNALILLO COUNTY
46
528
GOLF COURSE RD.
IRVING BLVD.
LAS CALABACILLAS ARROYO
COORS RD.
SPARTON TECHNOLOGY, INC.
194
46
GRANDE
RIO
448
CORRALES MAIN CANAL
85
SPARTON TECHNOLOGY, INC.
IRVING BLVD.
BOULEVARD NW.
COORS RD.

Figure 1

are present or are being constructed. Residential developments, such as Paradise Hills, are approximately 1/4 - 3/4 mile west of the Facility. Agricultural operations are present east of the Facility and Coors Road.

The subsurface soils across the Facility consist of sandy muds, sands, and gravel. The depth to ground water varies from approximately 65 feet at the Facility to approximately 200 feet in the hills to the west. The depth to ground water can vary as much as two to three feet during the year as a result of recharge from irrigated fields and the Corrales Main Canal. Ground water flow is generally to the southwest across the Facility, changing to the west-northwest between the Facility and Irving Boulevard.

Local ground water supplies both drinking water for the City of Albuquerque as well as process water for industrial purposes. New Mexico Utilities, Inc., operates the nearest downgradient municipal water supply well (well No. 2) approximately 2.6 miles northwest of the Facility (Figure 2). There have been no identified private water supply wells immediately downgradient from the Facility.

B. Facility History

Manufacturing operations began in 1961 with commercial, industrial, and military electronic components, including printed circuit boards. As of 1994, Sparton discontinued manufacturing operations at the Facility and other than routine maintenance activities, the Facility is currently inactive.

The printed circuit board manufacturing process at the Facility generated an aqueous plating waste which was classified as hazardous waste due to heavy metals and a low pH. Waste solvents were generated primarily from cleaning of electronic components. From 1961 to 1975, the plating wastes were stored in an in-ground concrete basin. This basin was replaced by a lined surface impoundment in 1975, termed the "West Pond" and a second lined surface impoundment in 1977 termed the "East Pond" (Figure 3). The "West" and "East" ponds remained in use until 1983, when Sparton ceased discharging to either pond and removed the remaining plating wastes. The ponds are approximately 20 feet by 30 feet in surface dimension and 5 feet deep. The impoundments were constructed of concrete block or cast-walls with a natural sand base and a 30-mil, two-ply hypalon liner.

From 1961 to 1980, waste solvents were accumulated in an on-site sump (Figure 3) and allowed to evaporate. The sump was constructed of concrete blocks and measured approximately 5 feet by 5 feet in surface dimension by 2 feet deep. Sparton ceased discharging to the sump in October 1980 by removing the remaining wastes and filling the sump with sand.

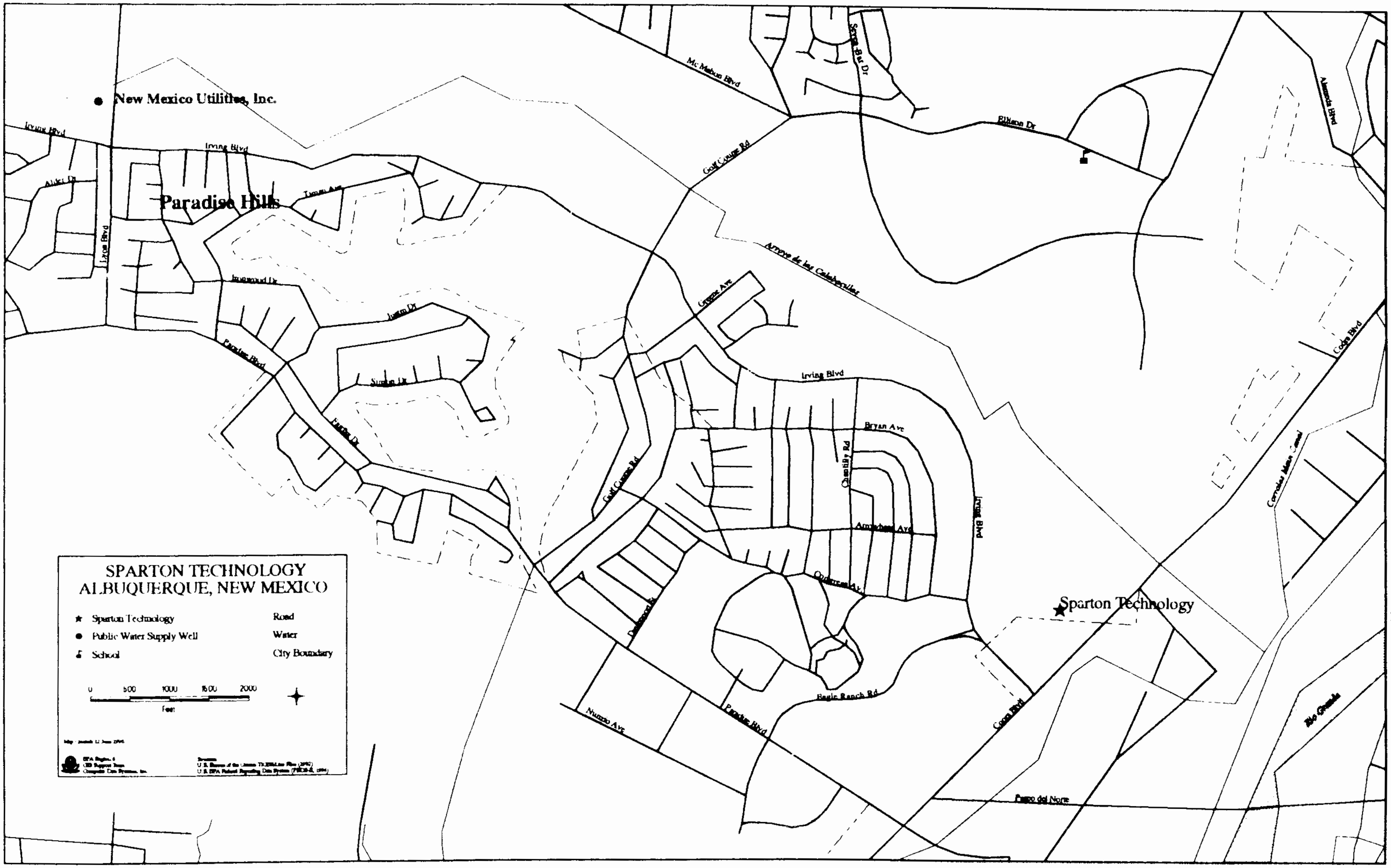

New Mexico Utilities, Inc.
Paradise Hills
Irving Blvd
McMahon Blvd
Golf Course Rd
Paradise Blvd
Arroyo de las Calabacillas
Bryan Ave
Eagle Ranch Rd
Coors Blvd
Paseo del Norte
Rio Grande
Sparton Technology
SPARTON TECHNOLOGY
ALBUQUERQUE, NEW MEXICO
Sparton Technology
Public Water Supply Well
School
Road
Water
City Boundary
0 500 1000 1500 2000
Feet

Figure 2

Drums of hazardous waste were stored on the ground surface prior to May 1981, when a new drum storage area was constructed for storage of all drummed hazardous waste. The new drum storage area consists of a covered concrete pad and a spill collection system.

C. Regulatory History

In response to a Consent Agreement and Final Order signed by Sparton and EPA in 1983, Sparton installed a ground water monitoring system for the RCRA regulated hazardous waste management units at the Facility (East and West ponds). Analyses of the samples collected from the ground water monitoring system revealed that hazardous waste had been released to the ground water as a result of previous and ongoing hazardous waste management practices. During the period from 1983 to 1984, Sparton installed 17 ground water monitoring wells at the Facility. These monitoring wells were screened predominately across the top of the aquifer. Analyses of ground water samples collected from the monitoring wells detected the significant contaminants presented in Table 1.

TABLE 1

Chemical	Concentration (ppb)
Trichloroethylene	27 - 90,900
1,1,1-Trichloroethane	7 - 54,900
Methylene Chloride	11 - 78,400
1,1-Dichloroethylene	18 - 31,600
Tetrachloroethylene	17 - 953
Toluene	5 - 4,720
Benzene	20 - 193
Chromium	22 - 32,100

Sparton ceased discharging to the ponds in 1983, and removed the remaining plating wastes from the ponds for shipment to a permitted off-site disposal facility. On June 16, 1986, the New Mexico Environmental Improvement Division (NMEID), the predecessor agency to the New Mexico Environment Department (NMED), approved the closure plan for the "East" and "West" Ponds and Sump. The ponds and sump were certified closed by Sparton on December 18, 1986, and closure was acknowledged by NMEID on May 18, 1987. Sparton removed the solvent sump and sand backfill, and placed the wastes in the two remaining lined impoundments. The impoundments and sump area were capped by a 6-inch thick

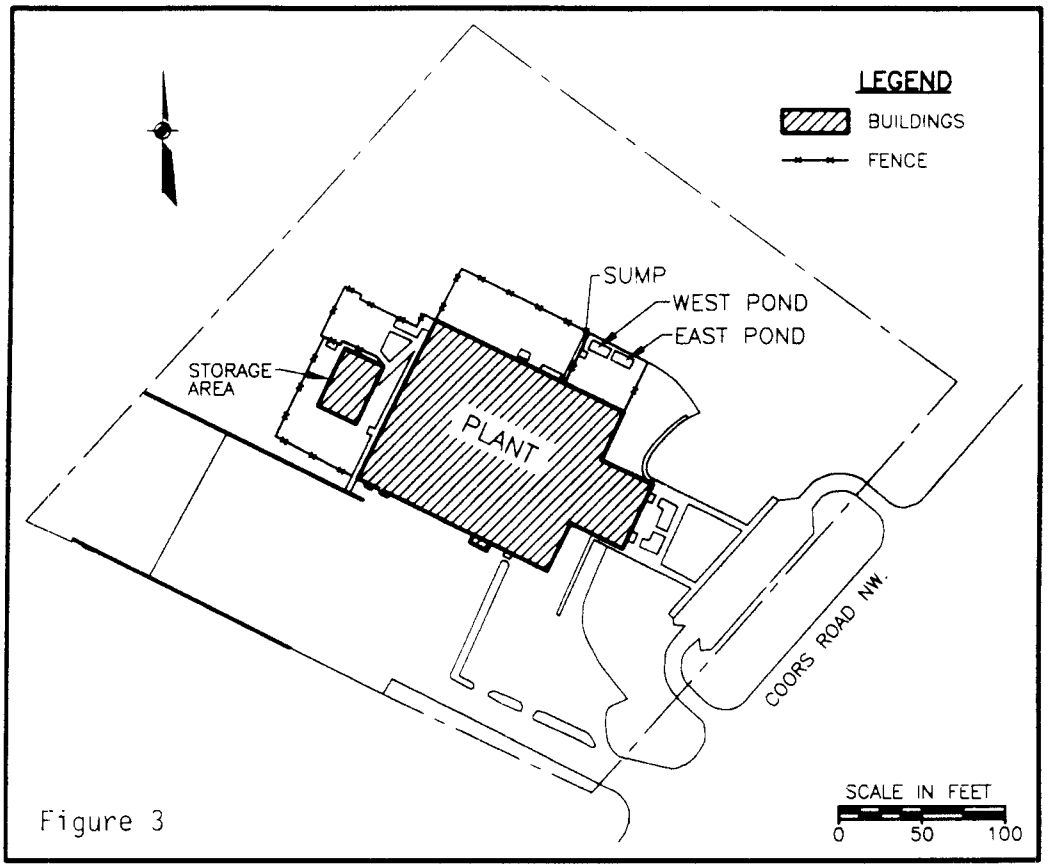


Figure 3

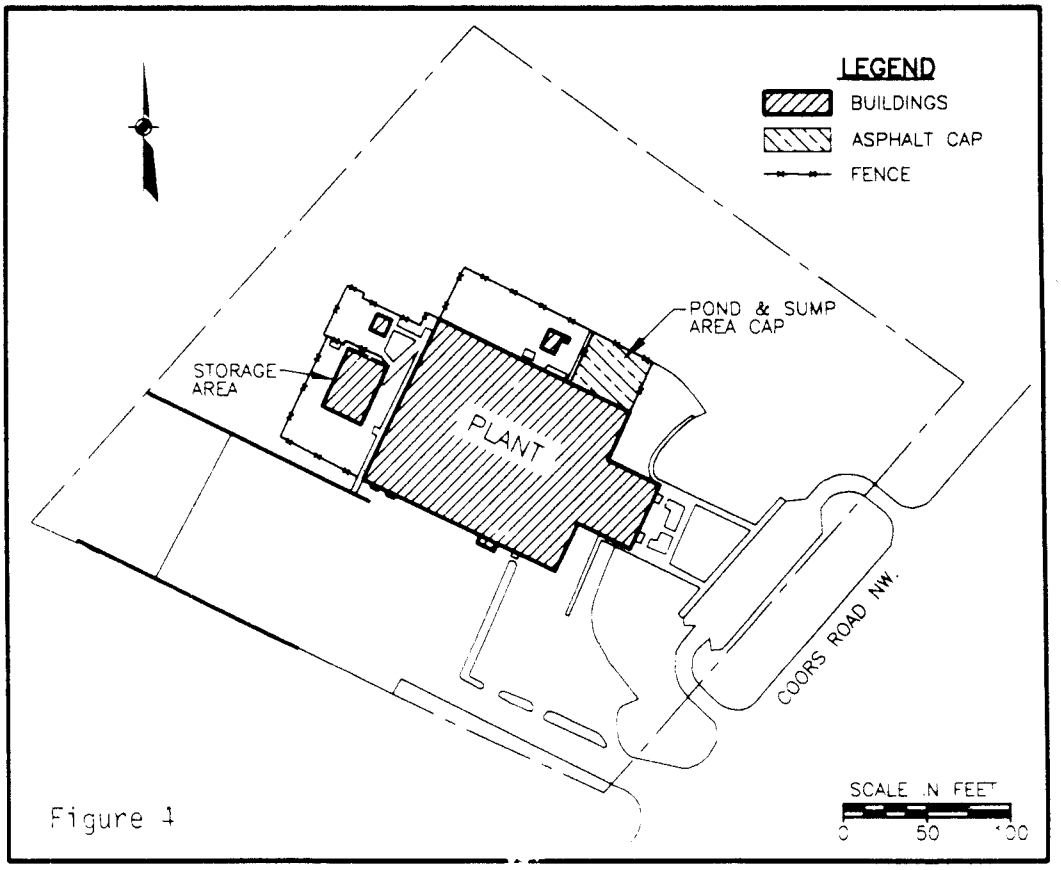


Figure 4

asphaltic base overlain by a 3-inch asphaltic concrete layer (Figure 4). The cap was sloped at 1 percent to promote drainage and reduce the potential for infiltration. The protective cap installed across the former waste management area reduces the potential for direct exposure to the contaminated material, prevents stormwater runoff from transporting contaminants away from the Facility, and reduces further downward migration of hazardous waste to the underlying ground water.

Sparton also performed a soil investigation during 1986 through 1987. Soil borings were used to evaluate the contaminant migration within the unsaturated subsurface soils as a result of past operations at the Facility. Total metals analyses indicated that chromium was the primary inorganic contaminant exceeding 3000 ppm underneath the former pond and sump area. The chromium concentration decreases to approximately 20 ppm outside of the waste management area, but is still above the background levels (2-3 ppm). Field screening conducted for the organic contaminants indicated the presence of volatile chemicals throughout the soil profile. Additional investigations included surface soil gas surveys conducted in 1984 and 1987. Trichloroethylene and trichloroethane were detected in the soil gas across the Facility and the general area of the ground water contamination.

On October 1, 1988, the EPA and Sparton Technology, Inc. (Sparton) entered into an Administrative Order on Consent (Order), Docket No. VI-004(h)-87-H, pursuant to Section 3008(h) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6928(h). The Order specified the legal and technical requirements for Sparton to follow in performing corrective action at the Facility.

FACILITY INVESTIGATION

Under the terms of the Order, Sparton was required to complete the following three actions: 1) install and operate a ground water extraction and treatment system at the Coors Road facility as an interim measure; 2) conduct a RCRA Facility Investigation (RFI) to determine the nature and extent of contamination resulting from past Facility operations; and 3) perform a Corrective Measures Study (CMS) to evaluate the various clean-up alternatives. Sparton performed the requirements of the Order with oversight by EPA.

A. Interim Measure

In an effort to begin the recovery of contaminated ground water in 1988, Sparton was required to install and operate a ground water extraction and treatment system at the Facility. The system consists of 8 extraction wells pumping contaminated ground water from the upper 10 feet of the aquifer.

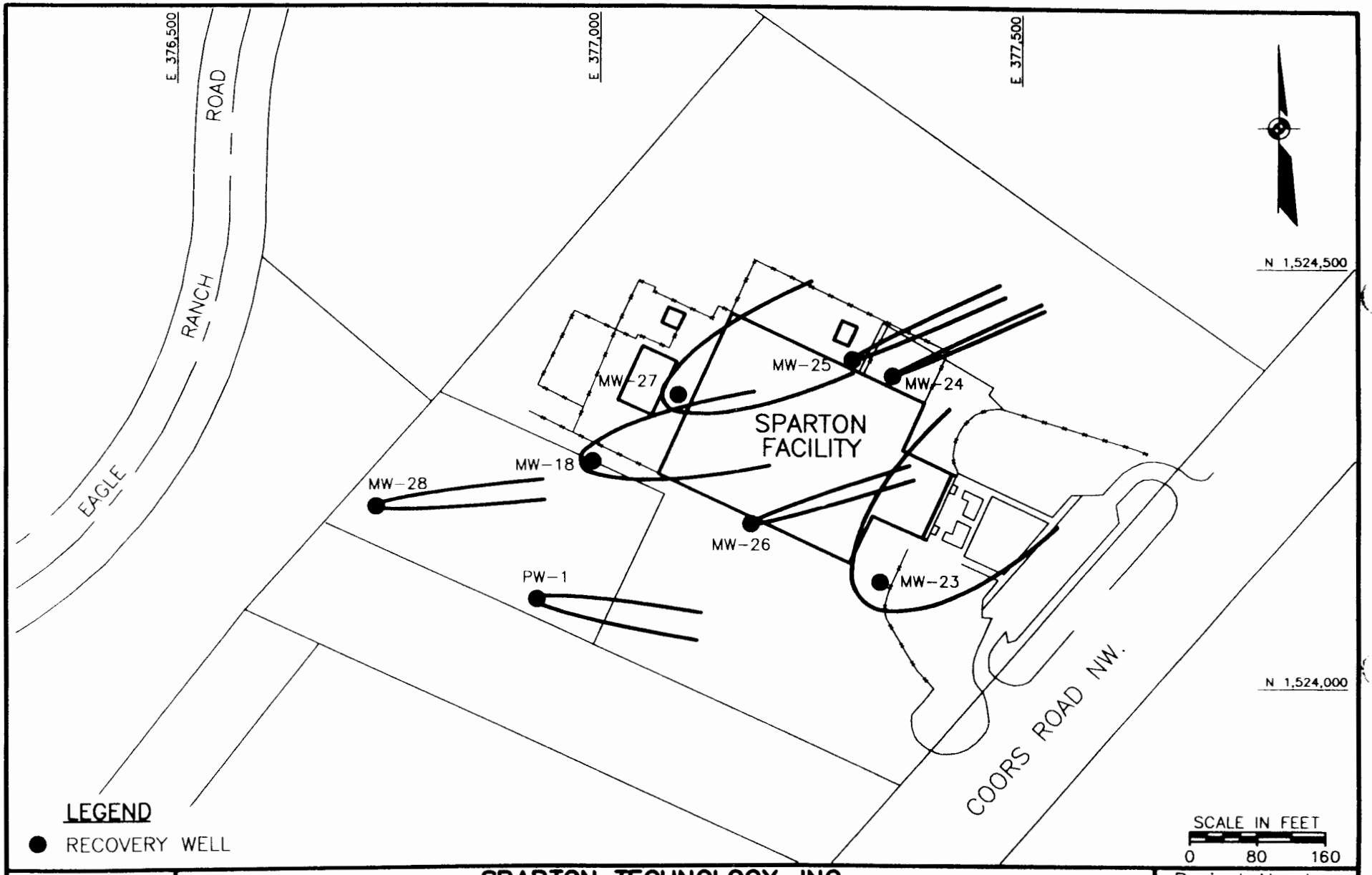
Figure 5 illustrates the well locations and approximate capture zones as estimated by EPA calculations. The total volume of recovered ground water is approximately 1300 gallons per day. The annual ground water withdrawal rate is regulated under the New Mexico State Engineer's office permit No. RG-50161 (expiration date is December 31, 1999). The recovered ground water is piped to a 550-gallon collection tank prior to treatment. The piping system consists of discharge lines encased in secondary piping to provide leak detection and containment. The collection tank is a fiberglass-coated, double wall, steel tank with a leak detection system connected to a visual and audible alarm in the control building.

Water from the collection tank is piped to the top of a 20 gallon per minute (gpm) packed tower air stripper. The air stripper operates by allowing the water to slowly flow downward across plastic balls while forcing air upward through the column to remove volatile organic compounds from the water. Approximately 3.56 million gallons of water have been recovered and treated in the air stripper. The demonstrated efficiency of the system is 99 percent for the contaminant indicators of trichloroethylene, 1,1,1-trichloroethane, methylene chloride, and 1,1-dichloroethylene. Contaminant concentrations in the treated water are in the range of 1 ppb for each contaminant. The volatile organic contaminants which are removed from the ground water in the air stripper are released to the atmosphere. The emissions are permitted by the City of Albuquerque Environmental Health Department (Air Quality Permit Number 187). The average daily air emission from the air stripper is 0.02 pounds, which is below the maximum allowable of 9.1 pounds per day in the permit.

Treated water from the air stripper is discharged to a 15,000-gallon fiberglass-coated, double wall, steel tank for storage. The tank has a leak detection system with a visual and audible alarm in the control building. During previous plant operations, treated water from the storage tank was used in the main plant building as cooling and flushing water, and eventually discharged into the sewer system. Since Facility operations have been discontinued, the treated water is utilized in the sanitary system prior to discharge into the sewer system.

B. RCRA Facility Investigation

Sparton was required to investigate the nature and extent of contaminant releases to the ground water. Monitoring wells installed in the aquifer were used to monitor the concentration and migration of contaminants in the ground water. Of these monitoring wells, 24 are located on-site at the Facility and 23 are installed off-site to a distance of approximately 1/2 mile



Metcalf & Eddy

SPARTON TECHNOLOGY, INC.

APPROXIMATE CAPTURE ZONES FOR THE UPPER FLOW ZONE RECOVERY WELLS

ALBUQUERQUE, NEW MEXICO

Project Number	
165022	
File Name	Figure
SPAR-CAP	5

west-northwest of the Facility. The wells are installed to monitor discrete intervals of the aquifer from 0-10 feet (upper flow zone), 30-40 feet (upper-lower flow zone), 50-60 feet (lower-lower flow zone), and 70-80 feet (third flow zone) below the top of the water table.

Analyses of samples collected from the monitoring wells have shown both organic and inorganic contaminants (Table 1) using EPA approved methods. Trichloroethylene is the major ground water contaminant and has been used to define the extent of the contaminant plume. Concentrations of trichloroethylene in the ground water ranged from 7,600 ppb on-site to less than 5 ppb at a distance of at least 1/2 mile from the facility in 1996. Of the inorganic contaminants, hexavalent chromium has the highest frequency of occurrence with concentrations up to 500 ppb.

Trichloroethylene is a chlorinated organic compound which is denser than water, and if present as a dense, nonaqueous phase liquid (DNAPL), would sink to the bottom of the water column. While a DNAPL has not been identified in the monitoring wells, existing concentrations of trichloroethylene indicate the possible presence of a DNAPL in the upper flow zone of the aquifer on-site at the Facility. Remaining DNAPL in the soil and ground water may produce a zone of contaminant vapors above the water table, and a plume of dissolved contaminants below the water table. Both residual and migrating DNAPLs dissolve slowly, supplying potentially significant concentrations of contaminants to ground water over a long period of time.

Based on available data, the horizontal extent of the ground water contaminant plume is greatest in the upper flow zone. Contaminant concentrations are the highest on-site at the Facility, decreasing off-site to the west-northwest. As of June 1991, the contaminant plume had migrated approximately 1/2 mile west-northwest of the Facility, and the boundary of the plume had shown no significant changes between 1989 and 1991. However, during sampling activities from 1993 through April 1996, analyses of the ground water indicated that the leading edge of the contaminant plume (<5 ppb) has continued to move further northwest along Irving Boulevard. In Figures 6 through 11, the boundary and concentrations of the contaminant plume are approximate, and the maps are intended for illustration purposes only. The plume boundary and relative concentrations may be revised significantly based on additional data. For 1991, the approximate boundary and concentration profiles for trichloroethylene at three separate depths in ground water is illustrated in Figures 6 through 8. For 1996, the approximate boundary and concentration profiles for trichloroethylene at three separate depths in ground water is illustrated in Figures 9 through 11. Figures 6 through 11 were copied from the final CMS Report.

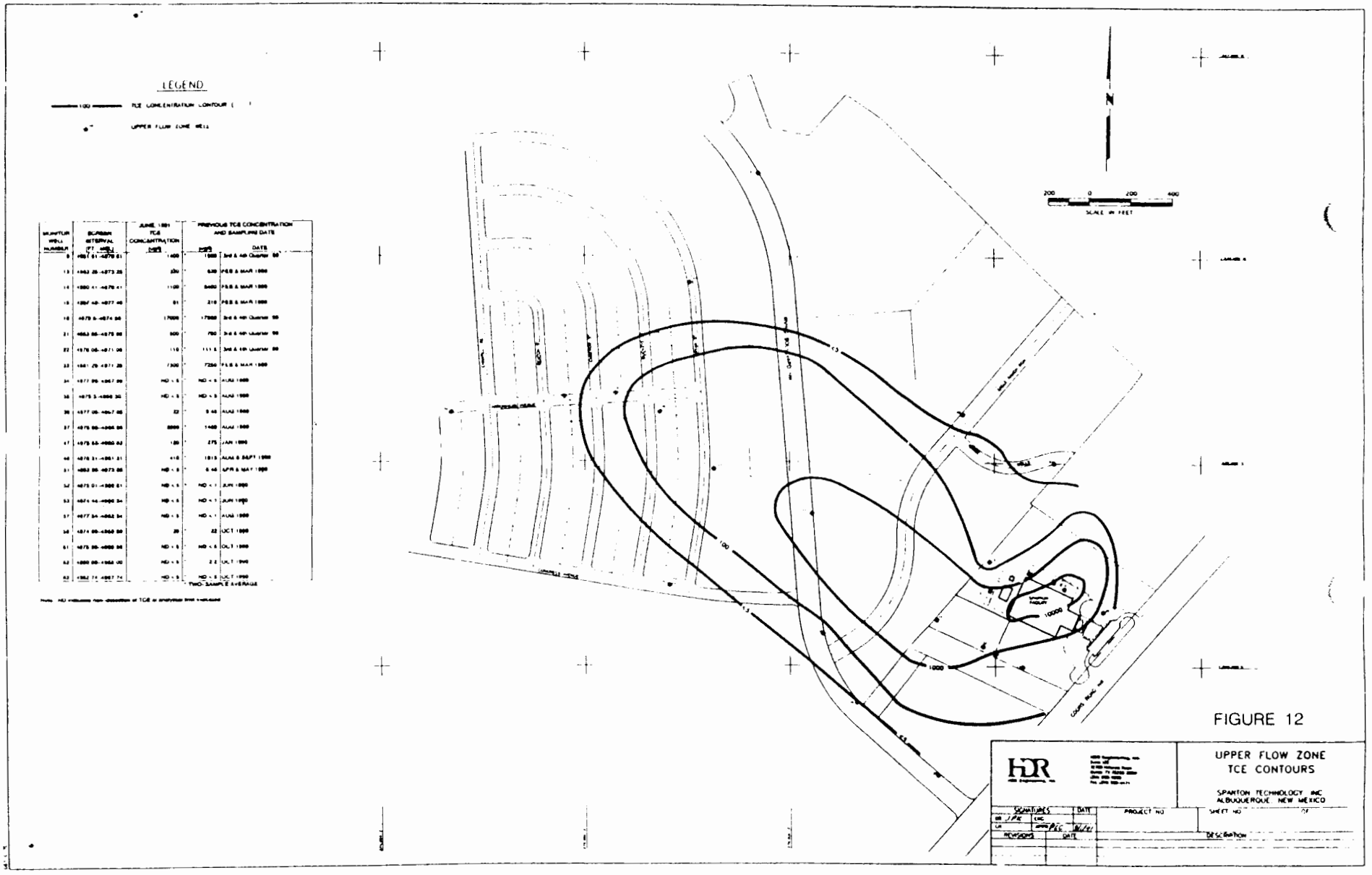

LEGEND
TCE CONCENTRATION CONTOUR
UPPER FLOW ZONE WELL
N
SCALE IN FEET
FIGURE 12
UPPER FLOW ZONE
TCE CONTOURS
SPANTON TECHNOLOGY, INC.
ALBUQUERQUE, NEW MEXICO
HDR

Figure 6

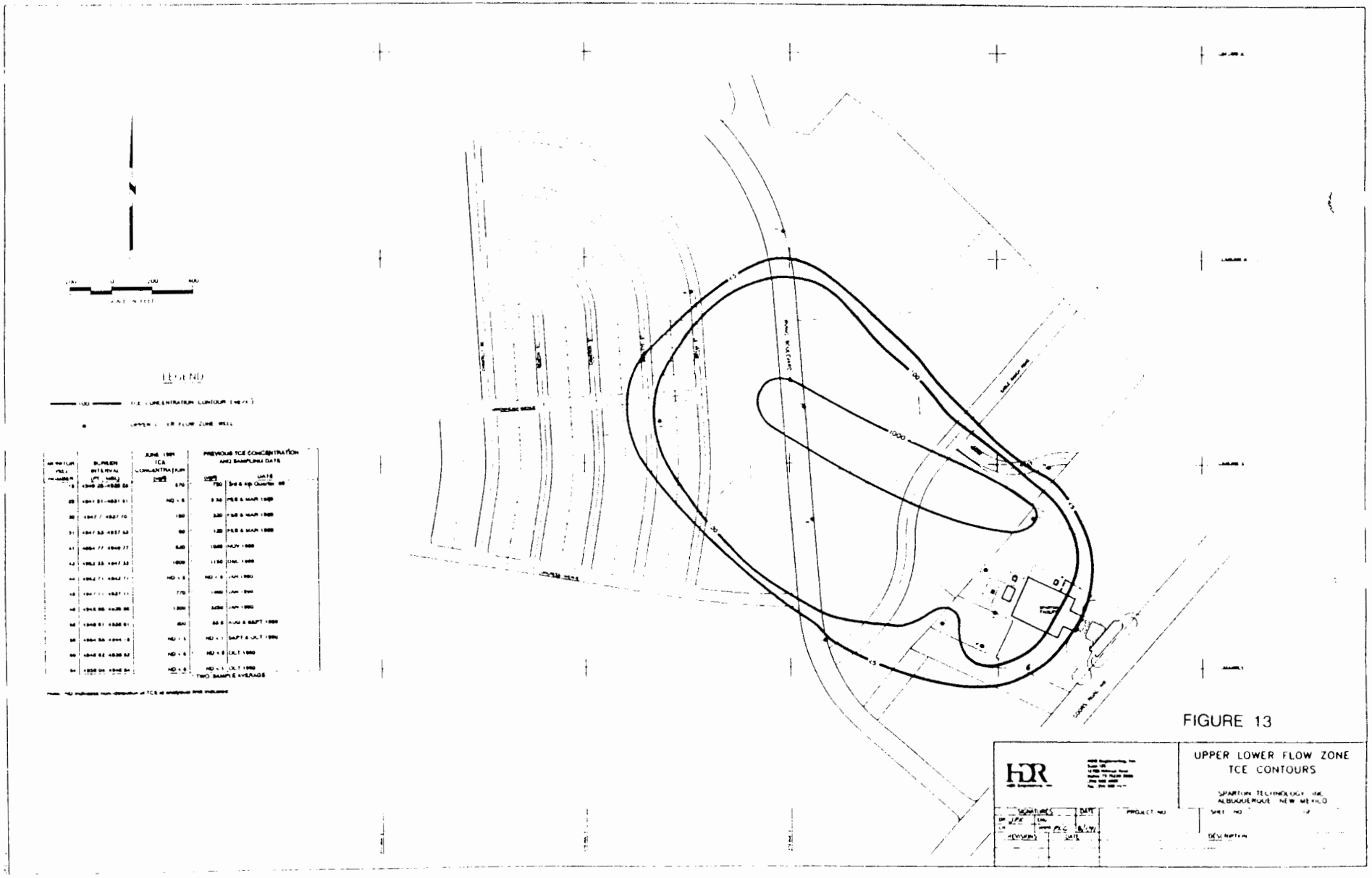

LEGEND
FIGURE 13
HDR
UPPER LOWER FLOW ZONE
TCE CONTOURS
SPARTON TECHNOLOGY, INC.
ALBUQUERQUE, NEW MEXICO

Figure 7

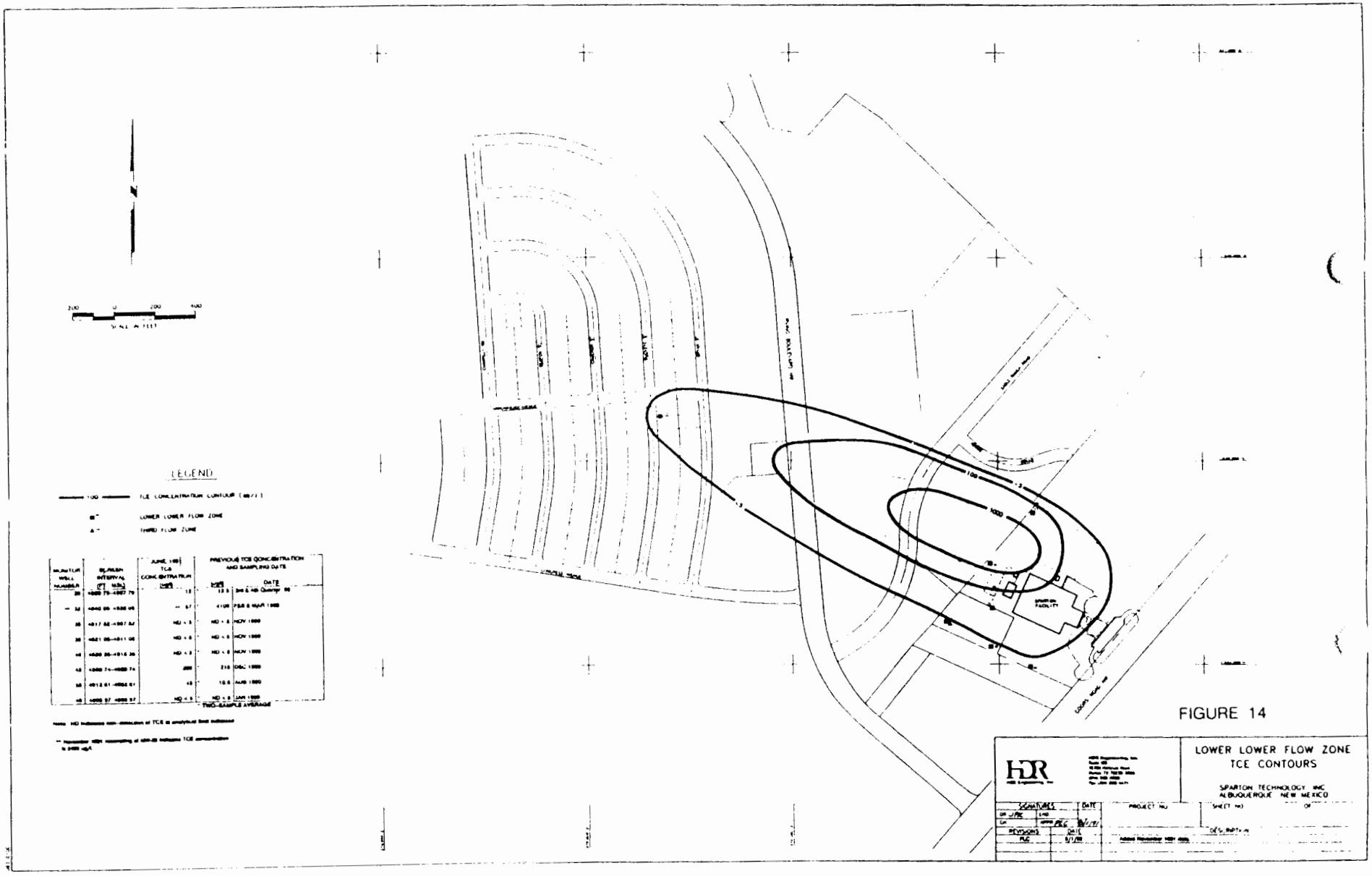


FIGURE 14

Figure 8

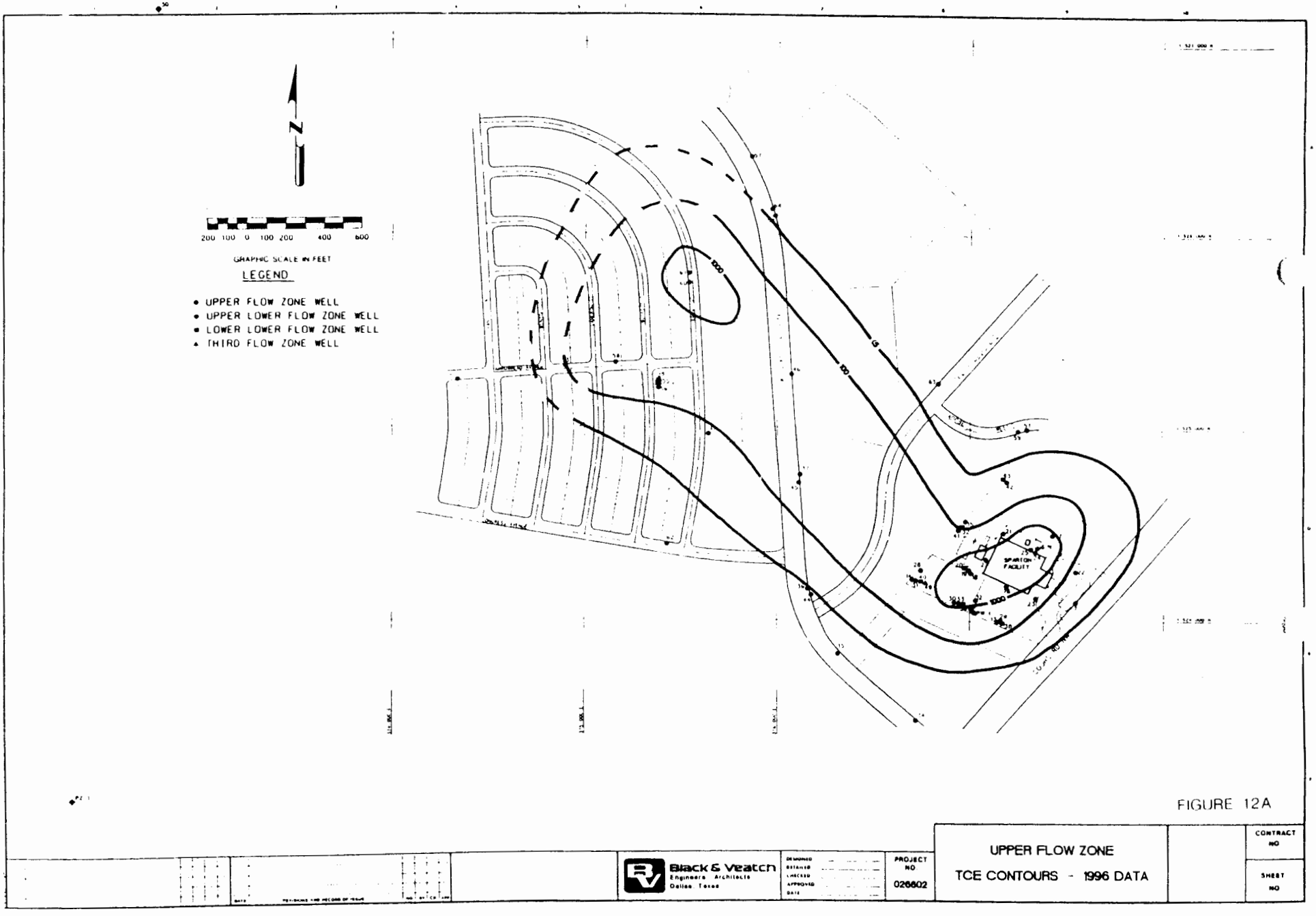

N
200 100 0 100 200 400 600
GRAPHIC SCALE IN FEET
LEGEND
• UPPER FLOW ZONE WELL
• UPPER LOWER FLOW ZONE WELL
■ LOWER LOWER FLOW ZONE WELL
▲ THIRD FLOW ZONE WELL
1000
500
1500
SPARTON FACILITY
FIGURE 12A
Black & Veatch
Engineers Architects
Dallas Texas
PROJECT NO
026802
UPPER FLOW ZONE
TCE CONTOURS - 1996 DATA
CONTRACT NO
SHEET NO

Figure 9

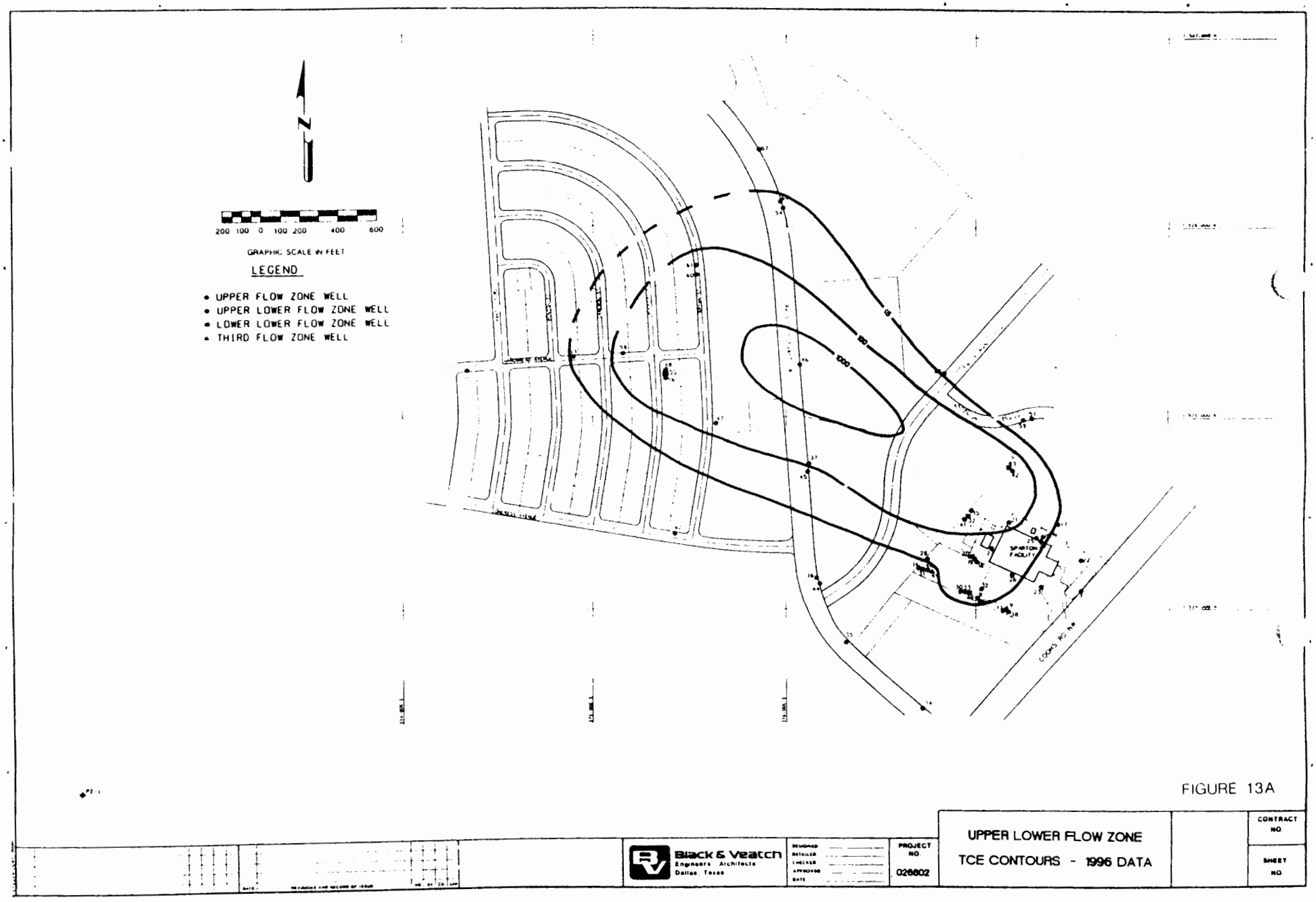


FIGURE 13A

Figure 10

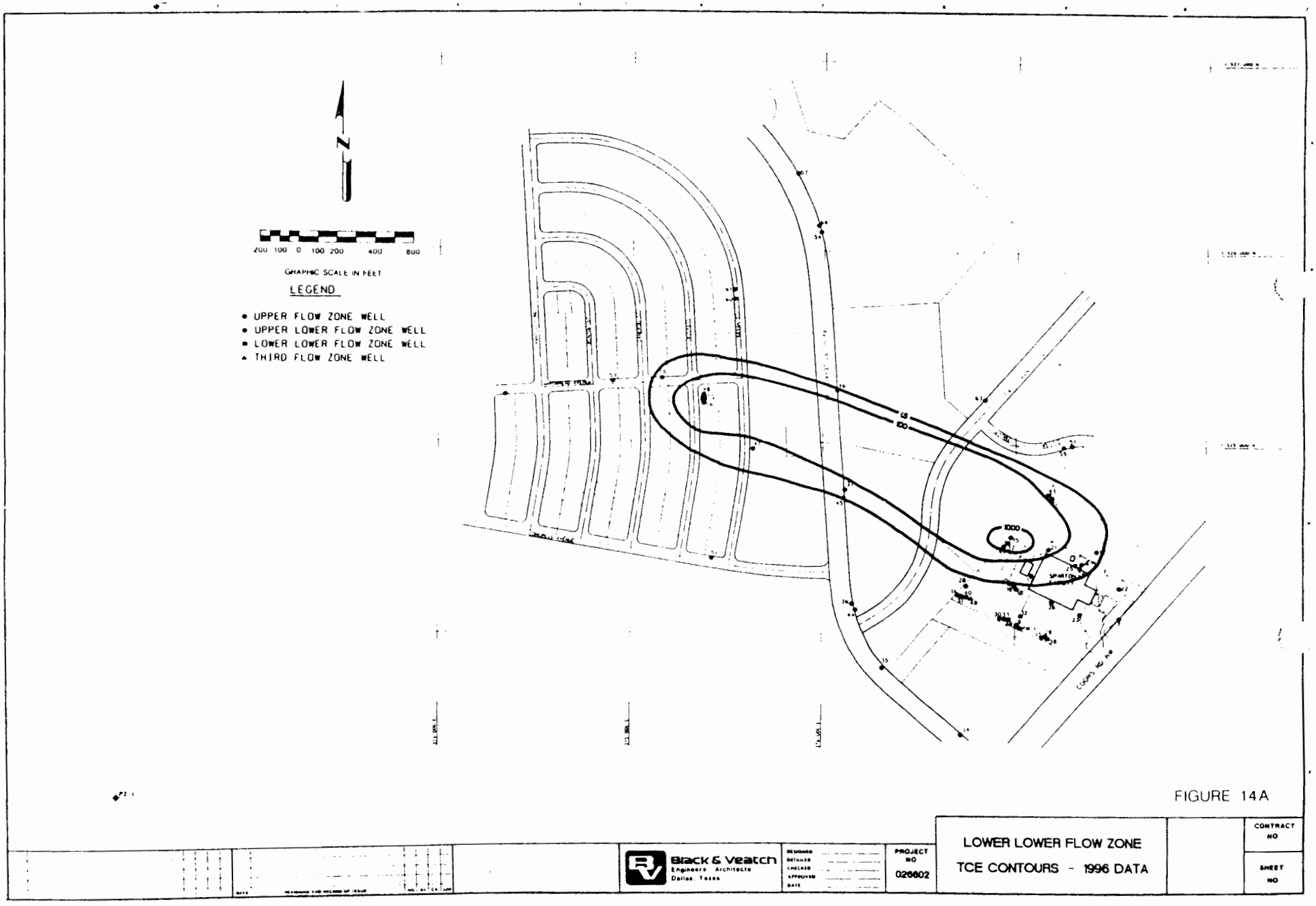


FIGURE 14A

Black & Veatch
Engineers Architects
Dallas, Texas

PROJECT NO 026602

LOWER LOWER FLOW ZONE
TCE CONTOURS - 1996 DATA

CONTRACT NO

SHEET NO

Figure 11

While the organic contaminant concentrations have decreased with time in the on-site and certain off-site monitoring wells, other off-site monitoring wells have shown an increase in organic concentrations related to the continued migration of the contaminant plume beyond the boundary defined during the RFI. Based on available data, the contamination extends at least 60 feet below the water table. However, the existing monitoring system does not completely define the horizontal and vertical extent of the contamination.

SUMMARY OF SITE RISKS

The New Mexico Environment Department, the New Mexico Office of the Natural Resources Trustee, the New Mexico Attorney General's Office, and the City of Albuquerque have all issued separate notices that an imminent and substantial endangerment to health or the environment may exist at or near the Sparton Technology, Inc., facility at 9621 Coors Road, NW, Albuquerque, New Mexico, pursuant to 42 U.S.C. §6972(a)(1)(B). These findings are the result of past waste management practices at the Sparton facility which have resulted in releases to the ground water and soil. These entities claim that the contamination from the Facility threatens the ability of the City of Albuquerque to use the ground water in this area as a source of drinking water in the future. EPA has not made a determination as of this date as to whether an imminent and substantial endangerment exists pursuant to 42 U.S.C. §6973.

Under Section 3008(h) of RCRA, 42 U.S.C. §6928(h), corrective action is required to protect human health or the environment. Ground water currently supplies the sole source of drinking water for the City of Albuquerque. At this site, the aquifer is potentially useable as a source of drinking water, and is currently used outside of the contaminant plume for this purpose. The New Mexico Utilities Inc., water supply well No. 2 is approximately 2 miles downgradient (northwest) of the leading edge of the contaminant plume. Therefore, a protective goal at this site is the restoration of potentially drinkable ground water to levels safe for drinking throughout the contaminated plume, regardless of whether the water is in fact currently being consumed. Restoration refers to the reduction of contaminant concentrations to the more stringent of either: 1) the Maximum Contaminant Levels (MCLs) for drinking water established under the Safe Drinking Water Act; or 2) the maximum allowable contaminant concentrations in ground water set by the State of New Mexico Water Quality Control Commission (WQCC). MCLs were established to reduce the risk of adverse health effects to users of public water supply systems. Protection of the ground water as a source of drinking water and as a natural resource is protected under 20 NMAC 6.2.3101. Table 2 lists the specific contaminants present in the ground water and the corresponding Federal MCL and State WQCC standard.

Other site risks are directly related to the former sump and the two waste impoundments. During closure of these units, the liquid wastes were removed and a protective cap placed across the former waste management area. The cap reduced the potential for direct exposure to the residual hazardous waste present in the units and in the surrounding soils. The cap also prevents stormwater runoff from transporting contaminants into the surrounding water bodies.

TABLE 2		
Contaminant	MCL (ppb)	WQCC (ppb)
Trichloroethylene	5	100
1,1,1-Trichloroethane	200	60
Methylene Chloride	NA*	100
1,1-Dichloroethylene	7	5
Tetrachloroethylene	5	NA*
Benzene	5	10
Toluene	1000	750
Chromium (total)	100	50

* Not Available

The following corrective action objectives have been established for this site as protective of human health and the environment: 1) prevent further migration of the contaminant plume; 2) restore the contaminated aquifer to the more stringent of Federal or State standards; and 3) reduce the quantity of source material in the soil and ground water, to the extent practicable, to minimize further release of contaminants to the surrounding ground water, and ensure no further contaminant migration to the ground water above the existing cleanup goals established for ground water.

SUMMARY OF ALTERNATIVES

The individual corrective measure alternatives in the final CMS Report have been combined and renumbered to present comprehensive alternatives for addressing the release of contaminants into the ground water and soil. The descriptions and evaluations of the corrective measure alternatives are presented in greater detail in the final CMS Report and Administrative Record. Information gathered during and after the RFI was used to develop several remedial alternatives in the final CMS Report. Sparton also conducted a screening process to eliminate those remedial

alternatives that may prove infeasible to implement, or that rely on technologies unlikely to perform satisfactorily or reliably.

The alternatives for remediation of the contaminated ground water and contaminant source areas are:

- Alternative 1: No Further Action
- Alternative 2: On-Site Ground Water Extraction and Soil Vapor Extraction
- Alternative 3: Expanded Ground Water Extraction
- Alternative 4: Expanded Ground Water Extraction and Soil Vapor Extraction
- Alternative 5: Expanded Ground Water Extraction, Soil Vapor Extraction, and Air Sparging
- Alternative 6: Expanded Ground Water Extraction and Soil Flushing
- Alternative 7: In Situ Bioremediation

Common Elements

Except for the "No Further Action" alternative, all of the alternatives that were considered for the site included a number of common elements. Each of the alternatives include long-term operation and maintenance (O&M) activities for ground water extraction and treatment, with the more conservative time frame for the O&M being 30 years. With all of the alternatives, further investigation of the horizontal and vertical extent of the ground water contamination will be required. An additional 20 or more ground water monitoring wells may be necessary to define the extent of the contaminant plume. The 20 or more wells would be in addition to the existing ground water monitoring well network. The number of additional wells may increase or decrease as the site characterization progresses. Additional monitoring wells may be needed after defining the plume as the contaminant plume continues to migrate, in response to future performance of the selected remedy, or any other changes in site conditions. Due to uncertainties in predicting the number of monitoring wells necessary for the future, no additional costs have been included beyond the initial 20 well estimate. However, Sparton has only recommended five additional wells for further characterization of the contaminant plume, and no additional wells or well costs to monitor the continued plume migration.

Each of the alternatives include a routine quarterly ground water monitoring schedule within and surrounding the contaminant plume to evaluate changes in the extent of the contaminant plume, changes in contaminant concentrations within the plume, and ensure the effectiveness of the remedy. An estimated 20 to 40 monitor wells may be required for the quarterly monitoring schedule. This estimate includes some of the existing monitoring wells installed in the on-site and off-site areas. The total number of wells for the quarterly monitoring schedule may

increase or decrease from this estimate based on the results of the site characterization, continued migration of the contaminant plume, future performance of the selected remedy, and any other changes in site conditions.

The following estimates for monitoring well construction and ground water sampling and analyses are included in Alternatives 2-7.

- Construction of 20 Monitoring Wells: $400,000
- Sampling and Analyses for 40 Monitoring Wells: $160,000/Year

The cost estimates presented for each of the following alternatives include capital costs, operation and maintenance costs, and present worth costs. The costs of several of the alternatives differ from those costs described in the EPA Statement of Basis because Sparton has revised the estimates in the final CMS Report. However, the costs are estimates and may not accurately reflect the final costs for each of the alternatives.

All costs and time required to operate the individual alternatives are estimates. For alternatives 3-7, the ability to achieve cleanup goals throughout the contaminated aquifer cannot be determined until the technologies are implemented, modified as necessary, and the plume response monitored over time. Due to the uncertainty in predicting the time necessary for restoration of the ground water to its beneficial use, all costs were based on a thirty year operational period for comparison purposes. For Alternative 2, it is assumed that the contaminant plume will remain in the ground water beyond the 30-year period. However, costs are only presented for a 30-year period for ease of comparison.

All of the alternatives can create potential impacts to the local community involving construction activities in the public right-of-ways for the off-site monitoring wells, quarterly sampling activities for the monitoring wells, and routine operation and maintenance activities for the monitoring wells.

Description of Alternatives

Alternative 1: No Further Action

Description

The "No Further Action" alternative is often evaluated to establish a baseline for the comparison with other alternatives. Under this alternative, no further remedial actions are performed by Sparton to address the existing ground water and soil contamination. In addition, Sparton's operation of the existing

ground water recovery and treatment system at the Coors Road facility would be discontinued.

Total Cost

Present Worth Cost: $0
Capital Cost: $0
Operation & Maintenance: $0

Time of Implementation

Design/Remedial Action: 0 months
Operation & Maintenance: 0 months

Alternative 2: On-Site Ground Water Extraction System and Soil Vapor Extraction

Description

Sparton has recommended Alternative 2 to address the release of contamination from the Coors Road facility. Alternative 2, as presented in EPA's Statement of Basis, was Sparton's previous recommendation in the draft CMS Report and consisted of the following: 1) continued operation of the existing ground water extraction and treatment system to remove contaminants from the ground water at the Coors Road facility; and 2) natural attenuation of the off-site contaminant plume. As part of the natural attenuation process, Sparton also proposed an annual evaluation of any changes in land use/development to determine the need for further studies as part of the routine ground water monitoring program.

Sparton has now amended Alternative 2 to include the following: 1) convert the existing monitoring well MW-32 into an extraction well; this well is located near the western fence-line of the Facility and would pump ground water from a depth of 35 feet below the water table; 2) sampling of the contaminant vapor concentrations in the soil beneath the facility and installation of a soil vapor extraction system if vapor concentrations are above a threshold value; and 3) installation of five additional ground water monitoring wells to confirm plume location and movement.

The existing ground water extraction system was previously described in the section on Interim Measures. The existing air stripper has sufficient remaining capacity to accommodate additional flow from another recovery well added to the system. Operation of the air stripper unit has confirmed the effectiveness and reliability of this technology for treating ground water contaminated with volatile organic compounds. However, the increased flow from the additional extraction well would also require disposal following treatment. Sparton did not

indicate in the final CMS Report if their proposal included continued disposal in the sanitary sewer system. It is not known at this time if the City of Albuquerque would permit continued disposal in the sewer system from the existing, or an expanded, on-site extraction system.

Since the existing on-site extraction system, or an expanded version of the on-site system, is not capable of containing or removing contaminants from the ground water outside of the facility, naturally occurring physical and biological processes would be relied upon to reduce the contaminant concentrations (natural attenuation). Since there have been no identified biological processes to transform the remaining contaminants, physical processes such as dilution and adsorption would be relied upon. As a result, the contaminant plume will continue to migrate for an indefinite period of time at concentrations exceeding the cleanup goals specified for this site.

In addition to the on-site recovery system, a soil vapor extraction (SVE) system would be installed to enhance the removal of volatile organic contaminants from source areas in the soil and ground water. Further removal of organic contaminants will assist in the attainment of the ground water cleanup goals. The SVE system does not remove inorganic compounds in the soil. SVE wells are installed in the soil above the water table to create a partial vacuum in the soil. This vacuum produces a flow of air which vaporizes the volatile organic compounds from the surrounding soil. The air and vapor mixture is then drawn into the SVE wells and collected at the surface for treatment before venting to the atmosphere. In situ air stripping processes are generally effective in removing volatile organic compounds (e.g. trichloroethylene and trichloroethane) from the soil. Since the SVE system does not result in the physical destruction or transformation of the contaminants, the organic vapors would have to be removed from the air by a granular activated carbon unit to prevent the transfer of contaminants to the atmosphere. The granular activated carbon would then be disposed of off-site or regenerated for future use.

Further sampling of the subsurface soil and contaminant vapor concentrations is necessary prior to installation of a SVE system. This data can then be used to evaluate the design and performance of a soil vapor extraction system. Preliminary remediation goals for contaminant vapors beneath the facility have been set by NMED at 10 ppmV. Further evaluation of this cleanup goal will be performed to determine if a lower cleanup goal is necessary to achieve maximum reductions in ground water contamination.

Since the highest volatile organic concentrations are expected to be associated with the source material in the on-site soil and ground water, the SVE wells would be installed on-site to remove

the maximum amount of contaminants. Performance of the SVE system can be enhanced with the addition of blowers which would force air into the soil in surrounding wells. Further enhancements to the SVE system can be achieved by lowering the water level in the upper few feet of the aquifer at the facility to allow greater volatilization of the organic contaminants in the upper flow zone. An added benefit of the SVE system is the potential for decreasing the time frame for meeting cleanup goals in the ground water by enhancing the volatilization of volatile organic compounds from the water table, thereby further reducing concentrations in the ground water.

Sparton has estimated that a 10 to 20 well SVE system will be necessary to effectively remediate the Coors Road facility. Sparton has also estimated operation of the SVE system would last approximately one to three years. Accordingly, the total O&M cost for cleanup of the site decreases after the third year in operation to reflect the discontinued operation of the SVE system. The ground water extraction system would continue to operate at the Facility and is reflected in the O&M costs for years 4-30. Also, since the five additional monitoring wells proposed by Sparton would be insufficient to monitor the contaminant plume, the capital and O&M costs for an expanded ground water monitoring system are included in the total cost estimate.

Total Cost

Present Worth Cost: $3.48 million
Total Capital Cost: $560,000
Total Operation & Maintenance: $213,000/Years 1-3;
$185,000/Years 4-30

Individual Component Cost

On-Site Ground Water Extraction System

Capital Cost: $10,000
Operation & Maintenance: $25,000/Year

Soil Vapor Extraction System - 20 Wells

Capital Cost: $150,000
Operation & Maintenance: $28,000/Years 1-3

Ground Water Monitoring

Capital Cost: $400,000
Operation & Maintenance: $160,000/Year

Time of Implementation

Design/Remedial Action: 1 year
Operation & Maintenance: 30 years

Alternative 3: Expanded Ground Water Extraction System

Description

Alternative 3 calls for the installation of ground water extraction wells to prevent further migration of the contaminant plume and restore the contaminated aquifer to its beneficial use. This alternative would require the installation of extraction wells at the Facility, and in off-site areas, preferably in existing public right-of-ways. The ground water monitoring wells installed in off-site areas are also installed in existing public right-of-ways.

This alternative can be implemented in several phases. For the contaminant plume extending off-site from the Sparton facility, an initial phase would include further characterization of the ground water contamination to determine the complete horizontal and vertical extent of the contaminant plume. As discussed in the Common Elements Section, the current estimate is that an additional 20 monitoring wells may be needed to monitor the contaminant plume.

After redefining the leading edge of the contaminant plume, ground water extraction wells would be installed near this leading edge to prevent further migration of the plume. Current estimates indicate that one to three extraction wells may be required to accomplish this goal. The appropriate number and location of the extraction wells would be determined during the design phase of the remedy. The construction and operation of two new extraction wells off-site from the Facility have been used for cost purposes. After construction of this phase of the system is completed, the extraction system and surrounding ground water monitoring wells would be carefully monitored on a regular basis to evaluate the performance of the system in meeting the containment goal. Further refinement of the extraction system may be necessary during the monitoring phase to prevent further migration of the contaminant plume. Quarterly sampling and analyses of selected monitoring wells would also continue for evaluation of the contaminant plume.

Along with the efforts to define and control migration of the leading edge of the plume, additional extraction well(s) would be installed on-site at the Coors Road facility to begin further containment and restoration of the contaminated ground water. At least one additional well would be required to achieve this goal. The appropriate number and location of the extraction wells for the on-site area would also be determined during the design phase

of the remedy. The construction and operation of one new extraction well at the Facility has been used for cost purposes. After construction of this phase of the system is completed, the extraction system and surrounding ground water monitoring wells would be carefully monitored on a regular basis to evaluate the performance of the system in meeting the containment and restoration goals. Further refinement of the extraction system may be necessary during the monitoring phase to prevent further migration of the contaminant plume. Quarterly sampling and analyses of selected monitoring wells would also continue for evaluation of the contaminant plume.

In a final phase, additional extraction wells are installed as necessary in off-site areas to restore the aquifer for use as a source of drinking water, in addition to controlling further plume migration. Due to the uncertainty in the number of extraction wells needed for the final phase, no costs have been included in the cost estimate for these wells. However, costs would be similar to costs of the extraction wells set forth above. Restoration is defined as attainment of the media standards (the more stringent of Federal MCLs or State WQCC standards) in the aquifer, over the entire contaminant plume. As additional physical data on the aquifer is collected and performance of the initial phases of the extraction system are monitored, the number of recovery wells for restoration of the contaminated aquifer would be better determined.

The extracted ground water from the off-site recovery wells would have to be transported back to the Facility via underground pipes for treatment. Since the contaminants present in the ground water include both organic and inorganic compounds, the treatment system may require two separate treatment units. For organic compounds, the treatment unit may consist of a larger air stripper to remove volatile organic compounds, and a granular activated carbon unit to reduce air emissions from the air stripper. For the inorganic compounds, the treatment unit may consist of an ion exchange unit for removal of metals from the water. Other treatment options for organic compounds include chemical and/or UV oxidation, and aerobic biological reactors. For the inorganic compounds, other available technologies include chemical precipitation and electrochemical methods. The final sequence of technologies used for the ground water treatment train would be determined during the remedial design. An air stripper and an activated carbon unit (organic compounds) and ion exchange (metals) have been used as treatment options for cost purposes. However, since there exists the possibility that metal concentrations in the recovered ground water may be below levels requiring treatment, the total costs were also presented without the costs for ion exchange. Any treatment train will need to be designed to: 1) attain the chemical-specific discharge requirements; and 2) be easily modified to treat increased flow from an expanded extraction system.

The expanded volume of recovered and treated ground water could no longer be discharged into the sewer system. Options for disposal of the treated ground water may include reinjection back into the aquifer, reuse of the treated ground water as irrigation water, or disposal into the Rio Grande. Reinjection into the aquifer has been used for cost purposes. Any disposal option will have to be consistent with both the State regulations governing ground water usage, and the water management plan presented in the Albuquerque Water Resources Management Strategy - San Juan-Chama Diversion Project Options (July 1995), and the Albuquerque/ Bernalillo County Ground Water Protection Policy and Action Plan (1994).

The ability to achieve the ground water cleanup goals throughout the entire ground water contaminant plume with Alternative 3 cannot be realized within a few years. It is likely that many years of ground water pumping and treatment will be required in order to determine if ground water cleanup goals can be achieved. The presence of high contaminant concentrations and the possible presence of DNAPL in the ground water, as well as the process of chemical and physical desorption of contaminants in both the ground water and soil which lies below the Facility, may delay achieving the cleanup goals throughout the aquifer. A possibility exists that the ground water contaminants may show a rapid initial drop in concentration and then level out to relatively constant, or slowly declining, concentrations. This relatively constant concentration would exist regardless of the length of time ground water extraction was implemented. The equilibrium or steady-state concentration of these organic and inorganic contaminants in the ground water may be greater than the corresponding cleanup goals.

Performance of a ground water extraction system would be carefully monitored on a regular basis and adjusted as warranted by the collected data. Refinement of the system may be required, if EPA determines that such measures will be necessary in order to restore the aquifer in a reasonable time frame, or to significantly reduce the time frame or long-term cost of attaining this objective. Post-construction refinements to the alternative may include any or all of the following:

- adjusting the pumping rate in some or all of the ground water extraction wells;

- installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume;

- initiating a pulsed pumping schedule in some or all of the ground water extraction wells to eliminate flow stagnation areas, or otherwise facilitate recovery of contaminants from the aquifer;

- discontinuing pumping at individual extraction wells where cleanup goals have been attained; monitoring of the aquifer would be continued to ensure that media cleanup goals are maintained;

- refining the treatment and disposal components of the alternative.

Potential impacts to the local community from implementation of this alternative would involve construction activities in the public right-of-ways for the off-site monitoring wells, recovery wells, and associated piping; quarterly sampling activities; and routine operation and maintenance activities for the monitoring and recovery wells and associated piping. The potential exists for accidents involving breakage or failure of a component in the recovery well system could result in the release of contaminated ground water at the surface.

The following cost estimates are presented for Alternative 3. Since the extracted ground water may or may not require further treatment to remove metals prior to disposal, the present worth cost along with the total capital cost and total O&M cost is presented with both ion exchange and without ion exchange.

Total Cost

Water Treatment Without Ion Exchange for Metals Removal

Present Worth Cost: $14.820 million
Total Capital Cost: $2,125,000
Total Operation & Maintenance: $825,900/Year

Water Treatment Includes Ion Exchange for Metals Removal

Present Worth Cost: $26.167 million
Total Capital Cost: $2,712,500
Total Operation & Maintenance: $1,525,900/Year

Individual Component Cost

Expanded Ground Water Extraction System - 3 Wells

Capital Cost: $306,250
Operation & Maintenance: $54,410/Year

Existing Ground Water Extraction System

Operation & Maintenance: $25,000/Year

Treatment System-Air Stripper and Air Emissions Control

Capital Cost: $181,250
Operation & Maintenance: $76,490/Year

Treatment System-Ion Exchange for Metals

Capital Cost: $587,500
Operation & Maintenance: $700,000/Year

Ground Water Disposal - Injection Wells

Capital Cost: $1,237,500
Operation & Maintenance: $510,000/Year

Ground Water Monitoring

Capital Cost: $400,000
Operation & Maintenance: $160,000/Year

Time of Implementation

Design/Remedial Action: 1-2 Years
Operation & Maintenance: 30 Years

Alternative 4: Expanded Ground Water Extraction and Soil Vapor Extraction

Description

Alternative 4 includes all of the activities outlined in Alternative 3 plus the soil vapor extraction activities outlined in Alternative 2. Alternative 4 combines the implementation of a ground water containment and restoration system designed to address the entire contaminant plume along with an additional technology to enhance further reduction of the remaining source material beneath the Facility.

The following cost estimates are presented for Alternative 4. Since the extracted ground water may or may not require further treatment to remove metals prior to disposal, the present worth cost along with the total capital cost and total O&M cost is presented with both ion exchange and without ion exchange.

Total Cost

Water Treatment Without Ion Exchange for Metals Removal

Present Worth Cost: $15.046 million
Total Capital Cost: $2,275,000
Total Operation & Maintenance: $853,900/Years 1-3;
$825,900/Years 4-30

Water Treatment Includes Ion Exchange for Metals Removal

Present Worth Cost: $26.393 million
Total Capital Cost: $2,862,500
Total Operation & Maintenance: $1,553,900/Years 1-3;
$1,525,900/Years 4-30

Individual Component Cost

Soil Vapor Extraction System - 20 Wells

Capital Cost: $150,000
Operation & Maintenance: $28,000/Years 1-3

Cost Estimate for Alternative 3

Water Treatment Without Ion Exchange for Metals Removal

Total Capital Cost: $2,125,000
Total Operation & Maintenance: $825,900/Year

Water Treatment Includes Ion Exchange for Metals Removal

Total Capital Cost: $2,712,500
Total Operation & Maintenance: $1,525,900/Year

Time of Implementation

Design/Remedial Action: 1-2 Years
Operation & Maintenance: 1-3 Years - Soil Vapor Extraction;
30 Years - Ground Water Recovery

Alternative 5: Expanded Ground Water Recovery System, Air Sparging and Soil Vapor Extraction

Description

Alternative 5 includes all of the activities outlined in Alternative 4. In addition, air sparging wells would be installed in the aquifer to remove additional source material. Air sparging utilizes wells installed in the aquifer to inject clean air directly into the ground water. Dissolved volatile organic compounds are stripped from the ground water by the rising air bubbles around the air injection wells. As the volatile organic compounds rise upward to the overlying soil, the SVE system collects the contaminants for treatment. In addition, the SVE system removes existing soil vapor from the surrounding soil. In situ air stripping/air sparging processes are generally effective in removing volatile organic compounds (e.g. trichloroethylene & trichloroethane) from the soil and ground water.

An added benefit of the combined air sparging/SVE system is the potential for decreasing the time frame for meeting cleanup goals in the ground water by enhancing the volatilization of volatile organic compounds from the water table, thereby further reducing concentrations in the ground water. Site limitations at the Facility may involve the presence of low permeability silt/clay layers which may produce lateral spreading of the volatile organic compounds in the ground water outside of the treatment zone. Performance tests would need to be conducted to determine the radius of influence created by the air injection wells in the aquifer.

Since the air sparging/air stripping technologies do not result in the physical destruction or transformation of the contaminants, the organic vapors would have to be removed from the air by a granular activated carbon unit to prevent the transfer of contaminants to the atmosphere. The granular activated carbon would then be disposed of off-site or regenerated for future use. The air stripping technologies are not useful in removing inorganic compounds in the soil or ground water.

The following cost estimates are presented for Alternative 5. Since the extracted ground water may or may not require further treatment to remove metals prior to disposal, the present worth cost along with the total capital cost and total O&M cost is presented with both ion exchange and without ion exchange.

Total Cost

Water Treatment Without Ion Exchange for Metals Removal

Present Worth Cost: $15.747 million
Total Capital Cost: $2,652,500
Total Operation & Maintenance: $972,650/Years 1-3;
$825,900/Years 4-30

Water Treatment Includes Ion Exchange for Metals Removal

Present Worth Cost: $27.094 million
Total Capital Cost: $3,240,000
Total Operation & Maintenance: $1,672,650/Years 1-3;
$1,525,900/Years 4-30

Individual Component Cost

Air Sparging

Capital Cost: $377,500
Operation & Maintenance: $118,750/Years 1-3

Cost Estimate for Alternative 4

Water Treatment Without Ion Exchange for Metals Removal

Total Capital Cost: $2,275,000
Total Operation & Maintenance: $853,900/Years 1-3
$825,900/Years 4-30

Water Treatment Includes Ion Exchange for Metals Removal

Total Capital Cost: $2,862,500
Total Operation & Maintenance: $1,553,900/Years 1-3
$1,525,900/Years 4-30

Time of Implementation

Design/Remedial Action: 1-2 Years
Operation & Maintenance: 1-3 Years - Air Sparging/SVE;
30 Years - Ground Water Recovery

Alternative 6: Expanded Ground Water Extraction and Soil Flushing

Description

Alternative 6 includes all of the activities outlined in Alternative 3. Instead of implementing a soil vapor extraction system as described in Alternatives 2 and 4, a soil flushing system is used to remove source material (both organic and inorganic contaminants) from the soil overlying the ground water. The process uses a flushing agent such as a solvent or surfactant solution to promote or enhance the mobility of the contaminants in the soil. The flushing process transports the contaminants downward to the ground water for recovery in extraction wells, and the contaminants are then pumped to the surface for treatment. The flushing agent can be applied to the soil by use of sprinkler system. Site limitations involve the presence of low permeability silt/clay layers in the soil above and within the water table which may produce lateral spreading of the flushing agent outside of the treatment zone. Performance tests would need to be conducted to determine the effectiveness of the technology under site conditions.

The following cost estimates are presented for Alternative 6. Since the extracted ground water may or may not require further treatment to remove metals prior to disposal, the present worth cost along with the total capital cost and total O&M cost is presented with both ion exchange and without ion exchange.

Total Cost

Water Treatment Without Ion Exchange for Metals Removal

Present Worth Cost: $16.005 million
Total Capital Cost: $2,875,000
Total Operation & Maintenance: $985,000/Years 1-3;
$825,900/Years 4-30

Water Treatment Includes Ion Exchange for Metals Removal

Present Worth Cost: $27.350 million
Total Capital Cost: $3,462,500
Total Operation & Maintenance: $1,685,000/Years 1-3;
$1,525,900/Years 4-30

Individual Cost Components

Soil Flushing

Capital Cost: $750,000
Operation & Maintenance: $160,000

Cost Estimate for Alternative 3

Water Treatment Without Ion Exchange for Metals Removal

Total Capital Cost: $2,125,000
Total Operation & Maintenance: $825,900/Year

Water Treatment Includes Ion Exchange for Metals Removal

Total Capital Cost: $2,712,500
Total Operation & Maintenance: $1,525,900/Year

Time of Implementation

Design/Remedial Action: 1-2 Years
Operation & Maintenance: 1-3 Years - Soil Flushing
30 Years - Ground Water Recovery

Alternative 7: In Situ Bioremediation

Description

In situ bioremediation is a process in which microorganisms completely or partially decompose organic contaminants, such as trichloroethylene, in the ground water and soil. The decomposition process can occur under either anaerobic (absence of dissolved oxygen) or aerobic (presence of dissolved oxygen) conditions. Limitations include the potential inability to produce a non-toxic degradation product due to incomplete

biodegradation and sensitivity to toxins, and changing environmental conditions resulting in limited bioremediation. The intermediate products produced by biodegradation may be more toxic than the original contaminant.

Within the contaminant plume originating from the Coors Road facility, there has been no data presented which would indicate which of the conditions exist in the plume. However, since there have been no identified by-products from anaerobic degradation, it is possible that aerobic conditions are present.

In order to enhance the bioremediation process under aerobic conditions, additional oxygen and nutrients would have to be injected into the ground water and soil. Sparton has estimated that 50 injection wells centered on a 100 ft. spacing would be required to implement an enhanced bioremediation system for the ground water and another 50 injection wells for the soil. Such a spacing would present difficulties since many of the well locations would be in non-public right-of-ways requiring access agreements in the local neighborhoods. The efficiency of the bioremediation process is limited by the ability to deliver a uniform application of nutrients and oxygen into the soil and ground water. Performance tests would need to be conducted to determine the effectiveness of the technology under site conditions.

The high contaminant concentrations beneath the Coors Road facility would probably restrict the initial application of bioremediation to less contaminated off-site areas. The on-site concentrations would have to be further reduced by continued operation of the existing or an expanded version of the on-site ground water extraction system prior to application. Therefore, all of the activities outlined in Alternative 2 would also be implemented as part of Alternative 7.

Sparton has revised the costs estimates for the bioremediation system. Capital costs have been reduced from $2,500,000 to $1,437,500 and operation and maintenance costs have been reduced from $650,000 to $393,750. Sparton did not present an explanation for the significant change in the cost estimates. Because there is no performance data to suggest the time in which bioremediation could achieve the cleanup goals, all costs were estimated for a 30-year period.

Total Cost

Present Worth Cost: $10.970 million
Total Capital Cost: $1,997,500
Total Operation & Maintenance: $606,750/Years 1-3;
$578,750/Years 4-30

Individual Component Costs

In Situ Bioremediation-Ground Water

Capital Cost: $875,000
Operation & Maintenance: $212,500/Year

In Situ Bioremediation-Soil

Capital Cost: $562,500
Operation & Maintenance: $181,250/Year

Cost Estimate for Alternative 2

Capital Cost: $560,000
Operation & Maintenance: $213,000/Years 1-3; $185,000/Years 4-30

Time of Implementation

Design/Remedial Action: 1 year
Operation & Maintenance: 30 Years

EVALUATION OF ALTERNATIVES

Prior to EPA's decision on a final remedy selection, the performance of all of the alternatives is evaluated against the nine criteria outlined in the Guidance on RCRA Corrective Action Decision Documents, Office of Solid Waste and Emergency Response (OSWER) Directive 9902.6 (Please see Figure 12 which discusses the criteria in more detail). In addition, there are two modifying criterion, State and Community Acceptance, which EPA considers in making its final remedy selection. The following discussion profiles how the performance of each of the alternatives compared against the four general standards, the five remedy decision factors, and the two modifying criterion.

1. **Overall Protection of Human Health and the Environment**

The first decision factor is a general mandate from the RCRA statute. Since the aquifer is potentially useable as a source of drinking water, and is currently used outside of the contaminant plume for this purpose, the final remedy selected for this site will have the goal of protecting the ground water by reducing or controlling the contamination in the soil and ground water. Alternative 1, "No Further Action", will not be considered further as a remedial alternative because it will not provide any protection to human health or the environment. Each of the remaining alternatives provide some degree of protection to human health and the environment by reducing the levels of contamination in the ground water and/or soil.

FIGURE 12

FOUR GENERAL STANDARDS FOR REMEDY SELECTION

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	ATTAIN MEDIA CLEANUP STANDARDS	CONTROL THE SOURCES OF RELEASES	COMPLY WITH STANDARDS FOR MANAGEMENT OF WASTES
• How alternatives provide human health and environmental protection	• Ability of alternatives to achieve the media cleanup standards. Media cleanup standards are the Federal and State statutory and regulatory requirements that a selected remedy must meet.	• How alternatives reduce or eliminate to the maximum extent possible further releases	• How alternatives assure that management of wastes during corrective measures is conducted in a protective manner

FIVE SELECTION CRITERIA FOR REMEDY SELECTION

LONG-TERM RELIABILITY AND EFFECTIVENESS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF WASTES	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
• Magnitude of residual risk • Adequacy and reliability of controls	• Treatment process used and materials treated • Amount of hazardous materials destroyed or treated • Degree of expected reductions in toxicity, mobility, or volume • Degree to which treatment is irreversible • Type and quantity of residuals remaining after treatment	• Protection of community during remedial actions • Protection of workers during remedial actions • Environmental impacts • Time until remedial action objectives are achieved	• Ability to construct and operate the technology • Reliability of the technology • Ease of undertaking additional corrective measures, if necessary • Ability to monitor effectiveness of remedy • Coordination with other agencies • Availability of off-site treatment, storage, and disposal services and specialists • Availability of prospective technologies	• Capital costs • Operating and maintenance costs • Present worth cost

MODIFYING CRITERIA

STATE ACCEPTANCE	COMMUNITY ACCEPTANCE
• The State has an opportunity to review the CMS Report and the Statement of Basis and offer comments to EPA. The State may agree with, oppose, or have no comment on the EPA preferred alternative	• During the public comment period, interested persons or organizations may comment on the alternatives. EPA considers these comments in making its final remedy selection. The comments are addressed in the Final Decision and Response to Comments document.

2. Attainment of Media Cleanup Standards

The final remedy will have the goal of meeting the applicable media cleanup standards. Since the aquifer is potentially useable as a source of drinking water, and is currently used outside of the contaminant plume for this purpose, standards for exposure to the contaminants in the ground water are based upon the more stringent of either: 1) the Maximum Contaminant Levels (MCLs) for drinking water established under the Safe Drinking Water Act; or 2) the maximum allowable contaminant concentrations in ground water set by the State of New Mexico Water Quality Control Commission (WQCC). Protection of the ground water as a source of drinking water and as a natural resource is protected under 20 NMAC 6.2.3101. Table 2 lists some of the contaminants present in the ground water and the corresponding Federal MCL and State WQCC standard.

Alternatives 4-6 would best achieve the media cleanup standards by reducing the quantity of source material available for migration to the surrounding ground water, and removal of contaminants throughout the ground water to restore the ground water to its beneficial use. Alternative 3 has the potential to meet the media cleanup standards for ground water through long-term operation. However, source material would remain in the soil and ground water, providing a long-term source of additional contamination to the surrounding ground water, and potentially limiting the effectiveness of this technology. Alternatives 2 and 7 would be limited or unable to meet the media cleanup standards by continuing to recover contaminants only from beneath the Sparton facility, while the off-site plume would remain at concentrations exceeding the cleanup standards for an indefinite period of time.

3. Controlling the Sources of Releases

Each of the remedial alternatives considered for the final remedy must address the potential for any remaining source material at the Facility. The control of source material to the extent practicable is necessary in eliminating further releases, and for the long-term strategy of addressing the ground water contamination. Unless source control measures are taken, efforts to clean up the ground water may be ineffective or, at best, will involve an essentially perpetual cleanup situation.

Alternatives 2 and 4-7 would provide the most effective source control by including additional technologies along with ground water extraction for removal and treatment of the source material in the on-site soil and ground water. Alternative 3 would rely solely on ground water extraction for source control.

4. Compliance with Waste Management Standards

Each of the remedial alternatives considered for the final remedy must comply with the requirements for management of wastes during construction of the remedy and routine operation and maintenance activities. Standards potentially impacting the various alternatives include regulatory limits on the discharge of contaminants into the atmosphere and treated ground water, disposal of residues from the treatment of ground water, and the consumption of ground water.

Alternatives 2 through 7 would comply with all applicable waste management standards. Recovered ground water would be treated through an air stripper to remove the volatile organic contaminants. Air emissions from the air stripper and soil vapor extraction system would be treated through a granular activated carbon unit to remove volatile organic contaminants prior to discharge to the atmosphere. Additional treatment of the recovered ground water may be necessary to remove metals prior to discharge. The granular activated carbon and any residues generated from the treatment process would be disposed or treated off-site at a permitted facility. The treatment train would be designed to attain the chemical-specific discharge requirements for the treated ground water and air emissions.

5. Long-Term Reliability and Effectiveness

Each of the remedial alternatives were evaluated on the ability to provide adequate protection of human health and the environment over the long-term. Adequate protection includes source control technologies to ensure that environmental damage from the sources of contamination at the facility will not occur in the future. The magnitude of the residual risk and the adequacy and reliability of preventive controls were also evaluated.

Alternatives 4-6 provide the best long-term approach for protection of human health and the environment. Alternatives 4-6 include an active remedial approach for the entire contaminant plume, as well as the source material remaining in the soil beneath the facility. The combination of technologies would ensure that the maximum amount of contaminants would be recovered. While Alternative 2 includes the removal of contaminants from beneath the Facility, this remedial approach would rely on institutional controls to prevent long-term exposure to the migrating contaminant plume. The active treatment of wastes in Alternatives 4-6 is preferred to the institutional controls in Alternative 2. Alternative 3 would provide a reduction in long-term risk by reducing concentrations throughout the contaminant plume by preventing further migration and recovering contaminants from the off-site contaminant plume. However, contaminants would remain in the soil and provide a

long-term source of additional contamination to the ground water. Due to the uncertainty in whether the in situ bioremediation process would achieve any reduction in contaminant concentrations at this site, Alternative 7 does not provide adequate long-term protection.

6. **Reduction of Toxicity, Mobility, or Volume of Wastes**

Remedial alternatives are favored during the selection process that are capable of permanently reducing the overall degree of risk posed by the contamination in the ground water and soil. This criteria is directly supportive of the goal for achieving long-term reliability. Each of the alternatives were carefully evaluated for the amount of expected reductions in the toxicity, mobility, or volume of wastes, and the type and quantity of the remaining residual waste following implementation of the remedy.

Alternative 7 would involve biological processes that have the potential to permanently reduce or destroy the organic contaminants, and if successful, would achieve the maximum reduction in toxicity, mobility, and volume through treatment. However, the expected success of Alternative 7 is relatively low. Alternatives 4-6 provide the greatest practical reduction in overall toxicity, mobility, and volume of contaminants by permanently removing contaminants from all areas of the ground water contaminant plume, as well as the source material remaining in the soil beneath the facility. The combination of technologies would ensure that the maximum amount of contaminants would be recovered. Alternative 3 would also provide a reduction in volume throughout the contaminant plume, but would not recover contaminants from the remaining source area beneath the Sparton facility. While Alternative 2 includes the removal of contaminants from beneath the Facility, this remedial approach would achieve the least reduction in ground water contamination by addressing only the on-site contaminated ground water.

Since existing technologies cannot ensure a 100% removal efficiency rate, there may be some concentration of contaminants remaining above the media cleanup standards for Alternatives 2 through 7. In addition, the proposed treatment processes in Alternatives 2 through 6 do not result in the permanent destruction of the contaminants, but instead rely on the transfer of contaminants to a permanent off-site disposal site.

7. **Short-Term Effectiveness**

This decision factor directly affects the local community since Alternatives 2-7 require some amount of construction activities in areas being developed for residential and commercial purposes. Protection of the local residents in the community, as well as workers involved in construction of a remedy, must be accounted for when evaluating each of the remedial alternatives. Potential

threats to the community involve exposure to contaminants during construction activities, management of contaminated media, and routine operation and maintenance activities. A potential threat does exist to the community from inadvertent destruction or vandalism of the off-site pipeline and wellheads, resulting in a release of contaminated ground water at the surface. While this possibility will be accounted for in the design and engineering of the off-site structures, the potential threat will remain during the operational period of the preferred remedy.

8. **Implementability**

This decision factor involves the future activities which must be coordinated between the City, County, State, and Federal governments for issuance of any permits at the site. Permits which may be required for the listed alternatives include construction activities in public right-of-ways, recovery and treatment of contaminated ground water, disposal of treated ground water, and management and disposal of hazardous contaminants. The issuance of these permits may affect the time required for implementation of the selected remedy.

Alternatives 2 through 4 utilize existing technology with no exceptional technical obstacles to prevent implementation, operation, performance monitoring and future modifications to the system design. For Alternatives 3 through 7, obstacles exist in the form of permits and/or administrative approvals required for installation of off-site structures in public easements, the discharge of recovered vapors to the atmosphere, the pumping of additional ground water from the aquifer, and the possibility for reinjection of ground water back into the aquifer. An additional obstacle is the requirement for an off-site facility for the regeneration or disposal of the granular activated carbon. Alternatives 5 through 7 would also require the performance of additional testing with varying degrees of uncertainty regarding actual implementation. The success of Alternative 7 is uncertain due to the limited success in aerobic degradation of the organic contaminants.

9. **Cost**

Cost is considered when choosing among the seven alternatives that best meet the objectives at the site. Based on the previous evaluation, Alternatives 4-6 offer a relatively equivalent protection of human health and the environment. Of these, Alternative 4 provides the lowest present worth cost for addressing contamination at the site at $15.046-26.393 million. Alternatives 5 and 6 have a present worth cost of $15.747-27.094 million and $16.005-27.350 million, respectively. Due to the uncertainty in predicting the time necessary for restoration of the ground water to its beneficial use, all costs were based on a thirty year operational period for comparison purposes.

10. State Acceptance

State acceptance is a modifying criterion with respect to the evaluation process. The State concerns that were assessed under this criterion include the following: 1) the State's position and key concerns related to the contamination originating from the Sparton Technology site and the corrective measure alternatives; 2) the State's preferred alternative for addressing contamination at this site; and 3) the applicable State and local standards and any waiver of these standards. EPA has and will continue to coordinate actions at this site through the New Mexico Environment Department, the New Mexico Office of the Natural Resources Trustee, the City of Albuquerque Environmental Health Department and the Public Works Department, and the County of Bernallilo.

The New Mexico Environment Department (NMED) preferred remedy is Alternative No. 5, as set forth in a letter from Mr. Ed Kelley, Division Director of NMED, dated February 7, 1996. This letter is included in the Administrative Record for this site.

The New Mexico Office of the Natural Resources Trustee (ONRT) preferred remedy is Alternative No. 5, as set forth in a letter from Mr. Steve Cary, Deputy Director of ONRT, dated February 8, 1996. This letter is included in the Administrative Record for this site.

The City of Albuquerque Public Works Department preferred remedy is Alternative No. 5, as set forth in a letter from Mr. A. Norman Gaume, Manager of the Water Resources Program, dated February 8, 1996. This letter is included in the Administrative Record for this site.

The New Mexico Attorney General's Office preferred remedy is either of the more comprehensive remedies described in Alternatives 3-7, as set forth in a letter from Mr. Charles de Saillan, Assistant Attorney General, dated February 8, 1996.

The County of Bernalillo in a letter from Mr. Richard Brusuelas, Environmental Health Director, dated February 8, 1996, preferred an expedited cleanup to address the ground water contamination, and concurred with the written statement from Mr. Norman Gaume, Manager of the Water Resources Program for the City of Albuquerque.

11. Community Acceptance

Community acceptance is a modifying criterion with respect to the evaluation process. EPA recognizes that the local community is the principal beneficiary of all remedial actions undertaken to address contamination originating from the Sparton Technology facility. As such, comments from the community are an important

consideration in the final evaluation of remedial alternatives. EPA also recognizes that it is responsible for informing interested citizens of the nature of the environmental problems and available solutions, and to learn from the community what its preferences are regarding this site.

EPA solicited input from the public on the remedial alternatives proposed to address the contamination originating from the Sparton Technology facility. A public comment period was held from December 8, 1995, to February 8, 1996. A public hearing was held on February 1, 1996, at the Cibola High School in Albuquerque, NM. All comments received from the community favored an expedited plan for restoration of the contaminated ground water. Specific recommendations were made for Alternative Nos. 4 and 5 to address the contamination. One commenter expressed concern over the location of ground water extraction wells and soil vapor extraction wells in the neighborhoods above the ground water contaminant plume. The preference for location of these wells is in the existing public right-of-ways along major streets, and in undeveloped land outside of existing neighborhoods. EPA believes that community concerns regarding the safety of these structures can be addressed through strict controls during the construction activities and the long-term operation and maintenance activities.

SELECTED REMEDY

The goal of this remedial action is to restore the contaminated ground water to its beneficial use. At this site, the aquifer is potentially useable as a source of drinking water, and is currently used outside of the contaminant plume for this purpose. The chemical-specific ground water cleanup goals for this remedial action are specified in Table 2, and are based on the more stringent of Federal MCLs established under the Safe Drinking Water Act, or the ground water standards set by the State of New Mexico under the NMWQCC regulations. Based on information and data concerning the nature and extent of contamination, the analysis of all remedial alternatives, and the information received during the public comment period, EPA believes that Alternative 4 may be able to achieve this goal. Ground water contamination may be especially persistent in the immediate vicinity of the contaminant's source, where concentrations are relatively high. The length of time and ability to achieve cleanup goals at all points throughout the contaminant plume, cannot be determined until the extraction system has been implemented, modified as necessary, and plume response monitored over time.

EPA prefers Alternative 4 to Sparton's recommendation of Alternative 2, because Alternative 4 emphasizes the containment and removal of contaminants from all areas of the ground water, not just the area immediately below the Sparton facility.

Alternative 4 is also more likely to achieve media cleanup standards, whereas under Alternative 2, the off-site plume would remain at concentrations exceeding the cleanup standards for an indefinite period of time. Alternative 4 has an active remedial approach for the entire contaminant plume, whereas Alternative 2 relies on institutional controls to prevent long-term exposure to the migrating contaminant plume. Alternative 2 also achieves the least reduction in ground water contamination by addressing only the on-site contaminated ground water.

EPA also prefers Alternative 4 to the State's recommendation of Alternative 5. While Alternatives 4 and 5 are similar, the potential technical difficulties associated with the implementation and effectiveness of air sparging at this site reduces the preference of Alternative 5. However, EPA concurs that an aggressive approach is necessary to achieve the maximum reduction in source area contamination. Therefore, contingency measures are incorporated in this selected remedy to reevaluate the technologies, including air sparging, if further source area reduction can be achieved following the implementation and performance monitoring of the soil vapor extraction system and the ground water extraction system.

A. Ground Water

Alternative 4 combines the implementation of a ground water containment and restoration system designed to address the entire contaminant plume along with a soil vapor extraction system to enhance further reduction of the remaining source material beneath the facility. The selected remedy will be implemented in a phased approach to build upon data collected at the site so that an efficient and cost-effective system is designed to address the contamination. For the off-site ground water contaminant plume, the initial phase will be to install additional monitoring wells to define the extent of the ground water contaminant plume, in particular the leading edge of the contaminant plume. While the current estimate is for 20 wells, the final number of monitoring wells will be determined during the site characterization. In addition, data on the aquifer characteristics near the leading edge of the contaminant plume will be collected. This data will then be used to design and install a ground water extraction system to prevent further migration of the contaminant plume. While the current estimate is for 1-3 wells, the final location and number of extraction wells will be determined during the remedial design phase. After construction of this ground water extraction system is completed, performance of the system will be carefully monitored on a regular basis. Further refinement of the extraction system may be necessary during the monitoring phase to prevent further migration of the contaminant plume. Quarterly sampling and analyses of selected monitoring wells will be implemented to

evaluate the design and monitor the performance of the extraction system.

For the contaminant plume beneath the Coors Road facility, the initial phase will consist of adding at least one additional ground water extraction well to the existing extraction system. Since the existing ground water extraction system removes contaminants from a limited area beneath the facility, the objectives for the additional well(s) will be to maximize contaminant removal and prevent further migration from the Facility to off-site areas. Additional monitoring wells may be necessary to further define the extent of contamination beneath the Facility and properly locate the extraction well(s). Performance of the system will be carefully monitored on a regular basis. Further refinement of the extraction system may be necessary during the monitoring phase to prevent further migration of the contaminant plume. Quarterly sampling and analyses of selected monitoring wells will be implemented to evaluate the design and monitor the performance of the extraction system.

Following these initial actions, additional extraction wells will be installed as necessary to restore the aquifer for use as a source of drinking water, in addition to controlling further plume migration. Restoration is defined as attainment of the chemical-specific interim ground water cleanup goals in the aquifer, over the entire contaminant plume. Cleanup levels for each ground water contaminant are specified in Table 2. Implementation of this phase of the ground water restoration will be expedited in order to meet the anticipated future demand on the aquifer as a water supply.

Performance of the selected remedy will be carefully monitored on a regular basis, and adjusted as warranted by the collected data. Refinement of the remedy may be required if EPA determines that such measures will be necessary in order to restore the aquifer in a reasonable time frame, or to significantly reduce the time frame or long-term cost of attaining this objective. Post-construction refinements to the proposed remedy may include any or all of the following:

- adjusting the pumping rate in some or all of the ground water extraction wells;

- installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume;

- initiating a pulsed pumping schedule in some or all of the ground water extraction wells to eliminate flow stagnation areas, or otherwise facilitate recovery of contaminants from the aquifer;

- discontinuing pumping at individual extraction wells where cleanup goals have been attained; monitoring of the aquifer would be continued to ensure that media cleanup goals are maintained; and

- refining the treatment and disposal components of the preferred remedy.

- implementing additional source control measures to further reduce the remaining source material in the aquifer and soil beneath the facility, if determined by EPA to be practicable; such measures could include the implementation of additional measures (e.g. an air sparging system) in the aquifer where possible NAPL contaminants remain relatively unaffected by ground water extraction;

B. Source Control

During the design phase of this remedial action, further soil investigation will be conducted to more fully delineate the nature and extent of contaminants in the vadose zone. This study will determine the depth and concentration of contaminants in the soil which require removal and/or treatment so as to achieve the ground water objective of restoration. At this time, installation of a soil vapor extraction system is expected to enhance the removal of volatile organic contaminants from the soil and ground water to levels which would allow attainment of the chemical-specific ground water cleanup goals. Characterization of the organic contaminants in the soil above the water table will be necessary to evaluate the design and performance of the soil vapor extraction system. A preliminary cleanup target of 10 ppmV for chlorinated organic vapors in the vadose zone has been set by NMED as a level protective of ground water at the Sparton site. Further evaluation of this cleanup goal will be performed to determine if attainment of a lower concentration is necessary to achieve the cleanup goals for the ground water.

C. Treatment and Disposal of Contaminants

Contaminated ground water brought to the surface by the ground water extraction system will require treatment prior to disposal. Treatment of the contaminated ground water will continue to be performed within the property boundary of the Coors Road facility. The existing treatment system at the Coors Road facility utilizes an air stripper to remove organic compounds, such as trichloroethylene, from the water. Since this system has been successful in removing the organic compounds, treatment of the contaminated ground water will continue to utilize an air stripper. However, since the expected volume of ground water from the new extraction system will exceed the capacity of the

existing air stripper, a new or expanded air stripper will be required to handle the increased volume of water.

Since a goal of this remedial action is to remove contaminants from the ground water, not merely transfer them to another media such as air, emissions from the air stripper will require further treatment. Utilization of a carbon adsorption system will remove organic vapors prior to release into the atmosphere. This will ensure that nearby residents and businesses are not affected by this remedial action, and ensure compliance with existing air quality standards. A carbon adsorption system will also be used to remove organic vapors from the soil vapor extraction system to ensure that there is no transfer of contaminants to the air above air quality standards.

Since the air stripper does not remove metals from the water, additional treatment may be necessary to remove metals, such as chromium, prior to disposal of the treated ground water. Since the concentration of metals in the ground water is variable throughout the contaminant plume, further study will be required to determine to what extent these technologies may be necessary. The sequence of technologies used for the ground water treatment train will be determined during the remedial design. The treatment train shall be designed to:

- Attain the chemical-specific discharge requirements; and
- Be easily modified to treat increased flow from an expanded extraction system.

The current method for disposal of the treated ground water is through the City of Albuquerque wastewater treatment system. This is currently accomplished by utilizing the sanitary sewer connections at the Coors Road facility. However, due to the increased pumpage of ground water from the aquifer after implementation of the remedy, this method of disposal is no longer practicable, and would not be permitted by the City of Albuquerque. As a result, other means for disposal of the ground water will have to be evaluated during the design phase of the ground water extraction system. The two options under consideration for the treated ground water will be reinjection back into the aquifer, or reuse at the surface.

Reinjection will require the installation of injection wells to pump the treated ground water back into the aquifer at a total rate equal to the total pumpage from the ground water extraction wells. The number of injection wells needed to accomplish this goal will likely exceed the total number of extractions wells. The number of wells necessary to accomplish this goal would be determined during the design phase of the remedy. The placement of the injection wells can be either on-site at the Coors Road facility or at some off-site location. If the injection wells

are located on-site, then additional cost savings can be achieved by reducing the distance required for additional piping to transmit the water. However, if the wells are located off-site, then a potential benefit is for further containment of the contaminant plume by reversing the flow of ground water near the leading edge of the contaminant plume. This method is currently being employed at the South Valley Superfund site in Albuquerque. Off-site placement of the injection wells would be limited to existing public right-of-ways to minimize the impact to the existing or planned neighborhoods.

For the second option for disposal of the treated ground water, surficial reuse, no potential users have been identified which can receive and utilize the volume of ground water from the expected ground water extraction system. This option will be further explored during the design phase to determine if a suitable use of the treated ground water can be found, and which would present a cost-savings over reinjection of the water. If no such receiver for the water can be identified, then reinjection would proceed as the method for disposal of the water. However, this does not preclude discontinuing the use of injection wells if such a receiver is identified in the future. Both of these options are consistent with the water management plan presented in the Albuquerque Water Resources Management Strategy - San Juan-Chama Diversion Project Options (July 1995) and the Albuquerque/ Bernalillo County Ground Water Protection Policy and Action Plan (1994).